Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
English (Compulsory)
GOLDEN PETAL

Day & Date: Thursday, 07-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
                         2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing the correct alternatives.   08

1) She liked _____ books you gave her.
   a) A   b) An
   c) The   d) no article

2) Charlie Chaplin's first film was titled as _____.
   a) The Little Tramp   b) Making a Living
   c) The Kid Auto Races   d) The Tramp

3) Nachiketa's father chose only the _____ cows to give away.
   a) Young   b) Old
   c) Expensive   d) Beautiful

4) As a matter of compensation _____ of Shanti Tigga was offered job with the police.
   a) Son   b) Daughter
   c) Broker   d) Sister

5) How are the 'Strains of triumph' described?
   a) Distant   b) Near
   c) Loud   d) Soft

6) This is the pilot <u>who</u> saved Japan in the II world war. The underlined word is _____ pronoun.
   a) Distributive   b) Reflexive
   c) Relative   d) Demonstrative

7) Sir Thomas Wyatt was born in _____.
   a) 1501   b) 1502
   c) 1503   d) 1504

8) Not one of all the _____ Host.
   a) Red   b) Yellow
   c) Purple   d) Blue

Q.2   Answer the following questions briefly. (Any Four)   12

1) How did the New York writer describe Charlie in his review after release of the first film?
2) Which wing of army did Shanti Tigga join? At what age?
3) What is the structure of the poem 'I Find No Peace'?
4) What made Nachiketa feel troubled?
5) What was the reaction of adivasi groups on Shanti Tigga's death?
6) What was Nachiketa's third boon? What was the reaction of Yama to Nachiketa's request?

Q.3 **Answer the following questions. (Any One)** **10**

    1)   What are the points that you need to keep in mind when you are encoding a message?

<div align="center">

OR

</div>

    2)   Write a message to the principal of your college, explaining to him why you are unable to pay all the fee in one installment. Use proper vocabulary, language and specify the medium.

Q.4 'Discuss the three 'M' approaches to make effective communication. **10**

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Paper – I)
BASIC CIRCUIT THEORY AND NETWORK ANALYSIS

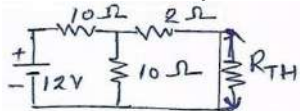Day & Date: Tuesday, 19-11-2019 Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Select the correct alternatives from the following rewrite the sentence. 08

1) The venin's equivalent resistance R_{TH} is _____ for shown circuit.

   a) 10Ω b) 02Ω
   c) 07Ω d) 12Ω

2) In series resonance circuit at resonance the impedance is _____.
   a) equal to current b) equal to voltage
   c) maximum d) minimum

3) Fuses are used to protect the device from _____.
   a) Excessive voltage b) Excessive current
   c) Excessive temperature d) both a and b

4) The Norton current is the _____.
   a) short circuit current
   b) open circuit current
   c) open and short circuit current
   d) neither open nor short circuit current

5) A RLC circuit is said to be capacitive if _____.
   a) $V_L = V_C$ b) $V_L > V_C$
   c) $V_L < V_C$ d) $V_L \geq V_C$

6) A sinusoidal voltage has a peak value of 10 volts. Its rms value is _____ volts.
   a) 10 b) 7.07
   c) 6.37 d) 20

7) Solar cell is an example of _____.
   a) dc voltage source b) ac voltage source
   c) Inverter d) signal generator

8) The T network is also called as _____ network.
   a) Active b) Delta
   c) Star d) Close

Q.2 Answer the following questions. (Any Four)   **08**
   1)   What is Thevenin's voltage V_{TH}?
   2)   Draw the symbol of
        i) Variable resistance   ii) Electrolytic capacitor
        iii) Iron core inductor   iv) Step down transformer
   3)   Calculate quality factor of series resonance circuit has resonating
        frequency of $100KHz$ and has bandwidth of $25KHz$.

   4)   Draw the equivalent diagram for practical voltage source with external load
        R_L.
   5)   The ac mains supply for domestic purpose is 230V, 50 Hz. Calculate the
        peak voltage and time period.
   6)   Define the hybrid parameter h_{11}. State its formula.

Q.3 Answer the following questions. (Any Two)   **08**
   1)   Explain specifications and applications of resistor.
   2)   An oscilloscope shows 5 cycle of a sine wave occurring in 10 m sec. What
        is the frequency and time period of the sine wave?
   3)   Convert following network.
           a) Π to T Network

        b)
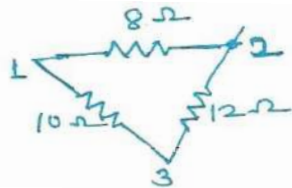
Q.4 Answer the following questions. (Any Two)   **08**
   1)   Describe Norton's theorem. Write necessary steps to solve the linear
        network using Norton's theorem.
   2)   Explain the behavior of series LCR circuit as inductive.
   3)   Explain and Prove the Maximum power transfer theorem.

Q.5 Answer the following questions. (Any One)   **08**
   1)   Explain phase relationship between voltage and current in pure inductor.
   2)   Derive the h parameters of the two networks.

Seat No.

Set **P**

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
BOTANY (Paper – V)
ANATOMY AND TAXONOMY OF ANGIOSPERMS

Day & Date: Friday, 25-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                  2) Figures to the right indicate full marks.
                  3) Draw neat and labelled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) Sunken stomata are seen in _____.
   a) Hydrophytes   b) Xerophytes
   c) Mesophytes   d) Epiphytes

2) Hydathodes are also called _____.
   a) Oil glands   b) Resin duct
   c) Water glands   d) Digestive glands

3) Histogen theory was proposed by _____.
   a) Hanstein   b) Nageli
   c) Schmidt   d) Hofmiester

4) Based on position in plant body Meristem are of _____type.
   a) 2   b) 3
   c) 4   d) 5

5) Vessels are components of _____.
   a) Xylem   b) Phloem
   c) Cambium   d) Cortex

6) Aerenchyma is a tissue having air spaces in _____tissue.
   a) Collenchyma   b) Sclerenchyma
   c) Parenchyma   d) None of these

7) Cyathium inflorescence is a _____ type of inflorescence.
   a) Racemose   b) Cymose
   c) Special   d) None of these

8) In hypogynous flowers the ovary is _____.
   a) Superior   b) Inferior
   c) Half inferior   d) Half superior

9) In *Annona squamosa* the type of fruit is _____.
   a) Etaerio of Achene   b) Etaerio of berries
   c) Etaerio of drupe   d) Etaerio of follicles

10) _____wood is more durable.
    a) Heart   b) Sap
    c) Primary   d) Secondary

11) Tylosis is plugging of tracheids by neighbouring _____cells.
    a) Parenchyma   b) Sclerenchyma
    c) Collenchyma   d) Arenchyma

12) Pollinia are found in _____family.
   a) Combretaceae   b) Asclepiadaceae
   c) Amaranthaceae   d) Liliaceae

13) Radical leaves are seen is _____family.
   a) Combretaceae   b) Asclepiadaceae
   c) Amaranthaceae   d) Liliaceae

14) *Achyranthus aspera* is a example of _____family.
   a) Combretaceae   b) Asclepiadaceae
   c) Amaranthaceae   d) Liliaceae

Q.2 **A)** **Answer the following questions. (Any Four)**   **08**
   1) What is meristem?
   2) What are hydathodes?
   3) Sketch and label periderm.
   4) Define annual ring.
   5) Give economic important of family combretaceae.

B) **Write Notes on. (Any Two)**   **06**
   1) Difference between porous and non porous wood
   2) Placentation and its types
   3) Add a note on syngeny

Q.3 **A)** **Answer the following questions. (Any Two)**   **08**
   1) Describe any two secretary tissues.
   2) Describe any two Racemose types of inflorescence.
   3) Give classification of meristem based on their position.

B) **Answer the following questions. (Any One)**   **06**
   1) Describe any three simple fleshy fruits studied by you.
   2) What is aestivation? Describe any two types of aestivation.

Q.4 **A)** **Answer the following questions. (Any Two)**   **10**
   1) Describe the elements of xylem.
   2) Describe types of wood studied by you.
   3) Describe cymose types of inflorescence.

B) **Answer the following questions. (Any One)**   **04**
   1) What is lenticels? Describe structure of lenticels.
   2) What is stomata? Write note on sunken stomata.

Q.5 **Answer the following questions. (Any Two)**   **14**
   a) Give classification, distinguishing characters and economic importance of family Liliaceae.
   b) Describe normal secondary growth in dicot stem.
   c) Give distinguishing characters and economic importance of family Amaranthaceae.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
BOTANY (Paper – VI)
PLANT ECOLOGY

Day & Date: Saturday , 02-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Light is an important _____ factor.
   - a) Edaphic
   - b) Biotic
   - c) Climatic
   - d) Physiographic

2) The study of soil science is called _____.
   - a) Ecology
   - b) Pedology
   - c) Phycology
   - d) None of the above

3) Energy flow is always _____.
   - a) Unidirectional
   - b) Multidirectional
   - c) Circular motion
   - d) None of these

4) The term ecosystem was first proposed by _____.
   - a) Tansely
   - b) Lindemann
   - c) Misra
   - d) Odum

5) Ecological Pyramids are _____ in nature.
   - a) Quadrangular
   - b) Triangular
   - c) Pentangular
   - d) Hexagonal

6) Ecosystem is sub and _____ unit of communities.
   - a) Functional
   - b) Reciprocal
   - c) Non-functional
   - d) Organizational

7) The plants are called _____ of the Ecosystem.
   - a) Consumers
   - b) Decomposers
   - c) Producers
   - d) Rotifer's

8) Hydrilla is an example of _____ plant.
   - a) Mesophyte
   - b) Xerophytes
   - c) Hydrophytes
   - d) Halophyte

9) Xerophytes shows presence of _____ epidermis.
   - a) Multilayered
   - b) Single layered
   - c) Wax
   - d) Storied

10) _____ is the abiotic component of an ecosystem.
    - a) Light
    - b) Producer
    - c) Consumer
    - d) Decomposer

11) Green house effect is observed mainly because of _____ pollution.
    - a) Soil
    - b) Air
    - c) Water
    - d) none of these

12) The Pyramid of number for grassland and crop ecosystem shows _____ nature.
    - a) Inverted
    - b) Upright
    - c) Rectangular
    - d) Quadrangular

13) _____ is the last stage of hydrosere.
    a) Phytoplankton   b) Rooted swamp
    c) Floating   d) Forest

14) Rainkiaer (1934) recognized _____ frequency classes depending upon the frequency values.
    a) four   b) five
    c) six   d) seven

Q.2 A) Answer any four of the following questions.   **08**
    1) Define Population Density.
    2) Describe useful effects of wind.
    3) Enlist Biotic components of grassland ecosystem.
    4) Define pollutants.
    5) State the kinds of succession.

B) Write Notes on (Any Two)   **06**
    1) Importance of edaphic factor
    2) Food web
    3) Mesophytes

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Describe the structure of pond ecosystem.
    2) Write in brief steps of succession.
    3) Give the important morphological characters of xerophytes.

B) Answer the following questions. (Any One)   **06**
    1) Define pollution. Give various sources of air pollution.
    2) Describe the various successional stages of hydrophytes.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Describe in brief Nitrogen cycle.
    2) Describe the structure of community.
    3) Explain in brief important internal adaptations of Mesophytes with examples.

B) Answer the following questions. (Any One)   **04**
    1) Describe light as climatic factor.
    2) Describe the pyramid of biomass.

Q.5 Answer the following questions. (Any Two)   **14**
    a) What is food chain? Describe different food chains with examples.
    b) Describe sources of water pollutants and control measures of water pollution.
    c) Write in brief quantitative characters of communities.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Psychology (Paper – V)
EXPERIMENTAL PSYCHOLOGY

Day & Date: Monday, 04-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                     2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing the correct alternatives given below.   14

1) _____ published the book "Elements of Psychophysics"?
    a) Helmholtz   b) Fechner
    c) Galton   d) Wundt

2) Ernest Weber was an _____.
    a) Anatomist   b) Actor
    c) Thinker   d) Anchor

3) _____ published Handbook of "Physiological Optics".
    a) Freud   b) Fechner
    c) Helmholtz   d) Wundt

4) _____ was the First American who published a dissertation "Psychometric Investigation".
    a) Ebbinghaus   b) Cattel
    c) Watson   d) Wundt

5) _____ was the First Psychologists to experimentally investigate higher mental process.
    a) Thorndike   b) Pavlov
    c) Ebbinghaus   d) Watson

6) Psychology is the science of _____.
    a) Happiness   b) Behavior
    c) Life   d) None of These

7) _____ often considered the father of Experimental Psychology.
    a) Wilhelm Wundt   b) Sigmund Freud
    c) Francis Galton   d) None of These

8) The first Psychological Laboratory was established in _____.
    a) Nevada   b) Las Vegas
    c) Leipzig   d) California

9) _____ was the First founder of the school of behaviorism.
    a) Pavlov   b) Thorndike
    c) Watson   d) Ebbinghaus

10) _____ works with animal led to the famous "Trial & Error Methods of Learning".
    a) Ebbinghaus   b) Cattel
    c) Watson   d) Thorndike

11) The method of minimal changes or sometimes referred to as serial exploration is called _____.
   a) Method of Average Error
   b) Method of Limit
   c) Method of Constant limit
   d) None of These

12) Fechner's law concerned solely with the _____.
   a) Physical continuum
   b) Psychological Continuum
   c) Geological Continuum
   d) None of these

13) The sense organs receive stimuli of various types and convert them into _____.
   a) Experience
   b) Meaning
   c) Steps
   d) None of These

14) The Experimental method is an _____ observation.
   a) Uncontrolled
   b) Controlled
   c) Mis-Match
   d) None of These

Q.2 Answer the following questions (Any Seven)   **14**
1) Define Attention
2) On which factor sensation made direct approach?
3) Who identified cognitive style "Rods & Frame"?
4) When Tachistoscope is used?
5) What is mean by "Controlling Behavior"?
6) What is Motivation & Perception?
7) Define Stimulus.
8) What is Perception & Personality?
9) Define Sensation.

Q.3 A) Answer the following questions (Any two)   **10**
   1) What is the application of Experimental Psychology in the field of Education?
   2) Explain the Experimental Method.
   3) Explain the Laws of Perception.

   B) Explain the Nature of Experimental Psychology.   **04**

Q.4 A) Answer the following questions (Any Two)   **08**
   1) Explain Perception Adaption.
   2) Explain the Fechner's Law.
   3) Brief Explanation of Visual Illusion.

   B) Goals of Experimental Psychology   **06**

Q.5 Answer the following questions (Any Two)   **14**
   a) Method of Constant stimuli.
   b) Which Factors Affecting Perception?
   c) Goals of Experimental Psychology.

Seat No.	

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Geology (Paper - V)
OPTICS AND MINERALOGY

Day & Date: Monday, 04-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　 2) Figures to the right indicate full marks.
　　　　　　　 3) Draw neat labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**　　**14**

1) Asbestos is a fibrous variety of _____.
   a) tremolite　　　　　　　　　b) actinolite
   c) chlorite　　　　　　　　　　d) serpentine

2) Nephelene is a member os _____ Group.
   a) felspathoid　　　　　　　　b) Feldspar
   c) chlorite　　　　　　　　　　d) amphibole

3) Which of the following mineral shows twinkling property?
   a) calcite　　　　　　　　　　b) corundum
   c) phologopite　　　　　　　　d) amethyst

4) Beryl is the best example of _____ silicates.
   a) Tecto　　　　　　　　　　　b) Ino
   c) Cyclo　　　　　　　　　　　d) Neso

5) The refractive index of Canada balsm is _____.
   a) 1.658　　　　　　　　　　　b) 1.537
   c) 1.516　　　　　　　　　　　d) 1.666

6) Leucite is _____ mineral.
   a) anisotropic　　　　　　　　b) pleochroic
   c) isotropic　　　　　　　　　d) none of these

7) Clay minerals mainly occur in _____ rocks.
   a) metamorphic　　　　　　　b) Igneous
   c) sedimentary　　　　　　　d) none of these

8) Kyanite, Sillimanite and Andalusite are _____.
   a) Pseudo-morphs　　　　　　b) Poly-morphs
   c) Iso-morphs　　　　　　　　d) None of these

9) Mineral hypersthene occurs in _____.
   a) Schrol　　　　　　　　　　b) Gneiss
   c) Hornfels　　　　　　　　　d) Charnokite

10) Jadite mineral belongs to _____ group.
    a) mica　　　　　　　　　　　b) carbonate
    c) pyroxene　　　　　　　　　d) amphibole

11) Lower nicol prism is called as _____.
    a) polarizer　　　　　　　　　b) analyzer
    c) condenser　　　　　　　　d) pillar

12) Which of the following mineral shows parallel extinction?
   a) calcite
   b) forsterite
   c) hornblende
   d) augite

13) Encrustation and replacement processes are involved in _____.
   a) poly-metamorphism
   b) pseudo-metamorphism
   c) pleochroism
   d) isomorphism

14) Composition of dolomite is _____.
   a) $CaCO_3$ and $MgCO$
   b) $MgCO_3$
   c) $CaCO_3$
   d) none of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is polarized light?
   2) Give the optical properties of Microcline.
   3) Give four names of members of Plagioclase isomorphous series.
   4) Give optical properties of Hornblende.
   5) Describe Garnet under microscope.

B) Write Notes on. (Any Two)   **06**
   1) Neso-silicates
   2) Clay group minerals
   3) Physical properties and chemical composition of Aluminium silicates.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe Phylo-silicate structure.
   2) Define Pleochroism. Explain scheme of Pleochroism.
   3) What is relief in minerals? Explain their types.

B) Answer the following questions. (Any One)   **06**
   1) Distinguish between ordinary and petrological microscope.
   2) Describe single and double chain ino-silicate structures.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Write a note on Olivine group.
   2) Describe lower assembly of petrological microscope.
   3) Explain Soro-silicate structure.

B) Answer the following questions. (Any One)   **04**
   1) Describe polymorphism.
   2) Draw neat-labeled diagram of petrological microscope.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe in detail physical, chemical and optical properties of Mica group minerals with their occurrence.
   b) Describe in detail physical, chemical and optical properties of Silica group minerals with their occurrence.
   c) Define Twinning. Describe different types of twinning.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper - V)
CYTOLOGY AND PHYSIOLOGY OF MICROORGANISMS

Day & Date: Monday, 04-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                          2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) _____organelle helps in chromosomal transfer by conjugation process.
    a) Sexpili   b) Flagella
    c) Cell wall   d) Cell membrane

2) In T4 bacteriophage _____consists of contractile sheath surrounding an inner core.
    a) head   b) Tail
    c) tail fibers   d) base plate

3) _____ acts as a surface antigen of Gram positive bacteria.
    a) Protein   b) Teichoic acid
    c) O side chain   d) R core region

4) Plasmolysis takes place when cell are growing in _____solution.
    a) hypotonic   b) isotonic
    c) hypertonic   d) water

5) Pili originate from _____.
    a) cytoplasm   b) cell wall
    c) cell membrane   d) outer membrane

6) Basal body of flagellum of Gram negative organism has _____rings.
    a) 4   b) 2
    c) 3   d) 5

7) _____ discovered structure of TMV.
    a) Stanley   b) Ivanowski
    c) Pasteur   d) Crick

8) HeLa cell line is used for cultivation of _____.
    a) Bacteria   b) Actinomycetes
    c) Viruses   d) Fungi

9) Heterolactic lactic acid bacteria produce _____.
    a) Co_2 and ethanol   b) Co_2 and methanol
    c) Co_2 and propanol   d) Co_2 and butanol

10) Pyrimidine dimer is formed by the action of _____.
    a) U. V. Rays   b) High temperature
    c) Osmotic pressure   d) Hydrostatic pressure

11) _____ enzyme present in carboxysome plays important role in Co_2 fixation
    a) ribose 5 phosphate carboxylase
    b) ribulose $5Po_4$ carboxylase
    c) ribulose 1-5 phosphate carboxylase
    d) Ribose $1-5\ Po_4$ carboxylase

12) _____ enzyme plays important role in ED pathway of catabolism of glucose.
   a) glucose $6\ PO_4$ oxidase   b) phosphofructokinase
   c) aldolase   d) Glucose $6\ PO_4$ dehydrogenase

13) Murein mucopeptide is also called as _____.
   a) Peptidoglycan   b) Lipopolysaccharide
   c) Teichoic acid   d) Lipoprotein

14) Metachromatic granules are predominant in _____.
   a) *E - coli*   b) *Enterobacter*
   c) Lactobacillus   d) Pseudomonas

Q.2 A) Answer the following questions. (Any Four)   08
   1) Explain chlorobium vesicles.
   2) Define borophiles.
   3) List examples of sporulating bacteria.
   4) Define magnetosomes.
   5) Define growth.

B) Write Notes on. (Any Two)   06
   1) Structure of TMV
   2) Thermal death time & thermal death point.
   3) Explain simple diffusion.

Q.3 A) Answer the following questions. (Any Two)   08
   1) Describe structure of flagella.
   2) Explain fluid mosaic model.
   3) Germination of spore.

B) Answer the following questions. (Any One)   06
   1) Effect of osmotic pressure on growth of bacteria.
   2) Cyclic photophosphorylation.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Describe process of sporulation.
   2) Describe cultivation of viruses.
   3) Explain synchronous growth.

B) Answer the following questions. (Any One)   04
   1) Explain structure & functions of pili.
   2) Describe effect of p^H on growth of bacteria.

Q.5 Answer the following questions. (Any Two)   14
   a) Describe various methods of measurement of growth.
   b) Components of electron transport-chain.
   c) Explain active transport.

Seat No.	

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Psychology (Paper – VI)
SOCIAL PSYCHOLOGY

Day & Date: Tuesday, 05-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The _____ component of prejudice is related to social cognition.
   - a) behavioural
   - b) affective
   - c) cognitive
   - d) learning

2) Miller opposed the concept of group _____.
   - a) testing
   - b) minds
   - c) social
   - d) cognitive

3) There are eight key areas in _____ psychology.
   - a) abnormal
   - b) cognitive
   - c) social
   - d) experimental

4) Boqardus developed _____ Distance Scale.
   - a) Social
   - b) Educational
   - c) Emotional
   - d) Psychological

5) _____ psychologist proposed three models of urban life.
   - a) Social
   - b) city
   - c) villages
   - d) town

6) Sexism is discrimination based on _____.
   - a) personality
   - b) gender
   - c) cognition
   - d) emotion

7) _____ as a mental and neural state of redness, organizes through experience.
   - a) Learning
   - b) Explanation
   - c) Attitude
   - d) Prediction

8) _____ have devoted more attention to behavioural expression.
   - a) Sociologist
   - b) Psychologist
   - c) Psychiatric
   - d) Social worker

9) Prejudice refers to a negative attitude towards _____.
   - a) anxiety
   - b) people
   - c) stress
   - d) stereotypes

10) _____ Identity Theory developed by Tajfels.
   - a) Emotional
   - b) Educational
   - c) Social
   - d) Marital

11) Attitude developed exclusively through the _____ process.
   - a) learning
   - b) reading
   - c) observation
   - d) interaction

12) _____ proposed the balance theory.
a) Festinger
b) Fritz
c) Tajfels
d) Maslow

13) _____ is the study of human activities.
a) Psychology
b) Sociology
c) Economics
d) Social works

14) _____ is the world's largest democracy.
a) India
b) China
c) Japan
d) America

Q.2 Answer the following. (Any Seven) 14
1) Who published "An Introduction to Social Psychology" Book?
2) Explain the Discrimination.
3) Define social psychology.
4) Define Attitude.
5) What is "EMG"?
6) Explain the Xenophobia.
7) Explain the Racism.
8) Who develop Balance theory?
9) Explain the Balance theory.

Q.3 A) Short notes. (Any Two) 10
1) Nature of attitude
2) Nature of Prejudice
3) The Emotional components

B) Discuss on Rating Scales 04

Q.4 A) Answer the following. (Any Two) 08
1) Explain the Attitude Formation.
2) Explain the Cognitive components of prejudice.
3) Explain the functions of attitudes.

B) Explain the personal determents of prosocial behavior. 06

Q.5 Answer the following. (Any Two) 14
a) Discuss on the Identify the factors influencing conformity.
b) Describe the relationship of social psychology and other social sciences.
c) Discuss on the application of social psychology.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Geology (Paper – VI)
STRUCTURAL GEOLOGY

Day & Date: Tuesday, 05-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
          2) Figures to the right indicate full marks.
          3) Draw neat diagrams wherever needed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) The joints which are oriented parallel to the bedding plane in sedimentary rocks, are called the _____ joints.
   a) Bedding   b) Master
   c) mural   d) Sheet

2) The rock beds on opposite side of a _____ are parallel.
   a) non-conformity   b) disconformity
   c) angular unconformity   d) none of these

3) A fault which runs oblique to the strike and dip direction of strata is called the _____.
   a) oblique   b) tear
   c) wrench   d) bedding

4) In _____ fault the hanging wall moved upward relative to foot wall.
   a) strike   b) normal
   c) reverse   d) parallel

5) Columnar Joints divide the rock masses into _____ columns.
   a) Tetragonal   b) Pentagonal
   c) Hexagonal   d) All of these

6) Major breaks in sedimentation are called _____.
   a) Fold   b) unconformity
   c) conformity   d) fault

7) A _____ fold is an upright fold in which both the limbs are overturned.
   a) fan   b) chevron
   c) homocline   d) monocline

8) In _____ fold, the folding is mild and limbs make an obtuse angle.
   a) close   b) open
   c) dome   d) basin

9) Folds that have parallel limbs are called _____ fold.
   a) open   b) close
   c) isoclinal   d) symmetrical

10) The trend of rock bed on the ground surface is called _____.
   a) strike   b) apparent dip
   c) true dip   d) none of these

11) Folds in Himalava found because of _____ plate movement.
   a) divergent   b) convergent
   c) transform   d) none of these

12) _____ activity is localized around plateboundary.
   a) seismicity
   b) volcanicity
   c) tectonic
   d) all of these

13) Laurasia was the _____ landmass.
   a) northern
   b) southern
   c) eastern
   d) western

14) Divergent plate boundaries are also called the _____ zone.
   a) constructive
   b) destructive
   c) conservative
   d) none of these

Q.2 A) Answer the following. (Any Four)   **08**
   1) What is dip?
   2) What is lineation?
   3) What is foliation?
   4) Name the seven large tectonic plate.
   5) What is crest of fold?

B) Write short notes. (Any Two)   **06**
   1) Chevron folds
   2) Horst
   3) Columnar joint

Q.3 A) Answer the following. (Any Two)   **08**
   1) Explain normal and reverse fault.
   2) Explain symmetrical and asymmetrical fold.
   3) Explain terminology of fault.

B) Answer the following. (Any One)   **06**
   1) What is outcrop? Describe width of outcrop.
   2) Describe the recognition of fault in the field.

Q.4 A) Answer the following. (Any Two)   **10**
   1) Explain terminology of fold.
   2) Explain movement of tectonic plate.
   3) Explain recognition of fold in the field.

B) Answer the following. (Any One)   **04**
   1) Describe recumbent and overturned types of fold.
   2) Describe the recognition of unconformity in the field.

Q.5 Answer the following. (Any Two)   **14**
   a) Explain effects of faults on outcrop.
   b) Explain types of unconformity.
   c) Explain genetic classification of joints.

Seat
No.

Set **P**

B.Sc.(Semester - III) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper - VI)
BACTERIAL GENETICS

Day & Date: Tuesday, 05-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Draw neat labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Process of genetic information flowing form DNA to RNA is called _____.
   a) Gene annealing   b) Translation
   c) Gene expression   d) Transcription

2) _____ type of mutain involves replacement of a purine by purine.
   a) Transversion   b) Translocation
   c) Transition   d) Delection

3) A. T-T dimer formed by U. V. radiation is cut by _____ enzyme.
   a) Polymerase   b) Ligase
   c) Endonuclease   d) Exonuclease.

4) Anticodon describes triplets bases on _____.
   a) tRNA   b) rRNA
   c) mRNA   d) DNA

5) DNA replication by semiconservative mode in E.coli was experimentally proved by _____.
   a) Meselson and Stahl   b) Delbruck & Delbruck
   c) Zinder & Lederberg   d) Watson & Crick

6) Direct contact between the bacteria is seen in _____ type of gene transfer.
   a) Transduction   b) Conjugation
   c) Translation   d) Transfection

7) The enzyme required for synthesis of DNA from RNA template is_____.
   a) RNA polymerase   b) DNA polymerase
   c) Reverse Transcriptase   d) Transferase

8) The DNA backbone is made up of deoxyribose sugar and _____group.
   a) Hydroxyl   b) Amino
   c) Methyl   d) Phosphate

9) If a particular short mRNA sequence is UAAGAUU, the corresponding DNA sequence will be _____.
   a) UUCUAAG   b) GUCUAAG
   c) GTCUAAG   d) ATTCTAA

10) When mutation in codon may not produce any change in translation then it is called _____ mutation.
   a) Nonsense   b) Missense
   c) Silent   d) Point

11) An exposure to U. V. radiated culture to visible light results in _____.
   a) Induction   b) Photo reactivation
   c) Photolysis   d) Transduction

12) In prokaryotes initiation codon always codes for _____.
   a) N-formyl methionine   b) Methionine
   c) Cytosine   d) Glutamate

13) The genetic code is _____ in nature.
   a) Siglet   b) Doublet
   c) Triplet   d) Quadraplet

14) Specialized transduction is mediated by _____ phage.
   a) P_{22} b) (λ) lambda
   c) P_2 d) (μ) mue.

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Define plasmids.
2) What is muton?
3) Define phenotypes.
4) What is Hfr culture?
5) Define spontaneous mutation.

B) Write Notes on (Any Two)   **06**
1) Alternative forms of DNA
2) Describe in brief Transcription process
3) Describe Hershey and chase experiment

Q.3 A) Answer the following questions.(Any two)   **08**
1) Give account on DNA damage and repair.
2) Describe evidences for DNA as genetic material.
3) What is exogenote? Give the fates of exogenote.

B) Answer the following questions.(Any One)   **06**
1) Describe the chemical nature of DNA.
2) Explain in detail properties of Genetic code.

Q.4 A) Answer the following questions.(Any Two)   **10**
1) Describe in brief properties, types and applications of plasmids.
2) Describe in brief Nonsense and Missense mutations.
3) Describe briefly replica plate technique and give its significance in genetics.

B) A Answer the following questions.(Any One)   **04**
1) Briefly explain the process of conjugation.
2) Describe the process Dark repair mechanism.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Write an essay on "Bacterial Transduction".
   b) Explain in detail Induced mutations with suitable examples.
   c) Describe in detail fluctuation test and give its significance.

Seat No.

B.Sc.(Semester - IV) (CBCS) Examination Oct/Nov-2019
Chemistry (Paper - VII)
PHYSICAL CHEMISTRY

Day & Date: Saturday, 19-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
          2) Figures to the right indicate full marks.
          3) Neat and labeled diagrams must be drawn wherever necessary.
          4) Use of Logarithmic table and calculator is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   The equivalent conductance of the solution _____ with increasing dilution.
     a)   remains the same   b)   decreases
     c)   increases   d)   none of these

2)   The sum of transport number of cation and anion is _____.
     a)   1   b)   0
     c)   0.1   d)   0.5

3)   SI unit of equivalent conductance is _____.
     a) $S\ cm^{-2}eq^{-1}$ b) $S\ cm^{2}eq^{-1}$
     c) $mhos\ cm^{-1}$ d) $ohm^{-1}cm^{-1}$

4)   In case of a uni-univalent electrolyte the values of equivalent conductance and molecular conductance are _____.
     a)   unequal   b)   equal
     c)   remain same   d)   none of these

5)   Transport no. of the ion _____ with increase in concentration.
     a)   remains the same   b)   Decreases
     c)   Increases   d)   none of these

6)   Kohlrausch's law can be represented as _____.
     a) $\lambda_0 = \lambda_0{}^+ + \lambda_0{}^-$ b) $\lambda_0 = \lambda_0{}^+ - \lambda_0{}^-$
     c) $\lambda_0 = \lambda^0{}_+ - \lambda^0{}_-$ d) $\lambda_0{}^+/\lambda_0{}^-$

7)   An increase in the randomness suggest that the reaction is _____.
     a)   spontaneous   b)   endothermic
     c)   non-spontaneous   d)   reversible

8)   Unit of entropy is _____.
     a) $kJmol$ b) $JK^{-1}mol$
     c) $JK^{-1}mol^{-1}$ d) $kJmol^{-1}$

9)   Entropy of a perfect crystalline solid at absolute zero is _____.
     a)   one   b)   zero
     c)   infinite   d)   not measurable

10) The total no. of atoms in bcc unit cell is _____.
     a)   1   b)   3
     c)   4   d)   2

11) The unit cell of NaCl lattice is _____.
    a) fcc   b) bcc
    c) simple cubic   d) hcp

12) The _____ extraction is more efficient.
    a) double   b) single
    c) multiple   d) none of these

13) The efficiency of extraction process depends upon _____.
    a) distribution ratio   b) no. of extraction
    c) both a) and b)   d) none of these

14) In fusion of solid entropy will be _____.
    a) remains the same   b) decreases
    c) Increases   d) none of these

Q.2 A) Answer the following questions. (Any four)   **08**
1) Define specific conductance. Give its unit?
2) The ionic mobility of H^+ ion at 300k is 0.00370 cm/sec. Calculate the ionic conductance of H^+ ion at infinite dilution.
3) Explain how entropy is thermodynamically state function.
4) State the law of rational indices.
5) Give the limitations of partition law.

B) Write notes. (Any Two)   **06**
1) Entropy change in physical transformations.
2) Law of crystal symmetry.
3) Relation between specific and equivalent conductance.

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Explain in brief the application of distribution of law in:
    i) Determination of solubility
    ii) Determination of molecular weight
2) How the structure of the crystal sodium chloride determined by the application of X- rays?
3) Derive an expression for entropy change in an isothermal reversible process.

B) Answer the following questions. (Any one)   **06**
1) Define entropy? Derive an expression for entropy change of an ideal gas at constant volume and constant temperature.
2) Explain the term: Equivalent conductance at infinite dilution. How will you obtain the equivalent conductance at infinite dilution of strong electrolyte?

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain application of Kohlrausch's law for the determination of equivalent conductance at infinite dilution of weak electrolyte and ionic product of water.
2) Describe moving boundary method for determination of transport number.
3) Explain how the distribution law is modified when the solute undergoes association in one of the solvent.

B) Answer the following questions. (Any one)   **04**
1) Find the partition coefficient of the iodine between carbon disulphide and water from the following data of iodine per 10 dm^3 of the solution.

| Iodine in CS_2 layer | 0.68 | 1.87 | 0.075 |
| Iodine in H_2O layer | 0.0020 | 0.0055 | 0.00022 |

2) Calculate the entropy change involved in the isothermal reversible expansion of 4.5 moles of ideal gas from volume of 10 dm^3 to 100 dm^3 at 30^0 c (R= 8.314 J K^{-1} mole^{-1}).

Q.5 Answer the following questions. (Any Two)   **14**

1) Define transport number of ion. Explain factors influencing on transport number.
2) Derive Bragg's equation for interplaner distance of crystal.
3) The specific conductance of 0.05 N acetic acid is 7.7×10^{-4} ohm^{-1} cm^{-1} at 298k. The equivalent conductance at infinite dilution of HCl, CH$_3$COONa, and NaCl at 298k are 420.1, 125.9 and 90.2 ohm^{-1} cm^2 respectively. Calculate the degree of dissociation of acetic acid in 0.05 N solution.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Chemistry (Paper – VIII)
ANALYTICAL & INDUSTRIAL INORGANIC CHEMISTRY

Day & Date: Thursday, 07-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Draw neat and labeled diagrams.
3) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) Phenolphthalein is _____.
   a) Weak acid   b) Strong acid
   c) Weak organic acid   d) Weak inorganic acid

2) The solution of known strength is known as _____.
   a) Normal   b) Standard
   c) Molar   d) Molal

3) Erichrome Black-T is also known as _____.
   a) Solochrome black   b) Molochrome black
   c) Acid base indicator   d) None of these

4) Particle size of crystalline ppt is _____.
   a) 0.1 to 1 micron   b) 0.02 to 0.1 micron
   c) Less than 0.2 micron   d) None of these

5) The insoluble solid which is separated from the mother liquor due to chemical reaction is known as _____.
   a) Precipitate   b) Supersaturated solution
   c) Precipitant   d) All of these

6) Increase in temperature, decrease extent of _____.
   a) Post precipitation   b) Precipitation
   c) Peptization   d) Co-precipitation

7) Contact process was developed by _____.
   a) Phillips   b) Haber
   c) Ostwald   d) Solvay

8) In Haber's process forward reaction is favored by _____.
   a) High pressure   b) Low pressure
   c) Atmospheric pressure   d) Moderate pressure

9) For the removal of CaO from the Ore _____ flux is used.
   a) Neutral   b) Acidic
   c) Basic   d) Phenolic

10) Haematite is ore of _____.
    a) Aluminium   b) Iron
    c) Copper   d) Phenolic

11) In gravity separation method _____ is used.
    a) Blast furnace   b) Reveberatory furnace
    c) Wilfley table   d) Sintered furnace

12) The process of heating steel to bright redness and then cooling suddenly by plunging in oil or water is known as _____.
a) Annealing
b) Case hardening
c) Tempering
d) Hardening

13) When acidic impurities are removed by using basic lining in Bessemer convertor, the process is known as _____.
a) Basic Bessemer process
b) Acidic Bessemer process
c) Amphoteric Bessemer process
d) None of these

14) Steel contain _____% of carbon.
a) 2.5 to 5.0
b) 0.1 to 1.5
c) < 0.1
d) > 1.5

Q.2 A) Answer the following questions. (Any Four) 08
1) Define the terms.
   a) End point
   b) Equivalence point
2) Explain the effect of temperature on the oxidation of SO_2 to SO_3.
3) Define the terms.
   a) Ore
   b) Gangue
4) What is heat treatment on steel? Explain the process of annealing.
5) What are the advantages of L.D. process?

B) Answer the following questions. (Any Two) 06
1) Write a note on complexometric titrations.
2) What are the characteristics of good precipitates?
3) Distinguish between Bessemer and L.D. Process.

Q.3 A) Answer the following questions. (Any Two) 08
1) What are organic precipitants? Discuss the role of organic precipitants in gravimetric analysis.
2) Draw a neat labeled diagram of manufacturing plant for sulphuric acid by contact process.
3) Discuss different types of ores.

B) Answer the following questions. (Any One) 06
1) Discuss electro refining of copper.
2) Explain different types of steel.

Q.4 A) Answer the following questions. (Any Two) 10
1) Explain the choice an indicator for titration between strong acid and weak base with the help of neutralization curve.
2) Explain the phenomenon of co-precipitation.
3) Explain the conversion of cast iron in to steel by Bessemer process.

B) Answer the following questions. (Any One) 04
1) What is metal ion indicator? Discuss the role of Erichorme Black-T as an indicator in EDTA titration.
2) Write a note on magnetic separation method.

Q.5 Answer the following questions. (Any two) 14
1) What is gravimetric analysis? Explain the process of precipitation.
2) Discuss the manufacturing process of ammonia by Haber's process.
3) Explain Ostwald's theory of acid base indicators.

Seat No.

B.Sc.(Semester - I) (New) (CBCS) Examination Oct/Nov-2019
ELECTRONICS (Paper - II)
DIGITAL FUNDAMENTALS

Day & Date: Wednesday, 20-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Q.1   Select the correct alternatives from the following and rewrite the sentence.   08

1)   _____ IC is OR gate.
   a)   7400   b)   7402
   c)   7408   d)   7432

2)   1's compliment of 0101 is _____.
   a)   1001   b)   1000
   c)   0101   d)   1010

3)   The output device of the digital computer are_____.
   a)   Printer   b)   CRT (Cathode Ray Tube)
   c)   Projector   d)   All of these

4)   Parity bit is used to _____.
   a)   Indicate magnitude   b)   Indicate direction
   c)   Indicate sign   d)   Check error

5)   According to Boolean law $A + 1 =$_____.
   a)   1   b)   0
   c)   A   d) $\bar{A}$

6)   The output expressions of half-adder are ____.
   a) $sum = A \oplus B$ & $Carry. = A.B$ b) $sum = A + B$ & $Carry = A.B$
   c) $sum = A.B$ & $Carry = A \oplus B$ d) $sum = A.B$ & $Carry = A + B$

7)   In binary addition 1+1 is _____.
   a)   2   b)   10
   c)   1   d)   0

8)   IC 7404 contains _____ INVERTER gates.
   a)   One   b)   Two
   c)   Four   d)   Six

Q.2   Answer the following questions. (Any Four)   08

1)   Draw the 4 – variable k- map.
2)   Convert the $(82)_{10}$ decimal number in its equivalent octal number
3)   Write the truth table of Ex-NOR gate & draw logical symbol.
4)   Draw the block diagram of digital computer.
5)   Convert the following BCD code into decimal no
     1) $(0\ 1\ 0\ 1\ 0\ 1\ 0\ 1)_{BCD}$
     2) $(0\ 0\ 1\ 0\ 1\ 0\ 0\ 1\ 0\ 1\ 0\ 1)_{BCD}$
6)   Convert following Gary code into binary number.
     1) $(1\ 1\ 1\ 0\ 1)$
     2) $(1\ 0\ 0\ 1\ 1)$

Q.3 **Answer the following questions. (Any Two)** **08**
  1) Explain with logic diagram full subtractor circuit.
  2) Explain AND gate and NOT gate using NAND gate.
  3) Write a note on ASCII code.

Q.4 **Answer the following questions. (Any Two)** **08**
  1) Explain Binary to Gray converter with logic diagram.
  2) Solve

  1) $\begin{array}{r} 1\,0\,1_2 \\ +\,0\,1\,0_2 \\ \hline \end{array}$

  2) $\begin{array}{r} 1\,1\,1_2 \\ +\,0\,1\,1_2 \\ \hline \end{array}$

  3) Describe the role of quad in k-map simplification.

Q.5 **Answer the following questions. (Any One)** **08**
  1) Draw the logic diagram of Half – adder, Half Subtractor, Full adder & Full – Subtractor.
  2) Convert the following decimal number in to its equivalent hexadecimal number
  1) $(32)_{10}$ 2) $(64)_{10}$
  3) $(27)_{10}$ 4) $(29)_{10}$

| Seat No. | | **Set** | **P** |

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Physics (Paper – VII)
OPTICS

Day & Date: Friday, 08-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.
                3) Neat diagrams must be drawn wherever necessary.
                4) Use of logarithmic table and calculator is allowed.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) For an optical image forming system, the refractive indices of the initial and final media are water ($n_1 = 1.33$) and air respectively. If the focal length in the image space is +10 cm, the focal length in the object space is _____ cm.
    a) -13.3 cm   b) 13.3 cm
    c) 0.133 cm   d) -0.133 cm

2) The intensity of the fringes in FP interferometer is _____ than in Michelson's interferometer.
    a) equal   b) much smaller
    c) much more   d) more

3) The radius of the central maximum is $d\theta =$ _____.
    a) $1.4\, D/\lambda$ b) $1.22\, \lambda/D$
    c) $1.42\, \lambda/D$ d) $1.22\, D/\lambda$

4) The substances which rotate the place of vibration of polarized light towards the left side are known as _____.
    a) optically active   b) dextro rotatory
    c) laevo rotatory   d) laevo as well as dextro rotatory

5) The basic principle of optical fibres is _____.
    a) refraction   b) dispersion
    c) reflection   d) total internal reflection

6) Principle planes are the cardinal planes of _____.
    a) unit positive lateral magnification
    b) unit positive angular magnification
    c) unit positive longitudinal magnification
    d) one

7) In case of Michelson's interferometer thickness of the plate can be determined by _____.
    a) $t = \dfrac{\mu - 1}{D}$ b) $t = \dfrac{D}{\mu - 1}$
    c) $t = \dfrac{2D}{\mu - 1}$ d) $t = \dfrac{\mu - 1}{2D}$

8) The effect due to the zone on the back side is _____.
    a) minimum   b) maximum
    c) zero   d) one

9) The vesolving power of prism is _____.
    a) $t.\frac{d\mu}{d\lambda}$
    b) $\sqrt{t}.\frac{d\mu}{d\lambda}$
    c) $t/\frac{d\mu}{d\lambda}$
    d) $\frac{1}{t}.\frac{d\mu}{d\lambda}$

10) Plane of vibration and plane of polarization are_____.
    a) Parallel
    b) Mutually perpendicular
    c) Inclined at 45^0
    d) Inclined at 60^0

11) The Lagrange Helmholtz's law of magnification is_____.
    a) $n_1 y_1 \tan\theta_1 = n_2 y_2 \tan\theta_2 = \cdots = n_p y_p \tan\theta_p$
    b) $n_1 y_1 \tan\theta_1 = n_2 y_2 \tan\theta_2$
    c) $n_1 \sin\theta_1 = n_2 \sin\theta_2$
    d) $n_1 y_1 \sin\theta_1 = n_2 y_2 sin\theta_2$

12) The fringe width in FP interferometer is _____ than in Michelson's interferometer.
    a) smaller
    b) much smaller
    c) much more smaller
    d) same as

13) Optical fibres are better used in _____.
    a) communication system
    b) electrical wiring
    c) radar system
    d) computer system

14) In Fresnel's type of diffraction _____ must be at finite distance from the obstacles.
    a) the grating
    b) only the source
    c) only the screen
    d) both source and the screen

Q.2 A) Answer the following questions. (Any Four)   08
    1) What do you mean by numerical aperture of the fibre optics?
    2) How the zone plate is constructed?
    3) Distinguish between spectral resolution and geometrical resolution?
    4) Show that zone plate acts as convex lens, when the source is at infinity.
    5) The initial and final readings of Michelson's interferometer screw are 1.07345 cm and 1.07052 cm as 100 fringes get shifted through a point in the field of view. Calculate the wavelength of the source of light.

B) Answer the following questions. (Any Two)   06
    1) Write a note on magnification and resolution.
    2) In a coaxial system of lenses, the first and the second focal point are at 11cm and 19cm and the principle points at 16cm and 14cm respectively, from a certain origin. Calculate
        i) the focal length in the objective space and image space
        ii) the position of the image point of a point object placed at the distance of 2cm to the left of the first focal point
    3) State the laws of rotation of plane of polarization and specific rotation.

Q.3 A) Answer the following questions. (Any One)   08
    1) Describe polarimeter experiment to determine the specific rotation of an optically active solution.
    2) Explain the formation and the working of fibre optical communication system.
    3) Explain construction and working of Fabry-Perot interferometer.

B) **Answer the following questions. (Any One)** **06**
1) Derive and expression for the resolving power of a plane diffraction grating.
2) Explain Fresnel's diffraction at straight edge. Also explain the diffraction bands in the region of light.

Q.4 **A)** **Answer the following questions. (Any Two)** **10**
1) Show that
   i) The distance between the principle points is equal to the distance between the nodal points.
   ii) The principle points coincide with the nodal points when medium on both sides of the system is the same
2) What is optical activity? Obtain the rotation for elliptically polarized light.
3) What is the pulse dispersion? Derive an expression for the pulse dispersion in step index fibre.

B) **Answer the following questions. (Any One)** **04**
1) The diameter of the central zone of a zone plate is 2.3 mm and point source of light of wavelength 5000 A^o is placed 5 m away from the zone plate. Find the position of the primary (or principle) image and the adjacent secondary image.
2) Write a note on Rayleigh's Criterion for resolution and state Rayleigh's modified criterion.

Q.5 **Answer the following questions. (Any One)** **14**
a) Explain the principle, construction and working of Nicol prism.
b) With a neat diagram explain the construction and working of Michelson's interferometer.
c) Derive an expression for the focal length in the image space for a system of two thin lenses separated co-axially by some distance in air. Hence obtain expression for locating the positions of the principle planes.

B.Sc.(Semester - IV) (CBCS) Examination Oct/Nov-2019
Physics (Paper - VIII)
Modern Physics

Day & Date: Wednesday, 23-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.
             3) Neat diagrams must be drawn wherever necessary.
             4) Use of log table or calculator is allowed.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) According to special theory of relativity, the velocity of light in free space is _____.
   a) increases   b) decreases
   c) constant   d) zero

2) The inertial frame of reference is _____ Frame of reference.
   a) an accelerated   b) un accelerated
   c) a steady   d) variable

3) A clock will appear to run more and more slow if the relative velocity between clock and observer _____.
   a) decreases   b) remains same
   c) becomes zero   d) increases

4) The Wavelength of matter waves is independent of _____.
   a) mass   b) velocity
   c) charge   d) momentum

5) The relation between phase velocity (u) and corresponding particle velocity (V) is _____.
   a) $u = c^2/V$ b) $u = c/V$
   c) $u = V/c$ d) $u = c/V^2$

6) Maximum number of electrons in any shell is given by _____.
   a) $2n$ b) $2n^2$
   c) n^2 d) n

7) Spin quantum number associated with single electron is _____.
   a) zero   b) one
   c) one half   d) two

8) Anamolous Zeeman effect produces when external magnetic field applied to spectral lines is _____.
   a) weak   b) strong
   c) zero   d) infinite

9) According to Hund's rule, the electrons in sub shell have _____ spin whenever possible.
   a) parallel   b) perpendicular
   c) crossed   d) zero

10) In Compton scattering the wavelength of scattered radiations _____.
    a) increases   b) decreases
    c) remains same   d) becomes zero

11) The value of change in Compton wavelength $d\lambda$ = _____.
    a) 0.0242 A.U   b) 0.242 A.U
    c) 2.42 A.U   d) 24.2 A.U

12) The phenomenon of division of heavy nucleus into two fragments of nearly equal masses is called _____.
    a) nuclear fission   b) stripping reaction
    c) pickup reaction   d) None of the above

13) In chain reaction if effective multiplication factor k = 1, then size and mass of core is _____.
    a) critical   b) supercritical
    c) subcritical   d) none of these

14) The common material used as a fuel in reactor is _____.
    a) Cadmium   b) Lanthanum
    c) Lithium   d) Uranium

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) State postulates of Einstein's special theory of relativity.
    2) Define particle velocity and group velocity.
    3) State Pauli's exclusion principle.
    4) What is L-S coupling?
    5) Write any one neutron induced nuclear reaction.

B) Answer the following questions. (Any Two)   **06**
    1) Write note on time dilation.
    2) Write note on space quantization.
    3) Explain Chain reaction.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Deduce an expression for variation of length with velocity.
    2) Explain construction and working of Stern and Gerlach experiment.
    3) A particle is moving with velocity of 150m/s. Calculate group velocity and phase velocity of matter waves associated with particle.

B) Answer the following questions. (Any One)   **06**
    1) Derive Einstein's mass- energy relation.
    2) Explain quantum number associated with vector atom model.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Obtain an expression for relativistic variation of mass with velocity.
    2) Explain Bohr's quantum condition on the basis of matter waves.
    3) What is nuclear reactor? Explain construction and working of reactor.

B) Answer the following questions. (Any One)   **04**
    1) Describe an experimental verification of Compton effect.
    2) Write note on atomic energy in India.

Q.5 Answer the following questions. (Any Two)   **14**
    1) Explain Michelson Morley experiment and obtain equation for fringe shift.
    2) Describe Debye's explanation for normal Zeeman effect. Obtain the formula for Zeeman shift.
    3) What is Compton effect? Obtain an expression for change in wavelength of scattered radiations.

Seat No.	

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Statistics (Paper - VII)
CONTINUOUS PROBABILITY DISTRIBUTIONS AND EXACT SAMPLING DISTRIBUTIONS

Day & Date: Thursday, 24-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory and carry equal marks.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Gamma distribution is _____.
   a) Positively skewed   b) Negatively skewed
   c) Symmetric   d) Platykurtic

2) If X is a gamma variate with parameters 0.5 and 1 then distribution of (0.5 X) is _____.
   a) $G(1,1)$ b) exponential with mean 1
   c) Both a and b   d) G(0.5, 1)

3) If $X \sim \beta_2(m,n)$ then $1/X$ is _____.
   a) $\beta_1(m,n)$ b) $\beta_2(n,m)$
   c) $\beta_2(m,m)$ d) $\beta_1(n,m)$

4) If $X \sim \beta_1(2,3)$ then $E(X) = $ _____.
   a) 0.4   b) 0.04
   c) 0.25   d) 0.15

5) If X and Y are independent standard normal random variables then $E(X^2 + Y^2) = $ _____.
   a) 0   b) 1
   c) 2   d) 4

6) The m.g.f. of X is $e^{7t+\frac{25}{2}t^2}$, then the distribution of X is _____.
   a) N(0, 1)   b) N(5, 5)
   c) N(-5, 5)   d) N(7, 25)

7) The variance of chi square distribution with 10 d.f. is _____.
   a) 10   b) 20
   c) 30   d) 40

8) The relation between mean and variance of chi square variate with n d.f. is _____.
   a) mean = 2 variance   b) 2 mean = variance
   c) mean = variance   d) 3 mean = variance

9) If X is a t variate with 5 d.f. then mean of X is _____.
   a) 3   b) 0
   c) 4   d) None of these

10) Let X_1, X_2, X_3 be i.i.d. N(0,1) variates and $Y = \sqrt{2} X_3 / \sqrt{(X_1^2 + X_2^2)}$ then mean of Y _____.
    a) $\sqrt{2}$ b) 1
    c) 2   d) 0

11) If X is a t variate with 4 d.f. then variance of t is _____.
    a) 1   b) 0
    c) 2   d) 4

12) t distribution is a _____.
    a) leptokurtic   b) symmetric
    c) both a and b   d) positively skewed

13) If $F \sim F(10, 8)$ then $E(1/F)$ is _____.
    a) 11 / 10   b) 11 / 9
    c) 10 / 8   d) 11 / 8

14) If mode of $F(10, n_2) = 0.4$ then n_2 is _____.
    a) 3   b) 2
    c) 5   d) 6

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) State the p.d.f. of a gamma distribution with two parameters.
    2) Which is the m.g.f. of $G(\alpha, \lambda)$
    3) State mean of $\beta_1(10, 10)$
    4) State H.M. of $\beta_2(m, n)$
    5) Find mean and variance of $N(5, 1); -\infty < x < \infty$

B) Answer the following questions. (Any Two)   **06**
    1) If $X \sim N(1, 4)$, $Y \sim N(1, 4)$ are independent variates then find p.d.f. of $Z = X + 2Y$
    2) Find mean and mode of an $F(5, 10)$ distribution.
    3) Find mean of a t-variate with n d.f.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) If $X_1 \sim N(0, 1)$, $X_2 \sim N\left(0, \frac{1}{2}\right)$ and are independent then find the distribution of $(X_1^2 + 2X_2^2)$
    2) If X is a beta variate of first kind, find distribution of $(1 - X)$
    3) Find mean of chi square variate with n d.f.

B) Answer the following questions. (Any One)   **06**
    1) If X is a t-variate with n d.f., find the distribution of $Y = X^2$
    2) State and prove additive property of a gamma distribution.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) If X is beta variate of a second kind, find distribution of $X/(1 + X)$
    2) Find the distribution of $Y = AX + B + C$, where A, B and C are constants and X is normal variate.
    3) Define chi square statistic and state the p.d.f. of a chi square variate with 1 d.f.

B) Answer the following questions. (Any One)   **04**
    1) Find the p.d.f. of sum of i.i.d exponential variates.
    2) State and prove additive property of normal distribution.

Q.5 Answer the following questions. (Any Two)   **14**
    1) Find k, mean and variance, if the p.d.f. of X is
$f(x) = K \exp[(-1/18)(x^2 - 10x + 22)]; K > 0, -\infty < x < \infty$
    2) Find variance of an F-variate with (n_1, n_2) d.f.
    3) If X and Y are two independent gamma variates with parameters (α, λ_1) and (α, λ_2) respectively, then find the distribution of $\frac{X}{X+Y}$

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Statistics (Paper – VIII)
APPLIED STATISTICS

Day & Date: Friday, 25-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory and carry equal marks.
                         2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) The number of possible samples of size 2 from a population of 4 units is _____.
   a) 2   b) 4
   c) 8   d) 12

2) A sample consist of _____.
   a) all units of the population   b) 50 percent units of the population
   c) 5 percent units of the population   d) any fraction of the population

3) The number of possible sample of size n out of N population units without replacement is _____.
   a) $\binom{N}{n}$ b) N^n

   c) n^2 d) $n!$

4) Type – II error is _____.
   a) Rejecting H_0 when H_0 is wrong   b) Rejecting H_0 when H_0 is true
   c) Accepting H_0 when H_0 is wrong   d) Accepting H_0 when H_0 is true

5) For testing a population variance which of the following test to be used?
   a) Z - test   b) t – test
   c) Chi-square test   d) F – test

6) The hypothesis under test is _____.
   a) simple hypothesis   b) alternative hypothesis
   c) null hypothesis   d) none of these

7) To test $H_0 : \mu = \mu_0$ against $H_1 : \mu > \mu_0$ when population standard deviation is known, the appropriate test is _____.
   a) t – test   b) chi-square test
   c) normal test   d) None of these

8) The Schewart control charts are meant _____.
   a) To detect whether the process is under statistical quality control
   b) To find the assignable causes
   c) To reflect the selection of sample
   d) a, b and c

9) Number of defects follows _____.
   a) Binomial distribution   b) Poisson distribution
   c) Geometric distribution   d) None of these

10) Control chart consist of _____.
   a) Three control lines   b) Upper and lower control limits
   c) The level of the process   d) All of these

11) Variation due to assignable causes occurs due to _____.
   a) Faculty process
   b) Carelessness of operators
   c) Poor quality of raw material
   d) All of these

12) Vital statistics is a branch of biometry with data and laws of _____.
   a) Marriages
   b) Births
   c) Deaths
   d) All the above

13) The value of Net Reproductive Rate (NRR) > 1 will result into _____.
   a) population remains constant
   b) reduction in population
   c) increase in population
   d) none of these

14) The death rate obtained for a segment of a population is known as _____.
   a) Specific death rate
   b) Crude death rate
   c) Standardized rate
   d) Vital index

Q.2 A) Answer the following. (Any Four)   **08**
   1) Define Population and Sample.
   2) Define Power of the test.
   3) Define A. S. F. R.
   4) State central limit theorem.
   5) Define defect and defective.

B) Answer the following. (Any Two)   **06**
   1) Show that in SRSWOR the probability of selecting a specified unit of the population at any given draw is equal to the probability of selecting it at the first draw.
   2) Define General Fertility Rate (GFR). Also state the merits and demerits of GFR.
   3) Distinguish between process control and product control.

Q.3 A) Answer the following. (Any Two)   **08**
   1) State the procedure to test the equality of means for paired observations by using t-test.
   2) What is the meaning and purpose of Statistical Quality Control (SQC)?
   3) Show that in case of simple random sampling without replacement (SRSWOR) expected value of the sample mean is population mean.

B) Answer the following (Any One)   **06**
   1) Explain the methods of sampling.
   2) Explain the construction of $\bar{X}$ chart when standards are given.

Q.4 A) Answer the following (Any Two)   **10**
   1) Describe the large sample test for testing the equality of population proportion $P_1 = P_2$.
   2) Explain SRSWR and SRSWOR.
   3) Define Gross Reproduction Rate (GRR) and Net Reproductive Rate (NRR). Also state the limitations of GRR.

B) Answer the following (Any One)   **04**
   1) Show that in case of SRSWOR, expected value of sample mean square is the population mean square.
   2) Describe the procedure to test for testing population correlation coefficient $\rho = \rho_0$ by using Fisher Z-transformation.

Q.5 **Answer the following (Any Two)** 14
    a) Explain the test procedure for testing.
       i) The goodness of fit
       ii) The independence of attributes in case of m×n contingency table.
    b) With usual notations, prove that
$$V(\bar{y}_n) = \frac{N-n}{Nn} S^2$$
    c) Explain the construction control chart for number of defects when standards are not given.

Seat No.

B.Sc. (Semester – IV) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper – VII)
DIFFERENTIAL EQUATIONS

Day & Date: Saturday, 02-11-2019 　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　 2) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing the correct alternatives given below:　　14

1)　The differential equation of the form $y = 2px + f(xp^2)$ reduces to clairaut's form by using the substitutions _____.
　　a)　$x^2 = u, y^2 = v$ 　　　　　　b)　$x = u^2, y = v$
　　c)　$x = u, y = v^2$ 　　　　　　d)　$x = u^2, y = v^2$

2)　The differential equation $y = px + xp^2$ is of the type _____.
　　a)　Solvable for p 　　　　　　b)　Solvable for x
　　c)　Solvable for y 　　　　　　d)　None of these

3)　The general solution of differential equation $p^2x^2 - 2pxy + y^2 = p^2a^2 + b^2$ is _____.
　　a)　$y = cx \pm (c^2a^2 + b^2)^{1/2}$ 　　b)　$y = (c^2a^2 + b^2)^{1/2} \pm cx$
　　c)　$y = cx + (c^2a^2 + b^2)^{1/2}$ 　　d)　$y = (c^2a^2 + b^2)^{1/2} - cx$

4)　If $2 + 2Px + Qx^2 = 0$ then $y =$ _____ is a solution of the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = 0$
　　a)　$y = e^{-ax}$ 　　　　　　b)　$y = e^{ax}$
　　c)　$y = e^{2x}$ 　　　　　　d)　$y = x^2$

5)　The differential equation $y'' - 2\tan x y' + 5y = 0$ by removal of first derivative then $u =$ _____.
　　a)　$\sec x$ 　　　　　　b)　$\operatorname{cosec} x$
　　c)　$\cos x$ 　　　　　　d)　$\sin x$

6)　If the differential equation $\frac{d^2y}{dx^2} + \frac{2}{x}\frac{dy}{dx} + \frac{a^2}{x^4}y = 0$ is solved by change of independent variable method then value of z is _____.
　　a)　$\dfrac{1}{x}$ 　　　　　　b)　$-\dfrac{1}{x}$
　　c)　$\dfrac{2}{x}$ 　　　　　　d)　$-\dfrac{2}{x}$

7)　One of the solution of a differential equation $\frac{dx}{y^2} = \frac{dy}{x^2} = \frac{dz}{x^2y^2z^2}$ is _____.
　　a)　$x^3 + z^{-1} = c$ 　　　　　　b)　$x^3 - 3z^{-1} = c$
　　c)　$y^3 + 3z^{-1} = c$ 　　　　　　d)　$x^3 + y^3 = c$

8)　The solution of $\frac{xdx}{y^2z} = \frac{dy}{xz} = \frac{dz}{y^2z}$ is _____.
　　a)　$x^3 - y^3 = c_1, x^2 - 2z = c_2$ 　　b)　$x^3 + y^3 = c_1, x^2 - z = c_2$
　　c)　$x^3 - y^3 = c_1, x^2 + 2z = c_2$ 　　d)　$x^3 + y^3 = c_1, x^2 + 2z = c_2$

9) The solution of equation $\frac{dx}{1} = \frac{dy}{2} = \frac{dz}{5z+\tan(y-2x)}$ is _____.
   a) $y - 2x = c_1, 5x - \log(5z + \tan(y - 2x)) = c_2$
   b) $y + 2x = c_1, 5x - \log(5z + \tan(y - 2x)) = c_2$
   c) $y - 2x = c_1, x - 5\log(5z + \tan(y - 2x)) = c_2$
   d) None of these

10) The general solution $yzdx + zxdy + xydz = 0$ is _____.
   a) $xy = c$
   b) $xyz = c$
   c) $x + y + z = c$
   d) $x^2 + y^2 + z^2 = c$

11) The roots of auxiliary equation are $x^3\frac{d^3y}{dx^3} + 2x\frac{dy}{dx} - 2y = 0$ is _____.
   a) $D_1 = -1, 1 \pm i$
   b) $D_1 = 1, 1 \pm i$
   c) $D_1 = 1 + i, 1, -1$
   d) $D_1 = 1 - i, 1, -1$

12) The solution of $(y + z)dx + dy + dz = 0$ is _____.
   a) $e^x(y + z) = c_1$
   b) $e^y(z + x) = c_1$
   c) $e^z(x + y) = c_1$
   d) $x + y + z = c_1$

13) The P.I. $= \frac{1}{D_1^2 - 5D_1 + 6}e^{4z}$ is _____ $\left(D_1 = \frac{d}{d^2}\right)$
   a) x^4
      $\quad \overline{2}$
   b) x^2
      $\quad \overline{2}$
   c) $4\log x$
   d) $4\log z$

14) The solution of equation $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = 0$ is _____.
   a) $y = (c_1 + c_2\log x)e^x$
   b) $y = c_1 + c_2\log x$
   c) $y = c_1\log x + c_2(\log x)^2$
   d) $y = c_1 + c_2e^x$

Q.2 A) Answer the following questions. (Any Four) 08
   1) Solve $\left(\frac{dy}{dx}\right)^2 - ax^3 = 0$
   2) Solve $(x^2D^2 + xD - 4)y = 0$
   3) If $y = x$ is a solution of $x^2y'' + xy' - y = 0$, then find the complete solution.
   4) Solve $\frac{dx}{xz(z^2+xy)} = \frac{dy}{-y(z^2+xy)} = \frac{dz}{x^4}$
   5) Show that $(2x + y^2 + 2xz)dx + 2xydy + x^2dz = 0$ is integrable.

B) Answer the following questions. (Any Two) 06
   1) Solve $y = 2px + y^2p^3$
   2) Solve $\frac{dx}{mz-ny} = \frac{dy}{nx-lz} = \frac{dz}{ly-mx}$
   3) Solve $yzdx + 2xzdy - 3xydz = 0$

Q.3 A) Answer the following questions. (Any Two) 08
   1) Define Clairaut's equation and explain the method of solving it.
   2) Solve $(1 - x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0$ if $y = x$ is a known solution of it.
   3) Solve $\frac{dx}{z(x+y)} = \frac{dy}{z(x-y)} = \frac{dz}{x^2+y^2}$

B) Answer the following questions. (Any one) 06
   1) Explain the method of solving the equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$, where P, Q, R are functions of x, by changing the independent variable x to z by the relation $z = f(x)$
   2) Solve $[(3x + 2)^2D^2 + 3(3x + 2)D - 36]y = 3x^2 + 4x + 1$

Q.4 A) Answer the following questions. (Any two)   **10**
   1)   Solve the differential equation
$$e^{3x}(P-1) + P^3 e^{2y} = 0$$
   2)   Solve $y^{''} - 4xy^{'} + (4x^2 - 1)y = -3e^{x^2}\sin 2x$
   3)   Solve $\dfrac{dx}{x^2 - yz} = \dfrac{dy}{y^2 - zx} = \dfrac{dz}{z^2 - xy}$

B) Answer the following questions. (Any one)   **04**
   1)   State and prove the necessary condition of integrability of the differential equation $Pdx + Qdy + Rdz = 0$ where P, Q, R are functions of x, y, z.
   2)   Solve $x^2 \dfrac{d^2 y}{dx^2} + x\dfrac{dy}{dx} + 5y = x^2 \sin\log x$

Q.5 Answer the following questions. (Any two)   **14**
   a)   Obtain suitable substitution for dependent variable with transform the equation $\dfrac{d^2 y}{dx^2} + P\dfrac{dy}{dx} + Qy = R$ into normal form $\dfrac{d^2 v}{dx^2} + IV = S$
   b)   Explain the homogeneous linear differential equation
$x^n \dfrac{d^n y}{dx^n} + a_1 x^{n-1}\dfrac{d^{n-1}y}{dx^{n-1}} + \ldots\ldots + a_{n-1}x\dfrac{dy}{dx} + a_n y = X$ by changing the dependent variable x to z. Hence find P.I of equation
$x^2 \dfrac{d^2 y}{dx^2} + x\dfrac{dy}{dx} = 12\log x$
   c)   Solve:-
    1) $\dfrac{dx}{x(y^2 - z^2)} = \dfrac{dy}{y(z^2 - x^2)} = \dfrac{dz}{z(x^2 - y^2)}$
    2) $2xdx + 2ydy + (x^2 + y^2 + e^z)dz = 0$

Seat No.	

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - VIII)
ABSTRACT ALGEBRA - I

Day & Date: Monday, 04-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                          2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) If G is a finite group of order 'n', $a \in G$ and order of a is m, if G is cyclic, then _____.
    a) $m = n$ b) $m > n$
    c) $m < n$ d) None of these

2) If H is a subgroup of finite group G and order of H and G are respectively, m and n then _____.
    a) $m|n$ b) $n|m$
    c) $m \nmid n$ d) None of these

3) If $G = \{1, -1, i, -i\}$ is a multiplicative group then order of i is _____.
    a) 1   b) 2
    c) 3   d) 4

4) $f = (1\ 2\ 3)\ (1\ 2)$ is _____.
    a) Odd permutation   b) even permutation
    c) Both a and b   d) None of these

5) Let G be a cyclic group of order 6. Then the number of elements $g \in G$ such that $G = \langle g \rangle$ is _____.
    a) 5   b) 3
    c) 4   d) 2

6) $[Z_{10} : < [2] >] =$_____.
    a) 1   b) 3
    c) 2   d) 4

7) Simplify $([3]\odot[2]) \oplus ([3]\odot[4])$ in Z_5 _____.
    a) [3]   b) [0]
    c) [2]   d) [4]

8) The l.c.m of [10, 105] = _____.
    a) 5   b) 525
    c) 126   d) 210

9) The g.c.d of (36, -60, 90) is _____.
    a) 6   b) 18
    c) 180   d) -36

10) If φ is Euler φ function then φ(18) =_____.
    a) 5   b) 4
    c) 6   d) 17

11) The number of subgroups of Z_{36} are _____.
    a) 12   b) 10
    c) 8   d) 9

12) The set of integers Z with the binary operation $*$ defined as $a * b = a + b + 1$ for $a, b \in z$ is a group. The identity element of this group is _____.
   a) $0 = e$
   b) $e + 1 = 0$
   c) $e - 1 = 0$
   d) $e - 2 = 0$

13) If $f = G \rightarrow G'$ be a homomorphism then kerf = _____.
   a) $\{x \in G/f(x) = e'\}$
   b) $\{x \in G/f(x) = e\}$
   c) $\{x \in G'/f(x) = e\}$
   d) $\{x \in G/f(x) = 1\}$

14) The number of generators in group $(\{1, 2, 3, 4, 5, 6\}, X_7)$ are _____.
   a) 4
   b) 3
   c) 2
   d) 5

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Find all of the subgroups of Z_6
   2) Determine the right cosets of <[4]> in Z_{12}
   3) If G is a group then prove that every element of G has unique inverse.
   4) Write all of the elements of S_3 both in two-row form.
   5) Find the order of each element of the multiplicative group $\{1, -1, i, -i\}$

B) Answer the following questions. (Any Two)   **06**
   1) Show that if $H = \{(1), (1\ 2\ 3), (1\ 3\ 2)\}$ then H is a subgroup of S_3
   2) Prove that centre of $G, Z(G)$ is a subgroup of G.
   3) Show that every subgroup of an abelian group is normal.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Let $f : (Z, t) \rightarrow (R, t)$ be defined by $f(n) = 5n\ \forall\ n$. Test whether f is a homomorphism. If so find its kernel.
   2) Show that the group $(\{1, 2, 3, 4, 5, 6\}, X_7)$ is cyclic. How many generators are there?
   3) If $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{pmatrix}$ and $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 1 & 2 \end{pmatrix}$
   Compute :
   i) $\alpha \circ \beta$
   ii) $(\alpha \circ \beta)^{-1}$
   iii) $\beta^{-1} \circ \alpha^{-1}$
   iv) $\alpha^{-1} \circ \beta^{-1}$

B) Answer the following questions. (Any One)   **06**
   1) State and prove Lagrange's Theorem
   2) Let N be a normal subgroup of G and let $\frac{G}{N}$ denote the set of all right cosets of N in G, then prove that $\frac{G}{N}$ is a quotient group of G by N.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Find gcd of 616 and 427 and express (616, 427) = 616x + 427y
   2) If $f : G \rightarrow G'$ is a homomorphism then prove that
   i) $f(e) = e'$
   ii) $f(x^n) = [f(x)]^n$
   3) If R is an additive group of real numbers and R^+ be the multiplicative group of positive reals, show that the following mapping is an isomorphism. $f : R \rightarrow R^+$ such that $f(x) = e^x\ \forall\ x \in R$

B) **Answer the following questions. (Any One)** 04
1) Find all of the subgroups of Z_{12}. Also construct the subgroup lattice.
2) If a, b are any two elements of a group G and H any subgroups of G then $a \in Ha \Longleftrightarrow Ha = Hb$

Q.5 **Answer the following questions. (Any Two)** 14
a) State and prove Cayley's Theorem.
b) If $f : G \longrightarrow G'$ be an onto homomorphism with $k = kerf$, then $\frac{G}{K} \cong G'$
c) Prove that $Z_5^{\#}$ is a group with respect to the operation $\odot$.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Geography (Paper - VII)
BIOGEOGRAPHY - II

Day & Date: Tuesday, 05-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Draw neat diagrams wherever necessary.
            4) Use of stencils is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   **14**

1) Biogeography is a branch of _____Geography.
   a) Social   b) Human
   c) Physical   d) Cultural

2) According to geological time scale the age of the earth is _____ billion years.
   a) 4.6   b) 5.6
   c) 6.6   d) 7.6

3) _____ is the oldest and longest era in the geological history.
   a) Holocene   b) Ordovician
   c) Cambrian   d) Precambrian

4) Seasonal movement of animals from one region to another is called as _____.
   a) Animal Migration   b) Plant Migration
   c) Migration   d) People Migration

5) The theory of evolution of life was put forth by _____.
   a) S. Smith   b) A. Humboldt
   c) C. Darwin   d) V. Blache

6) _____ one of the reason for animal dispersal.
   a) Competition   b) Seasonal Movement
   c) Daily movements   d) Forcefully

7) _____ is the example of conventional resources.
   a) Solar energy   b) Coal
   c) Wind energy   d) Tide energy

8) All those things which are composed of non-living things are called _____ resources.
   a) biotic   b) abiotic
   c) renewable   d) non-renewable

9) _____ factors are responsible for the movement of animals and plants.
   a) Internal   b) External
   c) Natural   d) Anthropogenic

10) The word pollution derived from the Greek word of _____.
   a) Politics   b) Post
   c) Pollution   d) Pollutes

11) Unwanted sound is an example of _____ type of pollution.
   a) Noise
   b) Air
   c) Water
   d) Soil

12) Tsunami is the _____ type of environmental hazard.
   a) Natural
   b) Artificial
   c) Anthropogenic
   d) Manmade

13) The increasing number of automobiles has become a cause of _____ pollution.
   a) Soil
   b) Water
   c) Air
   d) Land

14) The wild life protection act was introduced by the parliament of India _____.
   a) 1970
   b) 1972
   c) 1980
   d) 1986

Q.2 A) Answer the following questions. (Any Four) 08
   1) State the any two types of geological time period.
   2) Define the concept of dispersal.
   3) What is resource?
   4) Define the term of environmental hazards.
   5) Define the concept of pollution.

B) Write short notes (Any Two) 06
   1) Precambrian period.
   2) Name the barriers of dispersal.
   3) State the types of pollution.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Describe the effects of noise pollution.
   2) Explain the need of environmental protection laws.
   3) Explain the effects of human activities on plants.

B) Answer the following questions. (Any One) 06
   1) Jurassic Period
   2) Describe the different types of natural hazards.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Describe the different types of marine resources.
   2) Describe the different Eras in geological time scale.
   3) Describe the causes of dispersal.

B) Answer the following questions. (Any One) 04
   1) Describe the causes of air pollution.
   2) Describe the life evolution in secondary period.

Q.5 Answer the following questions. (Any Two) 14
   a) Describe the different types of resources.
   b) Explain the effect of Water pollution.
   c) State the principle of Darwin's Theory.

Seat No.

B.Sc.(Semester - IV) (CBCS) Examination Oct/Nov-2019
Electronics (Paper – VII)
FUNDAMENTALS OF OPERATIONAL AMPLIFIER

Day & Date: Tuesday, 05-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                    2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The differential amplifier is _____ amplifier.
   a) transistor coupled   b) direct coupled
   c) capacitor coupled   d) gain coupled

2) The slew rate of the IC 741 OpAmp is _____.
   a) 0.5 V/μs   b) 0.5 V/ms
   c) 5 V/ms   d) 5 V/μs

3) The input offset current is _____.
   a) $I_{b1} - I_{b2}$ b) $(I_{b1} - I_{b2})/2$
   c) $|I_{b1} - I_{b2}|$ d) $(|I_{b1} - I_{b2}|)/2$

4) The bandwidth of open loop OpAmp circuits is _____.
   a) infinity   b) audio frequency range
   c) almost zero   d) radio frequency range

5) The ____ OpAmp configuration offers gain less than one.
   a) inverting   b) differential
   c) non-inverting   d) both a and b

6) The common mode gain of the ideal differential amplifier is _____.
   a) unity   b) zero
   c) infinity   d) finite

7) In case of zero crossing detector using OpAmp has _____ reference voltage.
   a) +Vcc   b) -Vcc
   c) zero volt   d) one volt

8) The OpAmp is in _____ configuration is utilized for phase shift oscillator.
   a) inverting   b) non-inverting
   c) differential   d) all of these

9) The OpAmp as wien bridge oscillator requires _____ closed loop gain for sustain oscillations.
   a) 29   b) 3
   c) ≥ 29 d) ≤ 29

10) In case of basic differentiator circuit the capacitor is connected _____ path.
    a) at the inverting   b) in feedback
    c) at the non-inverting   d) in designer chosen

11) The current to voltage converter using OpAmp is _____ amplifier.
    a) transconductance   b) transresistance
    c) LDR   d) buffer

12) The unity gain OpAmp adder in inverting configuration has two inputs, 10 mV and 25 mV, then the output voltage is _____.
   a) -15 V   b) +15V
   c) -35 V   d) +35 V

13) The _____ of IC 741 are utilized for offset null.
   a) pin 1 and 5   b) pin 2 and 3
   c) pin 2 and Vcc   d) pin 3 and Vcc

14) In case of emitter coupled differential amplifier, the constant current bias circuit is used to make _____ stable.
   a) collector current of Q1 transistor   b) collector current of Q2 transistor
   c) tail current   d) both a and b

Q.2 A) Answer the following questions. (Any Four)   08
   1) What virtual ground concept?
   2) Draw the equivalent circuit of OpAmp.
   3) State the applications of differential amplifier.
   4) State the various types of differential amplifier.
   5) Define the OpAmp parameter Input bias current and input offset voltage.

B) Answer the following questions. (Any Two)   06
   1) Explain the need of differential amplifier.
   2) Explain the voltage follower using OpAmp.
   3) Define CMRR. In case of OpAmp, Ad is 18000 and Ac is 0.2, find the CMRR in dB.

Q.3 A) Answer the following questions. (Any Two)   08
   1) Explain the integrator using OpAmp.
   2) Explain phase shift oscillator using OpAmp.
   3) Explain the need of closed configuration in OpAmp.

B) Answer the following questions. (Any One)   06
   1) Explain the Schmitt trigger circuit using OpAmp.
   2) Explain the V to I converter using OpAmp.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Explain the slew rate of an OpAmp.
   2) Explain the astable multivibrator using OpAmp.
   3) Explain the OpAmp as subtractor.

B) Answer the following questions. (Any One)   04
   1) Explain the open loop configurations of OpAmp.
   2) Explain the current mirror bias.

Q.5 Answer the following questions. (Any Two)   14
   a) Explain the triangular wave generator using OpAmp with neat labelled waveform and frequency relation.
   b) Classify the Open loop and closed loop configurations of OpAmp. Derive the gain relation for the Non-Inverting configuration.
   c) Explain the block diagram of basic OpAmp with each functional block.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Geography (Paper – VIII)
AGRICULTURAL GEOGRAPHY

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams wherever necessary.
4) Use of stencils is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) _____ geography is the sub branch of economic geography..
   a) Social   b) Historical
   c) Political   d) Agriculture

2) The word agriculture comes from a Latin term _____.
   a) Agra   b) Agercultura
   c) Ager   d) Agro

3) Ecological approach deals with the inter-relationship between plants and _____.
   a) Irrigation   b) Soil
   c) Animals   d) Climate

4) Relief is an _____ factor affecting on agriculture.
   a) Physical   b) Social
   c) Economic   d) Political

5) Government policies are a _____ factor affecting on agriculture.
   a) Physical   b) Economic
   c) Political   d) Social

6) Shifting cultivation is called _____ in north-east India.
   a) Chena   b) Ladang
   c) Zoom   d) Penda

7) _____ farming is utilizes maximum land under cultivation.
   a) Intensive   b) Extensive
   c) Mixed   d) Subsistence

8) _____ is a major crop in extensive agriculture.
   a) Rice   b) Wheat
   c) Maize   d) Bajara

9) Plantation Agriculture is mainly practiced in _____ area.
   a) Temperate   b) Tropical
   c) Equatorial   d) Polar

10) _____ revolution has made possible higher crop production.
   a) Blue   b) White
   c) Red   d) Green

11) Biological technologies used in agriculture are known as _____.
   a) Biotechnology   b) Green Revolution
   c) Organic Farming   d) Sustainable Agriculture

12) _____ type of agriculture that focuses on production long term crops and livestock which having minimum effect of environment.
    a) Survival   b) Traditional
    c) Sustainable   d) Shifting

13) _____ has the largest number of cattle in the world.
    a) Pakistan   b) India
    c) Australia   d) Denmark

14) _____ is known as the poor man's cow all over the world.
    a) Goat   b) Buffalo
    c) Sheep   d) Mules

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What is agriculture geography?
2) Name of any three physical determinants of agriculture.
3) What is subsistence agriculture?
4) What is organic farming?
5) Define biotechnology.

B) Write notes. (Any Two)   **06**
1) State the names of crops in plantation agriculture.
2) Describe the concept of organic farming.
3) Types of Biofertilizers

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Explain the nature of agriculture geography.
2) Describe the climate as an important factor affect on agriculture.
3) Explain the importance of fruit processing industry.

B) Answer the following questions. (Any One)   **06**
1) Explain the major problems of agriculture in India.
2) Give a brief account of mixed farming.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain the various approaches to the study of agriculture geography.
2) Explain the economic factors affect on agriculture.
3) Write a note on green revolution in India.

B) Answer the following questions. (Any One)   **04**
1) Describe the significance of agriculture.
2) State the importance of poultry farming.

Q.5 Answer the following questions. (Any Two)   **14**
a) Write a note on sheep and goat rearing.
b) Give a brief account of intensive agriculture.
c) Describe the social determinants of agriculture.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Electronics (Paper – VIII)
DIGITAL TECHNIQUES AND MICROPROCESSOR

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Draw neat labeled diagram wherever necessary.
            4) Use of log table & calculator is allowed.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) A memory chip has 14 bit wide address bus then its capacity is _____.
     a) 8KB   b) 32KB
     c) 16KB   d) 64KB

2) A 4 bit binary weighted digital to analog converter, if 8 KΩ resistor is connected at LSB position, then the value of resistor at MSB position is _____.
     a) 1KΩ b) 2KΩ
     c) 4KΩ d) 8KΩ

3) In 8085 processor the width of program counter is _____ bit.
     a) 4   b) 8
     c) 12   d) 16

4) RRC instruction have _____ addressing mode.
     a) Register   b) Immediate
     c) Indirect   d) Implied

5) _____ IC is used as a bidirectional buffer.
     a) 74244   b) 74245
     c) 74138   d) 74373

6) _____ memory is a volatile memory.
     a) PROM   b) Flash
     c) RAM   d) All of these

7) ADC IC 0804 gives _____ bit digital output.
     a) 12   b) 8
     c) 10   d) 9

8) In IO mapped IO scheme 8085 processor will access _____ IO ports.
     a) 128   b) 65536
     c) 256   d) 512

9) _____ instruction is a two byte instruction.
     a) ADD M   b) LXI H, 1234 H
     c) MVI H, 0A H   d) ANA D

10) _____ IC is used for decoding the control signals $IO/\overline{M}$, $\overline{RD}$, $\overline{WR}$ of 8085.
     a) 74138   b) 74245
     c) 74373   d) 74244

11) _____ IC is used for de-multiplexing of AD_0 to AD_7 bus.
     a) 74244   b) 74245
     c) 74138   d) 74373

12) _____ instruction is a logical group of instruction.
   a) MOV M, A   b) JMP 1234 H
   c) CMA   d) RAR

13) The standard crystal frequency of 8085 microprocessor is _____.
   a) 6 KH$_z$ b) 6 MH$_z$
   c) 3 MH$_z$ d) 3 KH$_z$

14) In ADC 0804 _____ technique is used for conversion of analog into digital data.
   a) Dual Slope   b) Single Slope
   c) SAR type   d) Flash

Q.2 A) Answer the following. (Any Four)   **08**
   1) Compare SRAM with DRAM.
   2) Define fetch cycle and execution cycle of an instruction.
   3) State the role of ALE signal.
   4) State any four single byte instructions.
   5) Compare Absolute address decoding scheme with linear address decoding scheme.

B) Write Notes. (Any Two)   **06**
   1) Status signals S_0 and S_1
   2) Absolute address decoding scheme
   3) Flash memories

Q.3 A) Answer the following. (Any Two)   **08**
   1) Explain in brief any four Logical group of instruction.
   2) Explain generation $\overline{MEMR}$, $\overline{MEMW}$, $\overline{IOR}$, $\overline{IOW}$ of signals with the help of decoder IC 74138.
   3) Find out the analog output for 5 bit R-2R ladder network DAC if 0 = 0 Volt and 1 = 5 Volt for digital input
      i) 11101
      ii) 10011

B) Answer the following. (Any One)   **06**
   1) Describe the working of SAR type ADC.
   2) What is addressing mode? Explain different types of addressing modes supported by 8085 processor with suitable examples.

Q.4 A) Answer the following. (Any Two)   **10**
   1) Compare IO mapped IO scheme with memory mapped IO scheme.
   2) Write the salient features of 8085 processor. Draw the flag structure of 8085, Explain each flag in brief.
   3) Write a note on semi-conductor memories.

B) Answer the following. (Any One)   **04**
   1) Explain with suitable diagram how multiplexed address/data bus is de-multiplexed.
   2) What is Flow chart? Draw three symbols used in flow chart with their meaning.

Q.5 Answer the following. (Any two)   **14**
   a) Draw the internal block diagram of 8085 processor. Explain accumulator and General Purpose Register.
   b) With suitable diagram; interface memory chip 2764 to an 8085 microprocessor. Give its memory map.
   c) Explain working principle of R-2R ladder network DAC.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper- I)
FUNDAMENTAL OF COMPUTER

Day & Date: Friday, 08-11-2019   Max. Marks: 40
Time: 03:00 PM To 5:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Select the correct alternatives from the following rewrite the sentence.   08
1) Which of the following is not the Zoom percentage in excel?
   a) 10   b) 100
   c) 300   d) 500

2) Which is not a type of margin?
   a) Top   b) Left
   c) Right   d) Center

3) A Microsoft Windows is _____.
   a) Operating System   b) Graphics Program
   c) Word Processing   d) Database program

4) Background color on a document is not visible in?
   a) Web Layout View   b) Print Preview
   c) Reading View   d) Print Layout View

5) What is the use of short cut key 'Ctrl + End'?
   a) Move to the top of a document
   b) Move to the bottom of a document
   c) Move the cursor to the end of a line
   d) Move the cursor to the beginning of a line.

6) Which of the following operating system reads and reacts in actual time?
   a) Quick Response System   b) Real Time System
   c) Time Sharing System   d) Batch Processing System

7) Which of the following is system software?
   a) Operating system   b) Compiler
   c) Utilities   d) All of the above

8) Linux is _____.
   a) single user, single tasking   b) single user, multitasking
   c) multi user, single tasking   d) multi user, multi tasking

Q.2 Answer the following questions. (Any Four)   08
1) What is Software?
2) Give phase of hardware life cycle plan.
3) How we can add a new slide in power point.
4) What is word processor?
5) What is Printer?
6) What is file?

Q.3 **Answer the following questions. (Any Two)** 08
1) State & explain Batch file with example.
2) Explain block diagram of a computer.
3) Write note on DOS. Explain internal and external commands in details.

Q.4 **Answer the following questions. (Any Two)** 08
1) Write note on Links and Action buttons in Microsoft power point.
2) What is Difference between CRT and LCD monitors?
3) Explain different types of functions performed by O.S.

Q.5 **Answer the following questions. (Any One)** 08
1) Prepare a power point presentation on plastic pollution. Explain it.
2) Explain different Generation of Computers.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper - VII)
DATA STRUCTURES

Day & Date: Saturday, 19-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) The total number of fields in nodes of singly linked list is _____.
   a) one   b) two
   c) three   d) four

2) Double circular linked contains _____ NULL links.
   a) one   b) two
   c) three   d) zero

3) _____ are used in computers for scheduling to applications.
   a) Stack   b) Queue
   c) Linked list   d) None

4) Linked list provides sequential access.
   a) True   b) False

5) Queue is primitive data structure.
   a) True   b) False

6) Queue overflow condition occurs while performing _____ operation.
   a) Status   b) Delete
   c) Insert   d) Empty

7) Inserting new node in between two nodes of doubly linked list requires _____ links to be set.
   a) zero   b) two
   c) three   d) four

8) A linear collection of data elements where the linear nodes is given by means of pointer is called _____ .
   a) binary tree   b) node list
   c) primitive list   d) none of these

9) Linked list can't be implemented without pointer.
   a) True   b) False

10) _____ algorithm is used to arrange the data elements.
    a) Searching   b) Sorting
    c) Merging   d) Arranging

11) A terminal node in a tree is called as _____ .
    a) root   b) branch
    c) node   d) leaf

12) The root is processed before its subtrees in _____ traversal.
    a) inorder   b) preorder
    c) postorder   d) all of the these

13) The complexity of linear search algorithm is _____ .
   a) O(n)
   b) O(log n)
   c) O(n2)
   d) O(n log n)

14) In AVL Tree, the Balance Factor of each node is either
   a) 1,2,3
   b) -1,1,2
   c) -1,0,1
   d) 2,0,-2

Q.2 **A)** **Answer the following questions. (Any Four)** **08**
   1) Define ADT? Give its examples.
   2) Define queue. Give its examples.
   3) Explain node structure of singly linked list.
   4) Define strictly binary tree. Give its example.
   5) List any two advantages of binary search over linear search.

B) **Write short notes. (Any Two)** **06**
   1) Space complexity
   2) Dynamic programming
   3) B+ Tree

Q.3 **A)** **Answer the following questions. (Any Two)** **08**
   1) Write a function to push an element in stack.
   2) Explain priority queue.
   3) Explain bubble sort technique.

B) **Answer the following questions. (Any One)** **06**
   1) Write an algorithm for evaluation of postfix expression using stack.
   2) Write a program to implement insertion sort.

Q.4 **A)** **Answer the following questions. (Any Two)** **10**
   1) Explain the operations on circular queue.
   2) Write a program to implement binary searching.
   3) Explain asymptotic notation.

B) **Answer the following questions. (Any One)** **04**
   1) Differentiate between stack and queue.
   2) What is tree? List the advantages of tree over linked list.

Q.5 **Answer the following questions. (Any Two)** **14**
   1) Write a program to implement tree traversal methods.
   2) Explain insert and delete operations on circular linked list.
   3) Convert the following infix expression to postfix form using stack.
      (A+B)*C/D-E

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper – VIII)
DBMS USING ORACLE

Day & Date: Thursday, 07-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) In relation, there is a set of permitted values of attribute is called as _____.
   a) Domain b) Set
   c) Tuple d) Row

2) CREATE TABLE student (sid number (4), sname char (10)); is _____ type of statement.
   a) DML b) DDL
   c) TCL d) DCL

3) Which of the following is not a basic operation of relational algebra?
   a) Intersection b) Union
   c) Grant d) Cartesian Product

4) Which of the following is not aggregate functions?
   a) Min b) Sum
   c) Count d) Mod

5) Which of the following concurrency control technique is not based on the serializability?
   a) Two-phase locking b) Graph-based locking
   c) Time-stamp based locking d) None of these

6) Wait-for graph is used for _____.
   a) Detecting view serializability b) Detecting conflict serializability
   c) Deadlock Prevention d) Deadlock Detection

7) The LENGTH function returns the length of a word.
   a) True b) False

8) An advantage of views is _____.
   a) Data security b) Hiding complex queries
   c) Derived columns d) All of these

9) A PL/SQL block begins with _____ section.
   a) Main b) Start
   c) Declare d) Define

10) In implicit cursor _____ attributes are always evaluates to false.
    a) %isopen b) %found
    c) %notfound d) %rowcount

11) Business rules, which are enforced on data being stored in a table are called _____.
    a) Lock b) Constraints
    c) Both a and b d) Join

12) The _____ operator is used to compare a value to a list of literals values that have been specified.
   a) BETWEEN   b) IN
   c) ANY   d) ALL

13) Which of the following is not a recovery technique?
   a) Deferred update   b) Immediate update
   c) Two-phase commit   d) Shadow paging

14) SQL stands for _____
   a) Structured Query Language   b) System Query Language
   c) Software Query Language   d) Sequential Query Language

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Define Schema. List out type of Schema?
2) How differ Null values from space or zero?
3) What is Index?
4) What is data model?
5) Define Procedure.

B) Write Notes. (Any Two)   **06**
1) Role of DBA
2) Share and exclusive locks
3) Purpose of checkpoint mechanism

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Explain Wait-Die and Wound-Wait.
2) What is shadow paging? State its advantages and disadvantages.
3) What is E-R diagram? Explain the various types of attributes.

B) Answer the following questions. (Any One)   **06**
1) Discuss the various type of join operation.
2) What are keys? How many type of keys used in Database? Explain Super and Candidate key?

Q.4 A) Answer the following questions. (Any Two)   **10**
1) What is sub query? Explain with example.
2) Write a PL/SQL block to check entered number is Armstrong or not.
3) Explain advantages of DBMS.

B) Answer the following questions. (Any One)   **04**
1) Why is concurrency control needed? Explain lost update problem.
2) Write a SQL statement for-
   i) Creates a STUDENT table with field (Roll_no, Name, Class, Marks).
   ii) Inserting the values in STUDENT table.
   iii) Change column name of "Name" to "Stu_Name".
   iv) Display list of student who got 60 marks.

Q.5 Answer the following questions. (Any Two)   **14**
  a) What is Normalization? Explain 1NF, 2NF, 3NF wit example.
  b) What is Transaction? Explain ACID properties of transaction management.
  c) What is Trigger? Explain types of trigger with examples.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Bio-Chemistry (Paper - III)
Nutrition and Metabolism

Day & Date: Friday, 08-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Write chemical reactions where involved.
4) Draw labeled diagrams wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) Cytochromes contain _____which is involved in respiration process.
   a) FAD   b) iron ions
   c) NAD$^+$ d) copper ions

2) The synthesis of fatty acids is catalysed by _____enzymes.
   a) 6   b) 7
   c) 8   d) 9

3) _____ are non essential food components in diet.
   a) proteins   b) vitamins
   c) lipids   d) carbohydrates

4) 40% energy is captured as ATP in _____acid oxidation.
   a) adipic   b) palonitic
   c) linolic   d) stearic

5) _____regulate the blood pH.
   a) lung   b) liver
   c) spleen   d) kidney

6) Acetyl C_OA is transported out of mitochondria in the form of _____.
   a) acetate   b) citrate
   c) nitrate   d) oxalate

7) In muscles _____ is the end product of glycolysis.
   a) acetic acid   b) lactic acid
   c) pyruvic acid   d) citric acid

8) Principal use of BMR in clinical practice is in the diagnosis of _____.
   a) thyroid   b) addisons
   c) phenyl ketouria   d) diabetis

9) _____ amino acid is not involved in urea cycle reactions.
   a) Arginine   b) Alanine
   c) Omithine   d) Citrulin

10) In mitochondria of the cell _____oxidation of fatty acids takes place.
    a) $\propto -$ b) $\beta -$
    c) $\gamma -$ d) $\delta -$

11) Glycolysis requires _____ molecules of ATP per glucose molecule for activation.
    a) 2   b) 4
    c) 12   d) 36

12) Degradable chemical reactions inside the cell are known as _____ processes.
   a) metabolic
   b) catabolic
   c) anabolic
   d) anaerobic

13) One mole of ATP on hydrolysis gives _____ kcal energy.
   a) 3.7
   b) 7.3
   c) 3.8
   d) 8.3

14) _____hormone increases reabsorption of Na^+ ions by renal tubules.
   a) Insulin
   b) Aldosterone
   c) Thyroxine
   d) Adrenaline

Q.2 A) Attempt any four of the following question.   **08**
   1) Explain phosphate buffer system in the body.
   2) How pyruvic acid obtained from $\propto\, - $ ketoglutamate?
   3) Define respiration quotient and Basal metabolic rate.
   4) Explain deamination.
   5) Write CO_2 fixation process using biotin.

B) Attempt any two of the following question.   **06**
   1) Define and Explain nitrogen balance in the body.
   2) What is chemiosmotic coupling hypothesis?
   3) Write differences between exergonic and endergonic reactions.

Q.3 A) Attempt any two of the following question.   **08**
   1) How are lipids oxidized in the body?
   2) Write note on production of acid and bases by body.
   3) Explain protein buffer system in body.

B) Attempt any one of the following question.   **06**
   1) What are essential fatty acids? Why?
   2) Explain the reactions of preparatory phase of glycogenolysis.

Q.4 A) Attempt any two of the following question.   **10**
   1) What is the effect of hormones on basal metabolic rate?
   2) Explain significance of high energy compounds.
   3) Explain lactic acid fermentation process.

B) Attempt any one of the following question.   **04**
   1) Explain different deamination reactions for amino acid metabolism in the body.
   2) Write two types of reactions of amino acid.

Q.5 Attempt any two of the following question.   **14**
   a) Write and explain in brief the reaction of TCA cycle.
   b) What is colorimeter? Draw a labeled diagram of constant volume diabetic bomb colorimeter.
   c) Explain compounds involved in electron transport chain.

Seat No.	

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Plant Protection (Paper–III)
INTRODUCTION TO WEEDS & NON INSECT PESTS

Day & Date: Friday, 08-11-2019　　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Draw neat labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** 　**14**

1) *Argemone mexicana* belongs to the family_____
   a) Cyperaceae
   b) Amaranthaceae
   c) Papaveraceae
   d) Annonaceae

2) *Cynadon dactylon* also known as _____.
   a) Bermuda grass
   b) Doob
   c) Devil's grass
   d) All of these

3) *Eichhornia crassipes* is commonly known as _____.
   a) water hyacinth
   b) water cabbage
   c) water lettuce
   d) Morning glory

4) Mulching is _____ method of weed management.
   a) Biological
   b) Cultural
   c) Chemical
   d) Mechanical

5) _____ are non insect pests.
   a) Birds
   b) Snails
   c) Slugs
   d) All of these

6) The widespread use of herbecides has been made only after the discovery of _____.
   a) Randox
   b) 2-4-D
   c) Dalapon
   d) Paraquat

7) Use of Bacteria, fungi and insects is _____ method of weed management.
   a) Cultural
   b) Biological
   c) Chemical
   d) Mechanical

8) _____ is the common weed of playground.
   a) *Argemone Mexicana*
   b) *Eichhornia crassipes*
   c) *Alternanthera tenella*
   d) *Cuscuta reflexa*

9) _____ is a poisonous weed.
   a) *Striga*
   b) *Loranthus*
   c) *Datura*
   d) *Cyperus*

10) *Zygograma bicolorata* a leaf eating insect is used to control _____.
    a) *Euphorbia*
    b) *Parthenium*
    c) *Cynadon*
    d) *Portulaca*

11) Ploughing and Hoeing are _____ methods used for weed management.
    a) Cultural
    b) Mechanical
    c) Biological
    d) All of these

12) Weeds are classified on the basis of _____.
   a) Types of leaves   b) Types of flowers
   c) Ecology   d) Mode of dispersal

13) _____is a parasitic weed grows on the roots of Jowar plant.
   a) *Cuscuta*   b) *Orobanche*
   c) *Striga*   d) *Loranthus*

14) Weed responsible for forest fire is _____.
   a) *Amaranthus*   b) *Lantana*
   c) *Sorghum halepense*   d) *Portulaca*

Q.2 A) Attempt any four of the following question.   **08**
   1) What is field sanitation?
   2) Name any two monocot weeds.
   3) Mention the damage caused by Birds.
   4) Define weed.
   5) Write management of *cyperus rotundus.*

B) Write Notes on any two.   **06**
   1) Role of Alachlor
   2) Cover crops
   3) Damage caused by Rats

Q.3 A) Attempt any two of the following question.   **08**
   1) State the role of snails & slugs.
   2) Write the damage caused by mites.
   3) What is crop rotation? How is it benifical?

B) Attempt any one of the following questions.   **06**
   1) Described the typical life cycle pattern of Nematodes and its management.
   2) Write the properties and uses of 2-4-D.

Q.4 A) Attempt any two of the following question.   **10**
   1) Write an account of Biological control of weed.
   2) Explain the weed *Argemone Mexicana* w.r.t. morphology, dispersal and management.
   3) Describe the losses caused by weeds.

B) Attempt any one of the following question.   **04**
   1) Describe the Mulching and Hand weeding methods.
   2) Describe the weeds of aquatic habitat.

Q.5 Attempt any two of the following question.   **14**
   a) Describe the different methods of weed dispersal.
   b) Describe the weed *parthenium hysterophorus* w.r.t. morphology, reproductive ability and management.
   c) Describe the classification of weedicides on the basis of chemical nature.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Bio-Chemistry (Paper - IV)
MOLECULAR BIOCHEMISTRY & DISEASES

Day & Date: Wednesday, 23-10-2019   Max. Marks: 70
Time: 11:30 AM To 2:00 PM

Instructions: 1) All questions are compulsory.
                          2) Figures to the right indicate full marks.
                          3) Write chemical reaction where involved.
                          4) Draw labeled diagrams wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Lactate dehydrogenase isoenzyme are composed of _____ types.
     a) 2   b) 3
     c) 4   d) 5

2)   Pancreas secret _____ hormone.
     a) thyroxine   b) growth
     c) insulin   d) adrenaline

3)   Natural UV rays from sun can cause cancer of _____.
     a) lung   b) skin
     c) bones   d) blood cells

4)   mRNA has poly a tails at its _____ end.
     a) 6′   b) 9′
     c) 4′   d) 3′

5)   Non insulin dependent diabetes causes _____.
     a) over sleeping   b) over eating
     c) over laughing   d) over emotional

6)   Induced fit hypothesis of enzyme catalysis was suggested by _____.
     a) Jacob and Monod   b) Emil Fischer
     c) Koshland   d) Sir Hans Krebs

7)   _____ is not a class of immunoglobulin.
     a) I_9 C   b) I_9 E
     c) I_9 D   d) I_9 A

8)   Cervical cancer is caused by _____.
     a) asbestos   b) human papilloma virus
     c) tobacco   d) ultraviolet rays

9)   In general AIDS patients die between _____ years.
     a) 1 to 2   b) 3 to 4
     c) 5 to 10   d) 0 to 1

10) I_9 G molecules is formed from _____ polypeptide chains joined by disulphide bonds.
     a) 2   b) 3
     c) 4   d) 5

11) _____ present in cigarette cause lung cancer.
     a) aliphatic hydrocarbon   b) aromatic hydrocarbon
     c) alicyclic hydrocarbon   d) brunched hydrocarbon

12) Insulin is a _____ hormone.
    a) monopeptide   b) Dipeptide
    c) Tripeptide   d) Polypeptide

13) First restriction map was obtained in _____ using Hind II enzyme.
    a) 1970   b) 1971
    c) 1972   d) 1973

14) HIV surface antigen gp120 is related to _____ disease.
    a) Cancer   b) Diabetes
    c) AIDS   d) Thyroid

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) What is tumor marker?
    2) What is innate immunity?
    3) How does Azidothymidime (AZT) acts on HIV?
    4) What is recombinant DNA?
    5) How are the antibodies obtained for artificial passive immunity?

B) Write Notes. (Any Two)   **06**
    1) Write three metabolic effects of insulin.
    2) What are the salient features of induced fit hypothesis?
    3) Define immunity and explain in brief.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Explain clonal selection theory for formation of antibodies.
    2) Explain characteristics of tumor cells.
    3) Write chronic phase and crisis phase in natural course of AIDS.

B) Answer the following questions. (Any One)   **06**
    1) Write note on factors affecting enzyme activity.
    2) Explain constitutive and inducible genes.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) What is the ways for management of insulin dependent diabetes and non insulin dependent diabetes?
    2) Explain types of enzyme specificity.
    3) Explain regulation of gene expression.

B) Answer the following questions. (Any One)   **04**
    1) Write an account of competitive inhibition.
    2) With the help of graph describe natural course of Aids.

Q.5 Answer the following questions. (Any Two)   **14**
    a) What is cloning? Explain preparation of C-DNA.
    b) Explain in detail types of diabetes mellitus.
    c) What are enzymes? Write note on line weaver Burk Plot.

Seat No.

B.Sc.(Semester - IV) (CBCS) Examination Oct/Nov-2019
Plant Protection (Paper – IV)
INSECT PESTS AND THEIR MANAGEMENT

Day & Date: Wednesday, 23-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Draw neat and labelled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) There are _____stages in the life cycle of insects
   a) 2   b) 3
   c) 4   d) 5

2) The Brinjal crop is generally affected by _____ pest.
   a) Aphid   b) Stem borer
   c) Fruit borer   d) Jassid

3) _____ are insect pests.
   a) Rates   b) Snails
   c) Birds   d) Aphids

4) *Holotrichia consanguinea* is the scientific name of _____.
   a) Mango jassid   b) Wooly aphid
   c) White grub   d) Fruit borer

5) _____ is used as contact poison obtained from tobacco plant.
   a) Nimbin   b) Pyrethrin
   c) Nicotine   d) Nimbidine

6) _____ is the pest of tomato.
   a) Fruit borer   b) Red spider
   c) Pod borer   d) Stem borer

7) A chemical, which induces insects to move towards is called _____.
   a) Attractants   b) Repellents
   c) Antifeedants   d) Pheromones

8) _____ is the plant origin insecticide.
   a) Pyrethrin   b) Diazinon
   c) Carbofuran   d) DDT

9) _____ is the pest of stored grains.
   a) Thrip   b) Pod borer
   c) Pulse bettle   d) Jassid

10) _____ is the most serious pest of gram.
   a) Cut worm   b) Stem borer
   c) Pod borer   d) Red spider

11) _____ crop is affected by wooly aphids.
   a) Jowar   b) Mango
   c) Sugarcane   d) Tomato

12) A chemical which has property of sterilizing insects without killing it is called _____.
   a) Microbial insectide
   b) Chemosterilants
   c) Repellents
   d) Attractants

13) The classification of insecticides is based on _____.
   a) Mode of entry
   b) Mode of action
   c) Chemical nature
   d) All of these

14) Insects have _____ pairs of legs.
   a) 2
   b) 3
   c) 4
   d) 5

Q.2 A) Answer the following questions. (Any Four) 08
   1) Write the marks of Identification of Red spider.
   2) What are pheromones?
   3) Write nature of damage caused by white grub.
   4) Explain the mouth parts of pod borer.
   5) What you know about microbial insecticides?

B) Write notes on. (Any Two) 06
   1) Effect of Insecticides on Respiratory and Nervous System of Insect.
   2) Host range and damage caused by Pulse beetle.
   3) Stomach Insecticides.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Give the life cycle of wooly aphids.
   2) Mention host range and damage caused by Thrips.
   3) Why insect becomes pest?

B) Answer the following questions. (Any One) 06
   1) Write the marks of Identification and life cycle of Rice Weevil.
   2) Describe plant origin insecticides.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Explain the general characters of typical insect w. r. t. wings and types of legs.
   2) Describe the principles of pest control.
   3) State the nature of damage and management of mango jassids.

B) Answer the following questions. (Any One) 04
   1) Describe precautionary measures used during pesticide application.
   2) Give the life cycle of white grub.

Q.5 Answer the following questions. (Any Two) 14
   a) Give an account of Jowar stem borer w. r. t. scientific name, marks of Identification and management.
   b) Write the classification of Insects based on mouthparts.
   c) Write the scientific name, range of host, nature of damage and management of pod borer.

Seat No.

B.Sc.(Semester – IV) (CBCS) Examination Oct/Nov-2019
Meteorology (Paper – III)
APPLIED CLIMATOLOGY

Day & Date: Thursday, 24-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Draw neat diagrams wherever necessary.
　　　　　　　4) Use of stencils is allowed.

Q.1　Fill in the blanks by choosing the correct alternatives given below:　　14

1) Shivering is physiological response to _____ condition.
　　a) cloudy　　　　　　　　　　b) cold
　　c) warm　　　　　　　　　　　d) hot

2) The primary purpose of clothing is to protect man against _____ and improve him physiological compare.
　　a) humidity　　　　　　　　　b) temperature
　　c) wind　　　　　　　　　　　d) weather

3) The _____ heat island are formed due to additional of heal from automobile.
　　a) hamlet　　　　　　　　　　b) rural
　　c) urban　　　　　　　　　　　d) village

4) _____ is irregular motion of air over short distance in the atmosphere.
　　a) Anticyclone　　　　　　　　b) Turbulence
　　c) Cyclone　　　　　　　　　　d) Circulation

5) The term 'forecast' was first applied in meteorology by _____.
　　a) Miller　　　　　　　　　　　b) Fitzroy
　　c) Coriolis　　　　　　　　　　d) Trewartha

6) _____ plays a significant part in the economic activities of people.
　　a) Climate　　　　　　　　　　b) Weather
　　c) Sunshine　　　　　　　　　d) Humidity

7) Medium rang forecast up to _____ days.
　　a) 3 to 21　　　　　　　　　　b) 3 to 26
　　c) 3 to 48　　　　　　　　　　d) 3 to 72

8) The grand bank is noted for hazards to shipping due to _____ and icebergs.
　　a) laze　　　　　　　　　　　b) fog
　　c) mist　　　　　　　　　　　d) smog

9) Indian meteorological services use liner equations to forecast coming of the _____.
　　a) autumn　　　　　　　　　　b) monsoon
　　c) summer　　　　　　　　　　d) winter

10) Observation of both surface and _____ air stations are necessary for weather analysis.
　　a) central　　　　　　　　　　b) lower
　　c) topmost　　　　　　　　　d) upper

11) Good and bad _____ can influence retail sales.
   a) climate
   b) weather
   c) humidity
   d) temperature

12) The last Tiros was launched in _____.
   a) 1960
   b) 1965
   c) 1970
   d) 1975

13) _____ Vitamin necessary for the prevention of bone disease.
   a) A
   b) B
   c) C
   d) D

14) The body comfort zone ranges between $18.9^{o}C$ to _____ ^{o}C.
   a) $22.4^{o}C$
   b) $23.9^{o}C$
   c) $25.6^{o}C$
   d) $27.4^{o}C$

Q.2 A) Answer the following questions (Any Four) 08
   1) Define urban climate.
   2) What is a local wind?
   3) What is meant by off-shore drilling?
   4) What is agro-climate?
   5) Long range forecasting.

B) Write the short notes (Any Two) 06
   1) Fishing activities
   2) Modification of weather for-casting
   3) Technological progress in weather for-casting

Q.3 A) Answer the following questions (Any Two) 08
   1) Statistical weather forecasting
   2) Weather application to transportation
   3) What are the rotational forces?

B) Answer the following questions (Any one) 06
   1) Explain urban climate effect on body comfort.
   2) Use of satellite in weather forecasting.

Q.4 A) Answer the following questions (Any Two) 10
   1) Explain the importance of pressure gradient in atmosphere.
   2) State the importance of temperature in physiological response.
   3) Describe the effect of climate on agriculture.

B) Answer the following questions (Any one) 04
   1) Explain the types of weather forecasting.
   2) Comment on heat island.

Q.5 Answer the following questions (Any Two) 14
   1) State the importance of air operations in marine activates.
   2) Describe the importance of climate in industrial activities.
   3) Explain the inter relations between telecommunication and air.

Seat No.	

B.Sc.(Semester – IV) (CBCS) Examination Oct/Nov-2019
Geo-Chemistry (PAPER – III)
PRINCIPLES OF GEOCHEMISTRY

Day & Date: Thursday, 24-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
          2) Figures to the right indicate full marks.
          3) Draw neat diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing the correct alternatives given below:**   **14**

1) Chemical equilibrium is _____ in nature.
   a) static   b) dynamic
   c) electric   d) mechanic

2) For _____ reaction, chemical equilibrium is absent.
   a) irreversible   b) reversible
   c) chain   d) fast

3) In conjugate acid base pair, there is a difference of _____ proton.
   a) zero   b) one
   c) two   d) three

4) $P^H + P^{OH} =$_____ for water.
   a) 11   b) 12
   c) 13   d) 14

5) Bacteria is a _____ water pollutant.
   a) organic   b) inorganic
   c) biological   d) nuclear

6) As per ISI rule, pH of potable water is _____.
   a) 3 to 4   b) 5 to 6
   c) 6 to 9   d) 10 to 12

7) The name of the compound $H_3C-CH(CH_3)-CH_3$ is _____.
   a) isobutane   b) n-butane
   c) iso-propane   d) butane

8) The functional group of alcohol is _____.
   a) $-COOH$ b) $C=O$
   c) $-OH$ d) $-NH_2$

9) Lechatalier's principle is applicable for _____ process.
   a) reversible   b) irreversible
   c) exothermic   d) endothermic

10) In, Van't Hoff isotherm _____ can calculate of the system.
   a) ΔH b) ΔS
   c) ΔG d) Temperature.

11) _____ is a protonic theory.
   a) Arrhenius   b) Lewis
   c) Bronsted - Lowry   d) Gibb's

12) Ammonium acetate is _____ salt.
   a) acidic   b) basic
   c) neutral   d) amorphous

13) _____ is a physical method for water pollution.
   a) Sedimentation   b) Chlorination
   c) Oxidation   d) Reduction

14) The abundance of petroleum is greater in _____ rocks.
   a) quartz   b) sedimentary
   c) calcite   d) igneous

Q.2 A) Answer the following questions (Any Four)   **08**
   1) Discuss the hydrolysis of Na_2CO_3.
   2) State and explain Lechatalier's principle.
   3) Give the classification of hydrocarbon.
   4) Explain the types of water pollution.
   5) Give the geological uses of acids and bases.

B) Write short notes (Any Two)   **06**
   1) Sources of water pollution
   2) Chemical equilibrium and its characteristics
   3) Sedimentary rocks

Q.3 A) Answer the following questions (Any Two)   **08**
   1) Derive Van't Hoff isotherm equation.
   2) Discuss TDS method for the treatment of water pollutants.
   3) Discuss the chemistry of carbon compounds.

B) Answer the following questions (Any one)   **06**
   1) Discuss the origin of coal.
   2) Discuss BOD method for the treatment of water pollutants.

Q.4 A) Answer the following questions (Any Two)   **10**
   1) Explain $[HCO_3]^{1-}$ and $[CO_3]^{2-}$ in the hydrolysis of Na_2CO_3.
   2) Give the characteristics of reversible process.
   3) Discuss organic matter in black shell.

B) Answer the following questions (Any one)   **04**
   1) Show conjugate acid base pair of the following.
$$HCl + H_2O \rightleftharpoons H_3O^+ + Cl^-$$
$$NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$$
   2) Discuss the effect of concentration on $CO_{2(g)} + H_2O \rightleftharpoons H_2CO_{3(l)}$

Q.5 Answer the following questions (Any Two)   **14**
   1) Discuss the origin of petroleum.
   2) Show that chemical equilibrium is dynamic in nature for the reaction.
$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$$
   3) Distinguish between reversible and irreversible reaction

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
ZOOLOGY (Paper - VII)
ANIMAL DIVERSITY – IV

Day & Date: Thursday, 24-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14
   1)   Crocodilia is a order of class _____.
        a) Amphibia   b) Reptilia
        c) Aves   d) Mammals

   2)   Venom of Cobra affects on _____ system.
        a) Muscular   b) Circulatory
        c) Excretory   d) Nervous

   3)   Liver stores sugar in the form of _____.
        a) Glycogen   b) Starch
        c) Sucrose   d) Lactose

   4)   _____ is muscular partition which separates thoracic cavity from abdominal
        cavity.
        a) Bronchiole   b) Alveoli
        c) Diaphragm   d) Larynx

   5)   _____ stores urine temporarily until it is driven out of the body.
        a) Urethra   b) Bowman's capsule
        c) Ureters   d) Urinary bladder

   6)   In rat gestation period is _____ days.
        a) 10 – 11   b) 15 – 16
        c) 20 – 21   d) 30 – 31

   7)   The teethes which are similar in shape and size are called as _____.
        a) Homodont   b) Thecodont
        c) Heterodont   d) Acrodont

   8)   Dental formula of Man is _____.
        a) 1,0,0,3/1,0,0,3   b) 2,1,2,3/2,1,2,3
        c) 1,0,0,3/0,0,0,3   d) 3,1,4,2/3,1,4,2

   9)   _____ is a egg laying mammal.
        a) Rat   b) Echidna
        c) Kangaroo   d) Squirrel

   10) _____ are large marine mesozoic reptiles.
        a) Diplodocus   b) Branchiosaurs
        c) Icthyosaurs   d) Stegosaurus

   11) Archaeopteryx shows connecting link between Reptiles and _____.
        a) Aves   b) Mammals
        c) Pisces   d) Amphibian

12) Raptorial feets are found in _____.
    a) Emu   b) Kites
    c) Jacana   d) Ducks

13) The glomerulus has arterial blood supply by _____ arteriole.
    a) Efferent   b) Afferent
    c) Renal   d) Urinary

14) Heart is enclosed in membranous sac called _____.
    a) Diaphragm   b) Pericardium
    c) Auricle   d) Pharynx

Q.2 A) Answer the following questions. (Any Four)   08
1) Apodiformes
2) Systematic position of Rat
3) Wading feet in birds
4) Mud probing beak in birds
5) Spermatozoa

B) Write short notes (Any Two)   06
1) General characters of Primates
2) Describe structure of Eye in Rat
3) Significance of teeth in Mammals

Q.3 A) Answer the following questions. (Any Two)   08
1) Fangs
2) Give composition of Rat blood
3) Explain salient features of Monotremes

B) Answer the following questions. (Any One)   06
1) Give an account on order Crocodialia.
2) Explain functions of different parts of brain.

Q.4 A) Answer the following questions. (Any Two)   10
1) Explain types of migration in birds.
2) Describe in detail snake venome.
3) Explain structure of Rat heart.

B) Answer the following questions. (Any One)   04
1) Describe lymphatic system of Rat.
2) Give general characters of Archaeopteryx.

Q.5 Answer the following questions. (Any Two)   14
1) Describe digestive system of Rat.
2) Give detail account on poisonous and non-poisonous snakes.
3) Describe in detail beak modification in birds.

Seat No.

Set **P**

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Meteorology (Paper - IV)
METEOROLOGICAL INSTRUMENTS

Day & Date: Friday, 25-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.
                        3) Use of scientific calculator is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Rainfall is measured using a _____.
   a) hygrometer   b) thermometer
   c) barometer   d) raingauge

2) The float gauge is used to measure_____.
   a) sunshine   b) rainfall
   c) radiations   d) humidity

3) Which of the following instrument automatically records the quantity measured?
   a) Thermometer   b) Barometer
   c) Hygrometer   d) The automatic siphon gauge

4) A mercury thermometer is used for the measurement of_____.
   a) humidity   b) rainfall
   c) pressure   d) temperature

5) Celsius and _____ scales show the same reading at minus 40 degrees.
   a) Fahrenheit   b) Reaumur
   c) Kelvin   d) Rankin

6) The instrument used for measurement of atmospheric pressure is known as_____.
   a) barometer   b) thermometer
   c) anemometer   d) calorimeter

7) _____ is used to measure atmospheric pressure.
   a) Aneroid barometer   b) Anemograph
   c) Thermometer   d) Thermograph

8) In Fortin's barometer_____.
   a) only mercury is used   b) only alcohol used
   c) only air is used   d) both air and alcohol are used

9) _____ is air in motion.
   a) Wind   b) Atmosphere
   c) Climate   d) Weather

10) Wind is a flowing wave of_____ moving hither and thither indefinitely.
    a) air   b) sound
    c) climate   d) Atmosphere

11) S.I. unit of wind velocity is_____.
    a) cm/s   b) cm/s^2
    c) m/s   d) m/s^2

12) Chemical hygrometer is used to measure_____.
    a) temperature   b) absolute humidity
    c) relative humidity   d) Relative temperature

13) Dry and wet bulb thermometer is used to measure_____ humidity.
    a) absolute   b) relative
    c) absolute and relative   d) minimum-maximum

14) For measurement of very high temperature_____ is used.
    a) thermometer   b) thermograph
    c) pyrometer   d) alcohol thermometer

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Describe different types of rain gauges.
    2) Establish the relation between Celsius and Absolute scales of temperature.
    3) What are the advantages of aneroid barometer over Fortin's barometer?
    4) What is wind vane?
    5) Define absolute humidity.

B) Write Notes on. (Any Two)   **06**
    1) A doctor measures body temperature of his patient as 104°F. How much is patient's body temperature in degree Celsius?
    2) For a thermocouple $\frac{de}{d\theta} = 0$ at 120 ^{0}C. Calculate inversion temperature for the thermocouple.
    3) With neat diagram explain radiation pyrometer.

Q.3 A) Answer the following questions. (Any two)   **08**
    1) With neat diagram explain construction and working of mercury thermometer.
    2) Calculate atmospheric pressure in mb if reading of Fortin's barometer is 27 inch. (Given density of $Hg = 13.6 g/cc$)
    3) Two unknown wind velocities 40km/hr and 60km/hr are measured using a cup anemometer and the respective liner velocities of rotating cups are 25m/s and 40 m/s determine constants of the cup anemometer.

B) Answer the following questions. (Any One)   **06**
    1) With neat diagram explain construction and working of float gauge.
    2) With neat diagram explain thermopile

Q.4 A) Answer the following (Any Two)   **10**
    1) With neat diagram explain construction and working of ordinary rain gauge.
    2) With neat labeled diagram, describe maximum and minimum thermometer.
    3) Draw neat labeled diagram of Aneroid barometer and describe its construction and working.

B) Answer the following questions. (Any One)   **04**
    1) Draw neat diagram of Hooke's anemometer.
    2) With neat diagram describe construction and working of hair hygrometer.

Q.5 Answer the following questions. (Any Two)   **14**
    a) Write a note on "The different temperature scales".
    b) With neat labeled diagram explain construction and working of barograph.
    c) With neat diagram explain ordinary wind vane, splayed wind vane and air foil wind vane.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper – II)
Programming Using C - I

Day & Date: Saturday, 09-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.

Q.1 **Select the correct alternatives from the following and rewrite the sentence.**   **08**

1) Which of the unit is used to store temporary data for further processing?
 a) Input device   b) Output device
 c) Memory unit   d) ALU

2) The following box denotes?
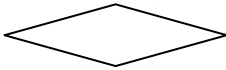
 a) Decision   b) Initialization
 c) Process   d) I/O

3) Array can be considered as set of elements stored in consecutive memory locations but having _____.
 a) Same date type   b) Different data type
 c) Same scope   d) None of these

4) What will be the output of the following C code #include<stdio.h>
 void main()
 { 1< 2? return 1: return 2; }
 a) returns 1   b) returns 2
 c) varies   d) compile time error

5) What will be the output of the following C code?
 void main()
 {
     int a[5]={1,2,3,4,5};
      printf("%d”,a[5]);
 }
 a) 0   b) 5
 c) Grabage Value   d) Error

6) Which is correct with respect to the size of the data types?
 a) char > int > float   b) int > char > float
 c) char < int < double   d) double > char > int

7) The operator "&" is used for
 a) Bitwise AND   b) Bitwise OR
 c) Logical AND   d) Logical OR

8) Which of the following is not a valid variable name declaration?
 a) int a3;   b) int a_3;
 c) int 3_a;   d) int _3a;

Q.2   Answer the following questions. (Any Four)   08
   1)   What is entry control loop?
   2)   What is string?
   3)   What is Array?
   4)   How a programmer does find coding errors?
   5)   Write any four string function.
   6)   What is language processor?

Q.3   Answer the following questions. (Any Two)   08
   1)   Give different types of string functions with syntax. Give example of each.
   2)   Explain Loop statements in C language.
   3)   Write note on phases of c programs Compilation and Execution.

Q.4   Answer the following questions. (Any Two)   08
   1)   Write a program to demonstrate the use of Operator in C program.
   2)   How to access and manipulate an element using array?
   3)   Define Array. Explain Array declaration and initialization of array.

Q.5   Answer the following questions. (Any One)   08
   1)   Write a program to demonstrate the use of relational operators.
   2)   Write a program to check given number is odd or even using if-else
          statement.

Seat No.		Set	P

B.Sc.(Semester - IV) (CBCS) Examination Oct/Nov-2019
Geo-Chemistry (Paper - IV)
CHEMISTRY OF THE EARTH

Day & Date: Friday, 25-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Draw neat labelled diagrams wherever necessary.

Q.1   **Fill in the blanks with correct answer from given option .**   **14**

1)   _____ soil horizon consist of partially altered and partially unaltered parent rock
    a) A   b) B
    c) C   d) R

2)   If pH of the soil is 10 then the soil is said to be_____.
    a) neutral   b) alkaline
    c) basic   d) acidic

3)   Which one of the following minerals is the most susceptible mineral to chemical weathering.
    a) Na-plagioclase   b) Talc
    c) Ca-Plagioclase   d) Quartz

4)   Biological oxygen Demand (BOD) for pure water is_____ppm.
    a) 4   b) 3
    c) 2   d) 1

5)   Pyroxene mineral convert to_____ mineral by oxidation and hydration.
    a) Kaolinite   b) Smectite
    c) Goethite   d) Calcite

6)   Marine clays are mainly of_____ type.
    a) Illite   b) Kaolinite
    c) China clay   d) Mont Morillonite

7)   The major source of air pollution is_____.
    a) Transportation   b) Industrial process
    c) Solid waste   d) Liquid waste

8)   The size of clay minerals is less than_____mm.
    a) 0.002   b) 0.02
    c) 0.0002   d) 0.00002

9)   _____is responsible for greenhouse effect
    a) $NO_2 + H_2O$ b) $SO_2 + H_2O$
    c) $CO_2 + H_2O$ d) $Ar + H_2O$

10)   The composition of soil is
    a) Solids   b) Organisms
    c) Air   d) All of these

11)   The most soluble atmospheric gas in water is_____.
    a) NO_2 b) SO_2
    c) Ar   d) CO_2

12) _____ type of clay structure has one tetrahedral layer linked with one octahedral layer.
    a) Smectite   b) Mont Morillonite
    c) Soil   d) Kaolinite

13) The absorption of H_2O in to the mineral is _____.
    a) hydrolysis   b) hydration
    c) carbonation   d) oxidation

14) The amount of CO_2 in the soil is_____.
    a) 0.001   b) 1.03
    c) 0.3   d) 1.02

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Name the air pollutants.
2) What is mollisol soil?
3) At which depth the asthenosphere is present?
4) Write reaction of minerals for 'oxidation' type of chemical weathering.
5) Define oxidation potential.

B) Write short notes (Any Two)   **06**
1) Describe gravitational differentiation?
2) The 'solution' type of chemical weathering.
3) Describe redox potential.

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Describe Eh and pH diagram
2) Explain geochemical cycle in brief.
3) Describe hydration processes.

B) Answer the following questions. (Any One)   **06**
1) Describe Smectite structure.
2) What are factors controlling soil formation?

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain porosity of soil.
2) Describe soil horizon.
3) Explain kaolinite structure with diagram.

B) Answer the following questions. (Any One)   **04**
1) Explain physicochemical system of the earth.
2) Explain air pollution.

Q.5 Answer the following questions. (Any Two)   **14**
a) Describe the process of formation of clay minerals.
b) Explain the concept of 'Crust as a separate system.
c) Describe various soil textures.

Seat No.

Set **P**

B.Sc.(Semester - IV) (CBCS) Examination Oct/Nov-2019
ZOOLOGY (Paper - VIII)
HISTOLOGY & PHYSIOLOGY

Day & Date: Friday, 25-10-2019　　　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Draw neat labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) Ligaments and tendons are formed of _____.
   a) Skeletal tissue　　　　　　　b) Epithelial tissue
   c) Nervous tissue　　　　　　　d) Muscular tissue

2) Node of raniver is related to _____.
   a) Connective tissue　　　　　b) Adipose tissue
   c) Nervous tissue　　　　　　　d) Muscular tissue

3) Well developed muscalaris mucosa is found in wall of _____.
   a) Pancreas　　　　　　　　　b) Ilium
   c) Stomach　　　　　　　　　　d) Liver

4) Copper 'I' is implanted in _____.
   a) Oviduct　　　　　　　　　　b) Vas defrence
   c) Vagina　　　　　　　　　　　d) Ovary

5) Islet's of langerhans are present in _____.
   a) Liver　　　　　　　　　　　b) Stomach
   c) Salivary glands　　　　　　d) Pancreas

6) Hormone secreting cells of a testis are _____.
   a) Follicular cells　　　　　　b) Spermatocytes
   c) Leyding cells　　　　　　　d) Cells of tunica albuginea

7) Malphigian bodies are present in _____.
   a) Testis　　　　　　　　　　b) Ovary
   c) Kidney　　　　　　　　　　d) Pituitary

8) Corpus luteum is found in _____.
   a) Kidney　　　　　　　　　　b) Testis
   c) Ovary　　　　　　　　　　　d) Pituitary

9) TSH is secreted by _____.
   a) Adrenal cortex　　　　　　b) Ant. Lobe of pituitary gland
   c) Thyroid follical cells　　　　d) Post. Lobe of pituitary gland

10) Vasectomy means _____.
    a) Cutting of Ureter
    b) Cutting and removal of seminal vesicles
    c) Cutting of vas deference
    d) Cutting and removal of prostate

11) Nephron is a structural and functional unit of _____.
    a) Testis　　　　　　　　　　b) Ovary
    c) Kidney　　　　　　　　　　d) Lungs

12) Sertoli cells are present in _____.
  a) Testis   b) Ovary
  c) Uterus   d) Liver

13) Hormone ACTH is produced by _____.
  a) anterior cortex   b) adrenal medulla
  c) anterior lobe of pituitary   d) posterior lobe of pituitary

14) Chromosomal abnormalities of a foetus can be detected by _____.
  a) Amniocentesis   b) X ray
  c) Electrocardiogram   d) Sonography

Q.2 A) Answer the following questions. (Any Four)   08
  1) Columnar epithelium
  2) Ligaments
  3) Structure Nephron
  4) Taste buds
  5) T-Cells

B) Write short notes(Any Two)   06
  1) Describe the structure of Neuron
  2) Histology of tooth
  3) Describe the humoral immunity

Q.3 A) Answer the following questions. (Any Two)   08
  1) Describe histological structure of kidney.
  2) Role of TSH
  3) Describe the female sex hormones.

B) Answer the following questions. (Any One)   06
  1) With the help of diagram explain histological structure of Graffian follicle.
  2) Describe the structure and functions of pancreas.

Q.4 A) Answer the following questions. (Any Two)   10
  1) Describe the histological structure of uterus.
  2) Describe the hormonal control of testicular activity.
  3) Abnormalities of GH hormones.

B) Answer the following questions. (Any One)   04
  1) Describe the hormones of posterior lobe of pituitary gland.
  2) Describe the hormonal control of pregnancy.

Q.5 Answer the following questions. (Any Two)   14
  a) Describe the any two types of epithelial tissue with reference to organ, location and functions.
  b) Explain different phases of menstrual cycle.
  c) Describe the procedure of IVF technique.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
BOTANY (Paper – VII)
PLANT PHYSIOLOGY AND CYTOGENETICS

Day & Date: Saturday, 02-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Draw neat and labeled diagram wherever necessary.
            4) All questions carry equal marks.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The cell organelle _____ is very essential for the process of photosynthesis.
   a) Chloroplast   b) Mitochondria
   c) Endoplasmic Reticulum   d) Ribosome

2) In C_3 cycle, _____ is the initial CO_2 acceptor.
   a) PGA   b) Rubisco
   c) PEP   d) RuBP

3) The atmospheric free Nitrogen can be fixed by _____.
   a) Blue green algae   b) Green algae
   c) Brown algae   d) Red algae

4) The root nodule bacterium was isolated by _____.
   a) Louis Pasteur   b) Beijerinck
   c) Lister   d) Haber

5) _____ is known as the father of genetics.
   a) Bateson   b) Punnet
   c) Gregor Mendel   d) Morgan

6) Mendel studied _____ number of characters in garden pea plant.
   a) five   b) six
   c) seven   d) eight

7) During meiosis, crossing over occurs in _____ phase.
   a) leptotene   b) zygotene
   c) pachytene   d) diplotene

8) The theory of linkage was put forth by _____.
   a) T. H. Morgan   b) Bateson
   c) Punnet   d) Mendel

9) A person of blood group _____ is a universal donor.
   a) A   b) B
   c) AB   d) O

10) In *Drosophila,* the red eye colour is _____ type.
   a) wild   b) mutant
   c) intermediate   d) both a & c

11) The Kranz anatomy is present in _____ plants.
   a) C_3 b) C_4
   c) CAM   d) C_3 & C_4

12) The percentage of Nitrogen in the atmosphere is approximately_____.
  a) 78
  b) 80
  c) 65
  d) 72

13) In dihybrid cross, typical genotypic ratio is _____.
  a) 3:1
  b) 9:7
  c) 9:3:3:1
  d) 3:7

14) The complete linkage is occurs in _____.
  a) Maize
  b) Male *Drosophila*
  c) Female *Drosophila*
  d) Man

Q.2 A) Answer the following questions. (Any Four) 08
  1) Define CAM plants.
  2) Define biological nitrogen fixation.
  3) What is dominant and recessive trait?
  4) What is meant by dimorphic chloroplast?
  5) Define phenotype.

B) Write Notes. (Any Two) 06
  1) Photosynthetic apparatus
  2) Nitrogen fixing micro organisms
  3) Mendelian traits

Q.3 A) Answer the following questions. (Any Two) 08
  1) Explain supplementary genes with suitable example.
  2) Describe photosystem I.
  3) Give the significance of crossing over.

B) Answer the following questions. (Any One) 06
  1) Explain law of segregation.
  2) Define multiple alleles. Write characteristics of multiple alleles.

Q.4 A) Answer the following questions. (Any Two) 10
  1) Explain Nitrogen cycle.
  2) State the difference between C_3 and C_4 pathway.
  3) Describe in brief eye colour in *Drosophila*.

B) Answer the following questions. (Any One) 04
  1) Describe Cyclic photophosphorylation.
  2) Explain in brief complete linkage.

Q.5 Answer the following questions. (Any Two) 14
  a) Explain law of independent assortment with suitable example.
  b) Describe the mechanism of crossing over.
  c) Describe C_4 pathway with its significance.

Seat No.	

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Botany (Paper – VIII)
ECONOMIC BOTANY

Day & Date: Monday, 04-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                         2) Figures to the right indicate full marks.
                         3) Draw neat labeled diagrams wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   **14**

1)   Example of drug obtained from Rhizome is _____.
   a) Ginger   b) Clove
   c) Gulvel   d) Vasaka

2)   Botanical name of Turmeric is _____.
   a) *Lawsonia inermis*   b) *Tectona grandis*
   c) *Curcuma longa*   d) *Indigofera tinctoria*

3)   _____ plant used as botanical pesticides.
   a) Tobacco   b) Henna
   c) Clove   d) Oak

4)   _____ is a source of drug obtained from *Syzygium aromaticum*.
   a) Stem   b) Floral bud
   c) Leaf   d) Root

5)   *Cajanus cajan* commonly known as _____.
   a) Pigeon pea   b) Chick pea
   c) Cow pea   d) Garden pea

6)   Perfumes and soap are prepared from the flowers of _____.
   a) Aloe   b) Opuntia
   c) Jasmine   d) Cymbopogon

7)   The botanical name of cotton is _____.
   a) *Gossypium arboretum*   b) *Cocos nucifera*
   c) *Azadirachta indica*   d) *Nicotiana tabacum*

8)   A medicine for bronchitis is obtained from _____.
   a) *Withania somnifera*   b) *Adhatoda zeylanica*
   c) *Emblica offinalis*   d) *Curcuma longa*

9)   *Bougainvillea spectabilis* is cultivated for _____ purpose.
   a) Medicinal   b) Ornamental
   c) Dyes   d) Insecticidal

10) _____ is the source of forage crop.
   a) *Medicago sativa*   b) *Cajanuscajan*
   c) *Arachis hypogaea*   d) *Cicer arietinum*

11) Vegetable oil obtained from _____.
   a) *Arachis hypogaea*   b) *Glycyrrhiza glabra*
   c) *Tinospora cordifolia*   d) Withania somnifera

12) Latex of rubber tree obtained from _____.
   a) Stem
   b) Leaf
   c) Root
   d) Inflorescence

13) *Celosia cristata* is _____.
   a) A large evergreen shrub
   b) A small annual herb
   c) Perennial herb
   d) Perennial shrub

14) A neem product used as insect repellent is _____.
   a) Azadirachtin
   b) Rotenone
   c) Endrin
   d) Parathion

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define dyes.
   2) State ornamental values of Bougainvillia.
   3) Define fodder legume.
   4) Give the botanical names of drug obtained from stem and root.
   5) State examples of seasonal and perennial plant.

B) Write Notes. (Any Two)   **06**
   1) Economic importance of Citronella
   2) Cultivation practices of Soybean
   3) Properties of Rubber

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Give the botanical name, ornamental values of cacti.
   2) Give the economic importance of ground nut.
   3) Give the botanical name and economic importance of red gram.

B) Answer the following questions. (Any One)   **06**
   1) Give botanical name, source, morphology and economic importance of any one insecticide.
   2) Give botanical name, source, morphology and economic importance of cotton.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) What is perennial? Give the botanical names and ornamental values of Acalypha and Aboli.
   2) Give botanical name, source and economic importance of dyes obtained from leaves.
   3) Give botanical name, source and extraction method of rubber.

B) Answer the following questions. (Any One)   **04**
   1) Describe economic importance of coir.
   2) Give economic importance of turmeric.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Give the botanical name, source, chemical constituent and economic importance of leaf drug.
   b) Give the botanical name, source, morphology and economic importance of chick pea.
   c) Give the botanical name, source, economic importance of korphad.

Seat No. ☐

Set **P**

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Psychology (Paper – VII)
COGNITIVE PSYCHOLOGY

Day & Date: Tuesday, 05-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) Paul C. Lauterbur and Peter Mansfield won the Nobel Prize in _____.
   a) Physiology   b) Physics
   c) Sociology   d) Economics

2) Cognitive psychology has come to rely on facts about the _____.
   a) Mind   b) Brain
   c) Memory   d) Society

3) _____ does not necessarily imply causation.
   a) Correlational   b) Effect
   c) Le Bon   d) Cost

4) _____ focused exclusively on the level of information processing.
   a) Personality   b) Abnormal
   c) Cognition psychology   d) Social

5) A behavioral method measures directly observable _____.
   a) Behavior   b) Explanation
   c) Attitude   d) Prediction

6) The oldest correlational methods record _____ activity from the scalp.
   a) Brain   b) Mind
   c) Soul   d) body

7) A _____ image creates the experience of "seeing with the mind's eye".
   a) Mental   b) Cognitive
   c) Abnormal   d) Experimental

8) _____ is investigated in several fields.
   a) Emotion   b) Motivation
   c) Cognition   d) Society

9) In 19th Century psychologists started to break away from _____.
   a) Economy   b) Philosophy
   c) Geography   d) Physics

10) _____ introduced the concept of schema.
    a) Wundt   b) Bartlet
    c) Cattle   d) Helmholtz

11) Active parts of Brain require _____ blood flow.
    a) Slower   b) Greater
    c) Average   d) Moderate

12) _____ defines two type of memory: Primary & Secondary.
    a) Wundt   b) James
    c) Cattle   d) Bartlet

13) The behaviorists had simply described _____ relation model.
   a) RT   b) RR
   c) SR   d) SS

14) In monitoring working memory involves _____ ordering task.
   a) Others   b) Self
   c) Any one   d) None of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define Cognitive Psychology.
   2) Write down Physical senses.
   3) What is isomorphism?
   4) What is SR model in Cognitive Psychology?
   5) How MRI Technique work?

B) Write Notes. (Any Two)   **06**
   1) MRI & EPI
   2) Characteristics of Short Term Memory
   3) Working Memory

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What is CAT Scan?
   2) What are the components of Long Term Memory?
   3) What are the parts of Central Executive in Working Memory?

B) Answer the following questions. (Any One)   **06**
   1) Pattern completion and recapitulation
   2) Short Term Memory

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) MRI Scan
   2) What is PET Scan?
   3) What is Phonological loop in Working Memory?

B) Answer the following questions. (Any One)   **04**
   1) Structure of Problem Solving
   2) Problem Solving Technique

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain the Nature of Long Term Memory.
   b) Define Forgetting & Write its function and Interference.
   c) Write the Brief History of Cognitive Psychology.

| Seat No. | | Set | P |

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
GEOLOGY (Paper - VII)
IGNEOUS PETROLOGY

Day & Date: Tuesday, 05-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.

Q.1 Choose and write correct answer from given alternatives.   14

1) The well- developed crystal faces in Igneous rocks are called _____.
   a) euhedral   b) anhedral
   c) subhedral   d) none of these

2) The presence of augite and leucite has lowered its freezing point by at least _____ ^0C in binary magma.
   a) 400   b) 500
   c) 600   d) 200

3) The end product of reaction relation in magma is _____.
   a) olivine   b) pyroxene
   c) amphibole   d) quartz

4) In ternary magma, _____magmas are represented by the corners of the Triangle.
   a) binary   b) ternary
   c) unicomponent   d) mix

5) The essential minerals in granite rocks are _____.
   a) Quartz, feldspar   b) Quartz, Augite
   c) Quartz, olivine   d) Olivine, Augite

6) Fine grain and the presence of glass in an igneous rock are indication of _____ cooling.
   a) Rapid   b) Slow
   c) Intermediate   d) All of these

7) The essential mineral composition in gabbro rock, are _____.
   a) Plagioclase and quartz   b) Augite and quartz
   c) Olivine and Quartz   d) Plagioclase and Augite

8) In Bowens continuous reaction series, the first crystallized mineral is _____.
   a) plagioclase   b) biotite
   c) muscovite   d) olivine

9) Texture of Basalt rock is _____.
   a) glassy   b) porphyritic
   c) granitic   d) equigranular

10) The contours in the ternary magma represents melting temperatures and are known are _____.
    a) liquids surface   b) eutectic point
    c) Isotherms   d) liquid melt

11) The essential features of _____ structure is simultaneous crystallization of fibres with radiate arrangement about a common center.
    a) spherulitic   b) orbicular
    c) corona   d) myrmekite

12) _____are usually rod or needle shaped to their mineralogical nature.
    a) microlites   b) holocrystalline
    c) merocrystalline   d) holohyaline

13) _____structures often shown a nucleus of an early-formed mineral.
    a) corona   b) myrmekite
    c) xenolithic   d) orbicular

14) The essential minerals in Basalt rock are _____.
    a) Quartz, feldspar   b) Quartz, Augite
    c) Quartz, olivine   d) olivine, Augite

Q.2 A) Answer the following questions (Any Four)   **08**
    1) Metastable region
    2) Formation of Granite rock.
    3) Xenolith formation
    4) Define Assimilation of magma
    5) Granitic Texture

B) Write Notes on (Any Two)   **06**
    1) Microlites
    2) Hypabyssal rocks
    3) Porphyritic texture

Q.3 A) Answer the following questions (Any two)   **08**
    1) Hybrid rocks
    2) Intergrowth texture
    3) Ophitic texture

B) Answer the following questions (Any One)   **06**
    1) Compare Glass and Crystal
    2) Compare differentiation and Assimilation

Q.4 A) Answer the following questions (Any Two)   **10**
    1) Explain crystallization of unicomponent magma.
    2) Explain reaction structure.
    3) Classification of Igneous rocks based on mode of occurrence.

B) Answer the following questions (Any One)   **04**
    1) Discontinuous reaction series in magma.
    2) Continuous reaction series in magma.

Q.5 Answer the following questions (Any two)   **14**
    a) Explain differentiation by liquid immiscibility and gravity settling.
    b) Explain crystallization of binary magma.
    c) Tabular classification of igneous rocks.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper - VII)
IMMUNOLOGY & MEDICAL MICROBIOLOGY

Day & Date: Tuesday, 05-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) The predominant antibody in saliva is.
   a) IgG b) IgA
   c) IgM d) IgD

2) _____ is the primary lymphoid organ of the human body.
   a) Thymus b) MALT
   c) Lymph node d) Spleen

3) _____ is antibody producing cell.
   a) Eosinophil b) Monocyte
   c) Lymphocyte d) NK cells

4) _____ are best antigen due to chemical complexity.
   a) Carbohydrate b) Lipids
   c) Nucleic acids d) Proteins

5) Immunogenicity of an antigen depends upon _____.
   a) Foreignness b) chemical complexity
   c) molecular size d) all of these

6) Valance of _____ antibody is not TWO.
   a) IgE b) IgD
   c) IgG d) IgM

7) Endotoxins are present in _____ of some gram negative bacteria.
   a) Cell membrane b) Cytoplasm
   c) Cell wall d) Nucleus

8) Substance does not have immunity alone but has specific reactivity is called _____.
   a) antigen b) hapten
   c) antibody d) complement

9) HIV virus can not cause AIDS to animals other than human, is an example of _____ immunity.
   a) Individual b) racial
   c) species d) all of these

10) IgA antibody present in mother's milk and transfer of IgG antibody through placenta from mother to child is an example of _____ immunity.
    a) Artificially active b) Artificially passive
    c) Naturally active d) Naturally passive

11) Widal test is used for diagnosis of _____.
   a) Enteric fever   b) Ricketssia
   c) Proteus spp   d) Candidiasis

12) IgE antibody has an affinity for ____ cells and results into hypersensitivity.
   a) Macrophage   b) lymphocytes
   c) Mast cells   d) Plasma cells

13) Primary lymphoid organ is _____.
   a) Spleen   b) bursa of fabricious
   c) Lymph node   d) payers patches

14) Antigen antibody reaction in Widal test used for diagnosis of typhoid is _____ type.
   a) Agglutination   b) precipitation
   c) Flocculation   d) none of these

Q.2 A) Answer the following questions in short. (Any Four)   **08**
1) What is inflammation?
2) What is acquired immunity?
3) Precipitation reaction.
4) Define antigen.
5) Transportation of clinical sample.

B) Write Short Notes (Any Two)   **06**
1) First line of defence
2) Which are types of acquired immunity?
3) Write on Dengue fever.

Q.3 A) Answer the following questions. (Any Two)   **08**
1) What are different cells involved in immune response?
2) Structure and function of Immunoglobin G (IgG).
3) What is Microbial invasion?

B) Answer the following questions. (Any One)   **06**
1) Write on Bacterial toxins
2) Candidiasis

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Urinary tract infections
2) Types of antigen
3) Immunogenicity

B) Answer the following questions. (Any One)   **04**
1) Chemical barriers in innate immunity.
2) What is Primary and secondary immune response?

Q.5 Answer the following questions. (Any Two)   **14**
a) Methods of diagnosis of diseases.
b) Write in brief on Antigen antibody reactions.
c) Primary lymphoid organs.

Seat No.	

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Psychology (Paper – VIII)
POSITIVE PSYCHOLOGY

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) "The broad and build theory" was presented by _____.
    a) Diener   b) Keyes
    c) Magyar   d) Frederickson's

2) _____ psychologists have also sensitized to the different cultural understanding of well- being and happiness.
    a) Social   b) Clinical
    c) Cognitive   d) Positive

3) _____ call for a positive psychology was aimed at refocusing the entire field of psychology.
    a) Seligman's   b) Diener
    c) Keyes   d) Magyar

4) _____ Psychology are very interested in the most recent studies.
    a) Clinical   b) Positive
    c) Social   d) Cognitive

5) _____ indicators assess the state of our health, families, and communities.
    a) Social   b) History
    c) Economic   d) Industrial

6) The extreme opposite of mental illness a state ____ & ____ called 'flourishing'.
    a) Keyes & Haidt   b) Diener & Magyar
    c) Ryff & Keyes   d) None of these

7) _____ seem to help restore the health of both our minds and our bodies.
    a) Positive emotions   b) Negative emotions
    c) Both   d) None of These

8) A satisfying _____ is founded on satisfying _____.
    a) Life, relationships   b) Love, life
    c) Relationships, love   d) Health, relationship

9) _____ and Personality Psychology researchers have contributed to an understanding of the roles that religion and morality play in people's lives.
    a) Social   b) Clinical
    c) Health   d) Cognitive

10) _____ described two psychological views of happiness distilled from classical philosophy.
    a) Diener   b) Keyes
    c) Waterman   d) Haidt

11) In the satisfaction with Life Scale, _____ scores are neutral point.
    a) 16   b) 10
    c) 20   d) 15

12) _____ developed a model they call him "Psychological well-being.
    a) Ryff   b) Diener
    c) Keyes   d) Magyar

13) _____'s theory is focus on discrete positive emotions.
    a) Fredrickson   b) Hagger
    c) Brown   d) Ryan

14) A long standing focus of _____ psychologist has been examination of conditions that threaten healthy development.
    a) Clinical   b) Social
    c) Developmental   d) Cognitive

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Define Long form of SWB.
    2) Define long form of PTG.
    3) Define positive psychology.
    4) Define Subjective Well- being.
    5) Define resilience.

B) Write Notes on. (Any Two)   **06**
    1) Pleasant Life
    2) Engaged Life
    3) Meaningful Life

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Explain the Positive psychology's goals.
    2) Positive emotions
    3) Economic indicators

B) Answer the following questions. (Any One)   **06**
    1) Define the Hedonic happiness.
    2) Defining Personal Goals.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Explain the Eudemonics Happiness.
    2) Explain the Need Fulfillment and Self- Determination Theory.
    3) Explain the Broaden- and - Build Theory.

B) Answer the following questions. (Any One)   **04**
    1) Explain the psychological Well- being.
    2) Explain the life satisfaction.

Q.5 Answer the following questions. (Any One)   **14**
    a) Explain the areas of Positive Psychology (Any Two)
    b) Explain the sources of Resilience in children.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Geology (Paper – VIII)
SEDIMENTARY & METAMORPHIC PETROLOGY

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.
                        3) Draw neat labelled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) Kankar is an example of _____deposits.
   a) chemical   b) residual
   c) argillaceous   d) arenaceous

2) Phyllite is _____ rock.
   a) Weakly foliated   b) Strongly foliated
   c) non foliated   d) none of these

3) A fine-grained metamorphic rock, typically with thin, separable layers, called as _____.
   a) shale   b) schist
   c) gneiss   d) slate

4) Shale converts to slate by _____ metamorphism.
   a) cataclastic   b) retrograde
   c) plutonic   d) thermal

5) Presence of Omphacite-garnet-quartz indicates ____ facies.
   a) amphibolite   b) green schist
   c) eclogite   d) none of these

6) A heterogeneous rock with mixture of metamorphic and igneous rock, common in folded region is called _____.
   a) BHQ   b) migmatite
   c) Anatexis   d) skarn

7) Braided channel deposits represent _____ environment.
   a) transitional   b) fluvial
   c) terrestrial   d) marine

8) The grain size in sandstones range between _____ mm.
   a) 4.0 – 3.5   b) 3.5 – 2.5
   c) 2.5 – 2.0   d) 2.0 – 0.1

9) Chemical deposits are represented by _____.
   a) limestone   b) dolomite
   c) kankar   d) all of these

10) The fine grained, non- laminated argillaceous rock is called _____.
   a) shale   b) slate
   c) mudstone   d) laterite

11) Gneiss are _____ rocks.
   a) Weakly foliated
   b) Strongly foliated
   c) non foliated
   d) none of these

12) In contact metamorphism, metamorphic effects are greatest adjacent to _____ rocks.
   a) Sedimentary
   b) Metamorphic
   c) Extrusive
   d) Intrusive

13) Poly-metamorphism can be recognized by _____.
   a) strain-slip cleavage
   b) cleavage
   c) Schistosity
   d) Rock Cleavage

14) Carbonaceous deposits represent _____ environment.
   a) transitional
   b) swamp
   c) marine
   d) none of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is metasomatism?
   2) Define metamorphism.
   3) Describe sedimentation in alluvial fan deposits.
   4) What is sedimentary basin?
   5) Give the names of minerals present in Granulite facies.

B) Write notes. (Any Two)   **06**
   1) Zeolite facies
   2) Chemical composition and characters of dolomite
   3) Shale

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe retrograde metamorphism.
   2) Describe the formation of oolitic limestone.
   3) Describe fabric of weakly foliated rocks.

B) Answer the following questions. (Any One)   **06**
   1) Explain in detail greenschist and amphibolite facies.
   2) Describe laterite and bauxite.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe conglomerate and breccias.
   2) Write a note on Retrograde metamorphism.
   3) Write a note on Marine environment.

B) Answer the following questions. (Any One)   **04**
   1) Write a note on Mylonite.
   2) Describe limestone.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe poly-metamorphism and anatexis processes.
   b) Describe in detail arenaceous sedimentary deposits.
   c) Describe in detail transitional sedimentary environment.

Seat No.

B.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper – VIII)
INDUSTRIAL MICROBIOLOGY - II

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw a neat labeled diagram wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) End point determination assays are meant for _____ substances.
   a) Amino acids   b) Antibiotics
   c) Vitamins   d) Amines

2) _____ is the waste product of sugar industry.
   a) Whey   b) Corn Steep Liquor
   c) Sulphite Waste Liquor   d) Molasses

3) Production of ____ is an example of dual fermentation.
   a) Penicillin   b) Vitamin B12
   c) Alcohol   d) Vinegar

4) _____ is waste generated by starch industry.
   a) Molasses   b) Whey
   c) Sulfite waste liquor   d) Corn steep liquor

5) Optimum sugar concentration in medium for alcohol production is _____%.
   a) 30-40   b) 10-18
   c) 50-60   d) 4-8

6) Crowed plate technique is used for screening of _____ producers.
   a) Acid   b) Growth factor
   c) Amine   d) Antibiotics

7) The best substrate for Penicillin production is _____.
   a) Whey   b) Molasses
   c) Corn steep liquor   d) Sulphite waste liquor

8) Overheating of fermenter during fermentation process is controlled by _____.
   a) Cooling jacket   b) Steam
   c) Ice   d) Cold air

9) *Bifidobacterium* is most commonly used as _____.
   a) *Probiotics*   b) SCP
   c) Biofertilizer   d) Biopesticides

10) _____ are used for disruption of vortex formation.
    a) Baffles   b) Impellers
    c) Spargers   d) Metal tubes

11) Phenyl acetic acid is precursor used in ____ production.
    a) Amylase   b) Penicillin G
    c) Vitamin B$_{12}$ d) Lysine

12) _____ Technique is used for selection of auxotrophic mutants.
   a) Penicillin
   b) Replica Plating
   c) Streptomycin
   d) Pour plating

13) Detection and isolation of industrially important organisms from natural source is called _____.
   a) Assay
   b) Preservation
   c) Enumeration
   d) Screening

14) The optimum temperature for alcohol production is _____°C.
   a) 18
   b) 28
   c) 20
   d) 24

Q.2 A) Attempt any four of the following question.   **08**
   1) Lyophilization
   2) Dual fermentation
   3) Continuous fermentation
   4) Recovery
   5) Industrial microbiology

B) Write Notes. (Any Two)   **06**
   1) Surface culture
   2) Production medium
   3) Probiotic Organisms

Q.3 A) Attempt any two of the following question.   **08**
   1) Explain briefly aeration control in fermentor.
   2) Write briefly on Turbidometric assays.
   3) Discuss secondary screening technique.

B) Attempt any one of the following question.   **06**
   1) Describe briefly preservation of industrially important microorganisms.
   2) Discuss briefly Scale- up.

Q.4 A) Attempt any two of the following question.   **10**
   1) Describe briefly Strain improvement techniques.
   2) Discuss in detail the Diffusion assay.
   3) Discuss briefly Primary screening.

B) Attempt any one of the following question.   **04**
   1) Discuss briefly the Production strain.
   2) Discuss briefly Enzymatic assay.

Q.5 Attempt any two of the following question.   **14**
   a) With labeled diagram discuss the parts of fermenter and their functions.
   b) Describe in detail the Penicillin fermentation.
   c) Describe in detail the alcohol fermentation.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Geography (Paper - I)
GEOMORPHOLOGY- I

Day & Date: Tuesday, 19-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat diagrams and map must be drawn wherever necessary.
4) Use of map stencil is allowed.

Q.1   Select the correct alternatives from the following rewrite the sentence.   08

1) _____ was an American Gemorphyologist.
   a) W. M Davis   b) Eratosthenese
   c) Ritter   d) Humboldt

2) Epeirogenic Movement are also called as _____ building movement
   a) Mountain   b) Plateau
   c) Ocean   d) Continental

3) _____ river valley is the example of rift rally in India.
   a) Ganga   b) Narmada
   c) Bhima   d) Krishna

4) Topographical condition of _____ region is ideal for Road and Railway
   Transportation.
   a) Plateau   b) Mountain
   c) Desert   d) Plain

5) Maximum destruction takes place by _____.
   a) Primary waves   b) Secondary waves
   c) Surface waves   d) Sound waves

6) The term 'Plate' was used by _____ for the first time.
   a) J. T. Wilson   b) Wegner
   c) Penck   d) Davis

7) Folding is the result of _____ movement.
   a) Sudden   b) External
   c) Slow   d) Vertical

8) There are_____ type of plate collisions.
   a) Four   b) Three
   c) Five   d) Six

Q.2   Answer the following questions. (Any Four)   08
1) State the second order landforms?
2) Define Geomorphology?
3) State the types of waves?
4) State the Sial and Sima?
5) State the scope of Geomorphology?
6) State any two type nature of Geomorphology?

Q.3 **Answer the following questions. (Any Two)** 08
  1) Explain types of Faults.
  2) Explain effects of Earth quakes?
  3) Describe the characteristics of Sedimentary rocks?

Q.4 **Answer the following questions. (Any Two)** 08
  1) State the importance of Geomorphology for Tourism development?
  2) Distribution of Volcanoes of the world.
  3) Explain the igneous rocks.

Q.5 **Answer the following questions. (Any One)** 08
  1) Explain the type of folds.
  2) Explain Plate Tectonic Theory.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
English
LITERARY QUEST

Day & Date: Saturday, 05-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                       2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   08

1) World's Parliament of Religious was held in the _____ year.
    a) 1893   b) 1891
    c) 1890   d) 1896

2) A 'Sister' according to Mother Teresa must give up all her _____.
    a) education   b) life
    c) possessions   d) job

3) _____ when our mind is tranquil says Grenville Kleiser.
    a) You feel insults keenly   b) I'll thoughts cease
    c) Become Selfish   d) Become unhappy

4) A man feels a real _____ if he hands out a ten pound note.
    a) tremor   b) sad
    c) bad   d) happy

5) Science is addressed as _____.
    a) daughter of Old Times   b) enemy of Old Times
    c) wife of Old Times   d) hearald of New Times

6) T. Ramalingam _____ (speak: simple present) Marathi fluently.
    a) Speaks   b) Spoke
    c) Speaking   d) Speak

7) Vishal is _____ (strong: use comparative) than Dinesh.
    a) Strongest   b) Strong
    c) Strongest   d) Stronger

8) _____ said, "Father! you come again."
    a) Sick man's wife   b) Sick man's son
    c) Sick man   d) Sick man's daughter

9) _____ is the best message conveyed by the Parliament of Religions.
    a) Holiness and purity are not exclusive to any one religion
    b) Assimilation, and not destruction
    c) All religions have produced men and women of exalted character
    d) None of the above.

10) _____ has made man cruel.
    a) Gold   b) Money
    c) Silver   d) Position

11) Father Gilligan is humbled by the experience because _____.
    a) he realizes God Lakes care of everyone
    b) he feels that the dying man waited for him
    c) he feels nature soothed him because he was so tired
    d) God could show his concern for his community

12) The priest has understood that God has sent one of his _____ to help him.
    a) Priest   b) Father
    c) Angel   d) Adam

13) The comparative form of strange is _____.
    a) Strangerly   b) Stranger
    c) More Strange   d) Most strange

14) The Superlative form of ill is _____.
    a) more ill   b) worse
    c) worst   d) most ill

Q.2 Attempt any four of the following questions.   16
  1) What does one gain from being clam according to the poet Grenville Kleiser?
  2) How has money made the individual nervous, afraid and insecure? What are its long term effects?
  3) What has science taken away from humans?
  4) Why is Father Gilligan so weary? Why is he so struck by Grief and Guilt?
  5) Why does the poet not support the cause of science? Describe in your own words the reasons he gives for this.
  6) Why does Lawrence say that the present attitude towards money is all wrong? What are the changes he wants to see in society?

Q.3 Attempt any two of the following questions.   12
  1) What are the evils that prevent the advancement of society according to Swami Vivekananda?
  2) What do we learn from Mothers Teresa's life?
  3) Write the dialogues for the situations:
      Rajesh goes to his friend Ramesh's Birthday Party where in he introduces himself to Ramesh's elder brother.
  4) Write the dialogue for the situation:
      Smita and Sita are good childhood friends, After a long gap, they meet in a Reception.

Q.4 Attempt any one of the following question.   14
Write an argumentation speech on 'Ban of Polythene'.
                                OR
Write a debate on 'Should Students Study ethics in colleges'?

Q.5 Read the following passage and summarize it.   14
The pie chart below shows the percentages of types of transportation used by 800 students to come to college.
Study the pie chart and answer the questions :
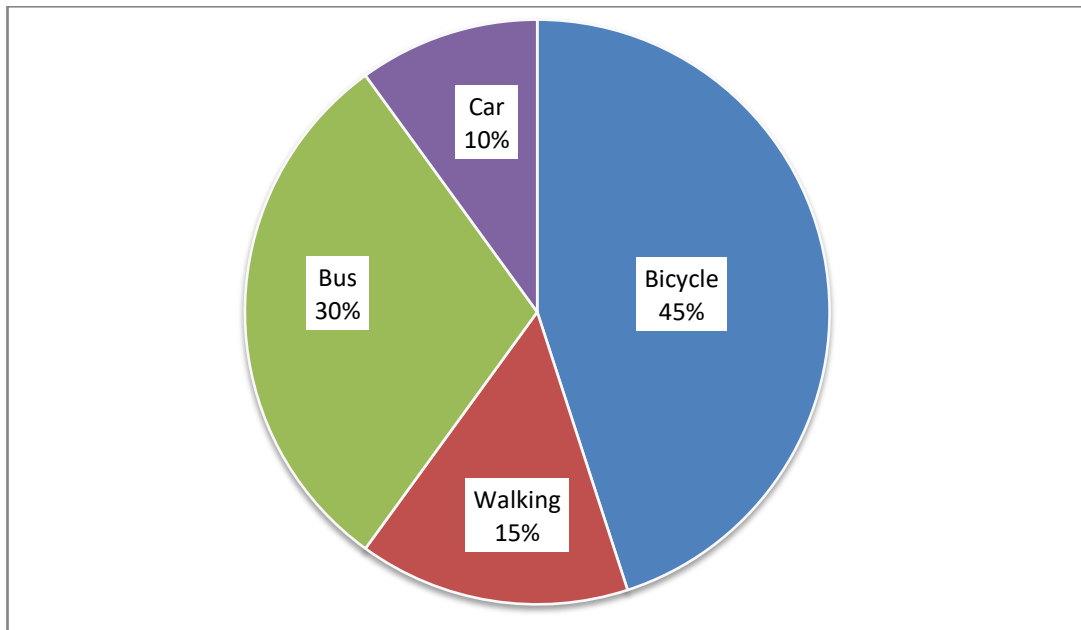
1) How many students come to the college by bicycles?
2) How many students do not walk to college?
3) How many students come to college by bus or car?
4) Write in brief, your observation and analyze the pie chart.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Physics (Special Paper – IX)
MATHEMATICAL PHYSICS & STATISTICAL PHYSICS

Day & Date: Monday, 07-10-2019　　　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Draw neat diagrams wherever necessary.
　　　　　　　4) Use of log table or calculator is allowed.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　In a _____ differential equation the dependent variable and its all derivatives occur in the first power.
　　a)　homogeneous　　　　　　　　b)　inhomogeneous
　　c)　linear　　　　　　　　　　　d)　nonlinear

2)　For _____ singularity the series solution is never possible.
　　a)　regular　　　　　　　　　　　b)　non essential
　　c)　infinite　　　　　　　　　　　d)　essential

3)　In spherical polar coordinate system, h_3 = _____.
　　a)　$r \sin \theta$　　　　　　　　　b)　Φ
　　c)　$\sin \theta$　　　　　　　　　　d)　r

4)　In orthogonal curvilinear coordinate system the coefficients h_1, h_2, h_3 are called _____.
　　a)　scales　　　　　　　　　　　b)　scale factors
　　c)　scale coefficients　　　　　　d)　scale coordinates

5)　Many different _____ may corresponds to same macrostates.
　　a)　phase spaces　　　　　　　　b)　phase densities
　　c)　microstates　　　　　　　　　d)　phase points

6)　For the distribution to be most probable _____.
　　a)　$w = 0$　　　　　　　　　　　b)　$\delta \ln w = 0$
　　c)　$\ln w = 0$　　　　　　　　　　d)　$\delta \ln w = 1$

7)　Volume of cell in phase space is _____.
　　a)　h^6　　　　　　　　　　　　b)　h^2
　　c)　h^3　　　　　　　　　　　　d)　h^4

8)　Maxwell-Boltzmann statistics is applicable to _____.
　　a)　He atoms　　　　　　　　　　b)　gas molecules
　　c)　electron　　　　　　　　　　　d)　protons

9)　The relation between V_{mp}, $\overline{V}$ and V_{rms} of gas molecules in a system is ____.
　　a)　$V_{rms} < \overline{V} < V_{mp}$　　　　b)　$V_{rms} \leq \overline{V} \leq V_{mp}$
　　c)　$V_{mp} \leq \overline{V} \leq V_{rms}$　　　　d)　$V_{mp} \leq \overline{V} < V_{mp}$

10)　According to Stefan's law _____.
　　a)　$E = \sigma T^4$　　　　　　　　b)　$E = \sigma T^2$
　　c)　$E = \sigma T^3$　　　　　　　　d)　$E = \sigma T$

11) Rayleigh - Jeans formula agrees well with the experimental results at _____ wavelength.
   a) longer
   b) shorter
   c) medium
   d) all

12) Rest mass of photon is _____.
   a) one
   b) infinity
   c) negative
   d) zero

13) Fermi- Dirac statistics applicable to _____.
   a) photons
   b) electrons
   c) molecules
   d) neutrons

14) According to F-D statistics, 3 particles can be arranged in 4 energy levels, in _____ number of ways.
   a) 4
   b) 16
   c) 9
   d) 12

Q.2 A) Answer the following questions. (Any Four) 08
   1) Define Degree and Order of differential equation with examples.
   2) Write Laplacian operator.
   3) Define accessible microstates.
   4) Define Fermi energy.
   5) What is quantum statistics? State its two sub classes.

B) Write Notes on (Any Two) 06
   1) Thermodynamic probability
   2) Concept of Orthogonal curvilinear coordinate system
   3) Types of differential equations

Q.3 A) Answer the following questions. (Any Two) 08
   1) Deduce Greens theorem from Gauss divergence theorem.
   2) Extend expressions in orthogonal curvilinear coordinates to Cartesian coordinates.
   3) What do you mean by ensemble? Describe micro canonical and canonical ensembles.

B) Answer the following questions. (Any One) 06
   1) What are thermodynamic functions? Express them in terms of Boltzmann partition function.
   2) Derive Fermi-Dirac distribution law.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Deduce the functional relationship between entropy and probability. Hence state statistical definition of entropy.
   2) Derive Maxwell-Boltzmann distribution law.
   3) Compare M-B, B-E and F-D statistics.

B) Answer the following questions. (Any One) 04
   1) Derive expression for most probable speed.
   2) If a black body at temperature 6174^0K emits 4700 A^0 with a maximum energy, calculate the temperature at which it will emit wavelength of 1.5×10^{-4} m with maximum energy.

Q.5 Answer the following questions. (Any Two) 14
   a) State and prove Stokes theorem in vector field.
   b) Obtain an expression for curl in vector field in orthogonal curvilinear coordinates.
   c) Derive Planck's radiation formula in terms of frequency and wavelength.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Special Paper – IX)
PHYSICAL CHEMISTRY

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Draw neat diagrams and give equations wherever necessary.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) For a pure gas the degree of freedom is _____.
    a) 3   b) 2
    c) 1   d) 0

2) Photochemical reactions are _____ of temperature.
    a) dependent   b) independent
    c) directly proportional   d) all of these

3) The unit of cell potential is _____.
    a) faraday   b) J
    c) erg   d) Volt

4) In case of one component system when all the three phases are in equilibrium, the system is _____.
    a) tri-variant   b) bi-variant
    c) uni-variant   d) non-variant

5) Only the light that is absorbed by the system is capable to produce the photochemical change. This is known as _____ law.
    a) Einsteins equivalence   b) Avogadro's
    c) Grotthus-Draper   d) Beer's

6) For electrochemical cell to be spontaneous, the change in free energy is to be _____.
    a) positive   b) zero
    c) negative   d) both a and b

7) According to IUPAC nomenclature, double vertical line in the cell represents _____.
    a) direct contact   b) salt bridge
    c) mixed system   d) all of these

8) For ice $\rightleftharpoons$ water (1) system, the degrees of freedom is _____.
    a) 1   b) 0
    c) 2   d) 3

9) In the primary photochemical process each molecule is activated by the absorption of one quantum of radiation. This is known as _____ law.
    a) Einsteins   b) Avogadro's
    c) Grotthus-Draper   d) Beer's

10) _____ is the radiative transition.
    a) internal conversion   b) delayed fluorescence
    c) vibrational relaxation   d) intersystem crossing

11) At 0 K, the cell potential is _____.
  a) equal to 0
  b) E^0
  c) less than E^0
  d) equal to 1

12) In some photochemical reactions low quantum yield is obtained. It is due to _____.
  a) deactivation of reacting molecules
  b) occurrence of reverse primary reactions
  c) recombination of dissociated fragments
  d) all of these

13) The standard electrode values of the elements A, B and C are $+0.68V, -2.50 V$ and $-0.50 V$ respectively. The order of their reducing power is ____.
  a) A > B > C
  b) A > C > B
  c) C > B > A
  d) B > C > A

14) Gibbs phase rule is _____.
  a) $F = P - C + 2$
  b) $F = C - P + 2$
  c) $P = F - C + 2$
  d) $P = F - C + 1$

Q.2 A) Answer the following questions. (Any Four) **08**
  1) Define:
     i) standard potential
     ii) single electrode potential.
  2) Give Nernst equation for electrode potential and cell potential.
  3) Define:
     i) eutectic point
     ii) congruent melting point
  4) Define:
     i) oxidation
     ii) reduction
  5) Mention various non-radiative (radiationless) transitions.

B) Write Notes on (Any Two) **06**
  1) Metal-insoluble salt electrode
  2) Oxidation-reduction electrode
  3) Luminescence

Q.3 A) Answer the following questions. (Any Two) **08**
  1) Define quantum efficiency. Give the reasons for low and high quantum efficiencies.
  2) Discuss the applications of phase rule to study water system.
  3) Discuss gas electrode with two examples.

B) Answer the following questions. (Any One) **06**
  1) With the help of neat labeled Jablonski's diagram, explain phenomena of fluorescence and phosphorescence.
  2) Derive an expression for emf for chemical cell without transference.

Q.4 A) Answer the following questions. (Any Two) **10**
  1) Draw neat labeled diagram of sulphur system. Explain why four phases of sulphur system can not exist at a single point.
  2) The emf of the cell
     $Pt, H_2 (g), 1 atm | H^+ (3 \times 10^{-4} M \parallel H^+ (M_1) | H_2 (g), 1 atm, Pt$ at 298 K is 0.0154 V. Calculate the value of M1 and pH of this solution.

3) A gas when exposed to radiation of wavelength 3310 A undergoes decomposition, and per kilocalorie of light energy absorbed, 0.023 moles of the gas is decomposed. Calculate the quantum efficiency. Given -1 cal= 4.184 J, h = 6.626x10^{-34} J sec.

B) **Answer the following questions. (Any One)** **04**
1) Explain how emf measurement can be used to determine ΔG and ΔH.
2) The standard emf of a Daniel cell involving the cell reaction Zn(s) + Cu^{2+}(aq) = Zn^{2+} + Cu(s) is 1.1 V. Calculate the equilibrium constant of the cell reaction at 25^{0}C.

Q.5 **Answer the following questions. (Any Two)** **14**
a) The emf of a cell $^{-}$Ag | AgI in 0.05 M KI || 0.05 M AgNO$_3$ | Ag^{+} is 0.788 volt at 25°C. Calculate the solubility of silver iodide in water at 25°C if AgNO$_3$ and KI are dissolved to the extent of 90%.
b) What are concentration cells? Derive an expression for the emf of a electrode concentration cell without transference reversible to anion.
c) Discuss the phase diagram of Ferric Chloride - Water system.

Seat No.

Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper – IX)
REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) Tapetal layer develop from division of _____.
   a) Sporogenous tissue   b) Parietal layer
   c) Microspore mother cell   d) None of these

2) Pollen grain divides in to two unequal cells; the larger one is called as _____.
   a) MMC   b) Vegetative cell
   c) Pollen tube   d) Sporogenous tissue

3) In NPC system _____ term is used instead of aperture.
   a) Monotreme   b) Peroblate
   c) Treme   d) Both b & c

4) _____ ovule shows horse shoe shape.
   a) Orthotropous   b) Anatropous
   c) Amphitropous   d) Hemianatropous

5) If both male & female garnets matures different time called as _____.
   a) Herkagamy   b) Heterostyly
   c) Dichogam   d) Sterility

6) Pollination has occurred between two flowers of same plant called as ___.
   a) Cross   b) Self
   c) Genitogamy   d) Xenogamy

7) Entry of Pollentube into ovule through chalaza is called as _____.
   a) Porogamy   b) Chalazogamy
   c) Mesogamy   d) None of these

8) _____ was first to show both male gametes released by pollen tube are involved in fertilization.
   a) Nawaschin   b) Shanarf
   c) Russeu   d) Belayeva

9) _____ is a type of monosporic embryo sac.
   a) *Polygonum*   b) *Allium*
   c) *Adoxa*   d) *Drusa*

10) Pollen grains without aperture are called as _____.
    a) Atreme   b) Ditreme
    c) Monotreme   d) Pentatreme

11) Bitegmic ovules are present in _____.
    a) Dicots   b) Monocots
    c) Polypetalae   d) Both b & c

12) The tetrasporic type of embryo sac are _____ nucleated.
   a) 4   b) 8
   c) 16   d) 32

13) _____ is a function of tapetum layer.
   a) Pollen wall formation   b) Formation of callose
   c) Transport of nutrients   d) All of these

14) Helobial type of endosperm is found in _____.
   a) Alage   b) Bryophyte
   c) Monocotydone   d) Dicotyledone

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Define microsporogenesis.
2) Draw a neat labeled diagram of female gametophyte.
3) Define anemophily.
4) Sketch and label monosporic embryo sac.
5) Give functions of tapetum layer.

B) Write Notes on (Any Two)   **06**
1) Anther wall
2) Significance of self pollination
3) Circinotropous ovule

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Describe in detail bisporic embryo sac with a suitable example.
2) Explain the diversity in structure of style.
3) With a neat labeled diagram describe anatroups ovule.

B) Answer the following questions. (Any One)   **06**
1) Describe in detail double fertilization.
2) Explain flower as a modified shoot.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Mechanism of pollination with suitable example.
2) Describe cellular type of endosperm.
3) Explain scope of palynology.

B) Answer the following questions. (Any One)   **04**
1) Describe process of megasporogenesis.
2) Mention the agencies of pollination.

Q.5 Answer the following questions. (Any two)   **14**
a) Describe in detail development of male gametophyte.
b) Describe in detail types of seed dispersal.
c) Describe the development of tetrasporic embryosac.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper – IX)
NON – CHORDATES

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat and labeled diagrams must be drawn wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Dactylozooids are conseaned with _____.
   a) Nutrition   b) Reproduction
   c) Respiration   d) Protection

2)   In Leech female genical opening is present in segment number _____.
   a) 9   b) 10
   c) 11   d) 12

3)   In Leucosolenia _____ type of canal system is present.
   a) ascon   b) sycon
   c) leucon   d) rhagon

4)   Peripatus is a connecting link between _____ and _____.
   a) Annelida & arthropoda   b) Arthropoda & Mollusca
   c) Mollusca & Echinodermata   d) Echinodermata & Hemichordata

5)   Botryoidal tissues are found in _____.
   a) Leech   b) Cockroach
   c) Tapeworm   d) Liver fluke

6)   _____ is the earliest and basic larval stage in crustaceans.
   a) Naupleus   b) Matanaupleus
   c) Zoea   d) Mysis

7)   Locomotor organs of sea star are _____.
   a) Pseudopodia   b) Tube feet
   c) Setae   d) Parapodia

8)   _____ pairs of testicular nephridia are present in leech.
   a) 10   b) 11
   c) 17   d) 6

9)   The Larva of butterfly moth is commonly called _____.
   a) Polypod   b) Oligopod
   c) Apodus   d) Trophosphere

10) Auto trophic type of nutrition is found in _____.
   a) Amoeba   b) Trypansoma
   c) Paramocium   d) Euglena

11) In a sponge which of the followings are responsible for maintaining the current of water?
   a) Pinocytes   b) Porocytes
   c) Choanocytes   d) Pinacocytes

12) Nauplius is the larva of _____.
  a) Mollusca
  b) Crustacea
  c) Insecta
  d) Echinodermata

13) _____ type of feeding habit is found in Leech.
  a) Herbivorous
  b) Frugivorous
  c) Sanguivorous
  d) Omnivorous

14) Bipinnaria is the larva of _____.
  a) Pila
  b) Ctenophora
  c) Sea-Star
  d) Nereis

Q.2 A) Answer the following questions. (Any Four)   **08**
  1) General Characters of Annelida
  2) Systematic Position of Sea-Star
  3) Structure of Tube Foot
  4) Brachilolaria
  5) Jaws of Leech

B) Write Notes on. (Any Two)   **06**
  1) Economic Importance of Leech
  2) Madreporite
  3) Systematic Position of Leech

Q.3 A) Answer the following questions. (Any Two)   **08**
  1) Describe Parasitic Adaptation in Leech.
  2) Explain Locomotion in Sea-Star.
  3) Conjugation in Paramoecium

B) Answer the following question. (Any One)   **06**
  1) Explain with neat labeled diagram Excretory System of Leech.
  2) Describe with neat labeled diagram "The Water Vascular System of Sea-Star".

Q.4 A) Answer the following questions. (Any Two)   **10**
  1) Describe Nervous System of Leech.
  2) Describe the types of Crustacean larvae.
  3) Describe the types of insect larvae.

B) Answer the following question. (Any One)   **04**
  1) Describe Body Wall of Sea-Star.
  2) Write notes on Torsion and Detorsion.

Q.5 Answer the following questions. (Any Two)   **14**
  a) With neat labeled diagram explain the Digestive system of Leech.
  b) Polymorphism in Coelenterates.
  c) Explain Food, Feeding and Digestive system of Sea-Star.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Mathematics (Special Paper – IX)
ALGEBRA – II

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The characteristics of the ring 3Z is _____.
   a) 0   b) 3
   c) 6   d) None of these

2) Which structure is not a field?
   a) $(R, +, \cdot)$ b) $(C, +, \cdot)$
   c) $(E, +, \cdot)$ d) None of these

3) The number of ideals in the field f is _____.
   a) 0   b) 1
   c) 2   d) None of these

4) The vector space $M_{6 \times 5}$ (F) has dimension is _____.
   a) 6   b) 5
   c) 30   d) None of these

5) The dimension of vector space of complex number C over field of complex number _____.
   a) 2   b) 0
   c) 1   d) None of these

6) Consider the two statement
   I) The empty set is Linearly Dependent
   II) Set containing zero vector is Linearly Dependent then _____
   a) only I true   b) only II true
   c) both I and II are true   d) None of these

7) If w_1 and w_2 are finite dimensional subspace of vector spare V then $\dim(w_1 + w_2) =$ _____.
   a) $\dim w_1 + \dim w_2$ b) $\dim w_1 + \dim w_2 + \dim(w_1 \cup w_2)$
   c) $\dim w_1 + \dim w_2 - \dim(w_1 \cap w_2)$ d) None of these

8) In inner product space the norm is defined by $\|v\| =$ _____.
   a) $\langle v, v \rangle$ b) $\sqrt{\langle v, v \rangle}$
   c) $\langle v, v \rangle^2$ d) None of these

9) If $u = (2, 1, -1) \in R^3$ then $\frac{u}{\|u\|} =$ _____.
   a) $\frac{1}{\sqrt{6}} (2, 1, -1)$ b) $\frac{1}{\sqrt{2}} (2, 1, -1)$
   c) $\frac{1}{\sqrt{6}} (-2, 1, -1)$ d) None of these

10) If $x = (1 + i, 4)$ and $y = (2 - 3i, 4 + 5i)$ in c^2 then $\langle x, y \rangle =$ _____.
   a) $15 - 15i$
   b) $15 + 15i$
   c) $-15 + 15i$
   d) None of these

11) Let $T: V \to W$ is linear then null space $N(T)$ of T is _____.
   a) $\{x \in V \,/\, T(x) = 0\}$
   b) $\{x \in W \,/\, T(x) = 0\}$
   c) $\{x \in V \,/\, T(x) = x\}$
   d) None of these

12) If $T : R^2 \to R^3$ be linear transformation defined by
   $T(a_1, a_2) = (a_1 + 3a_2, \ 0, \ 2a_1 - 4a_2)$ Then $[T]_\beta^\gamma$ where β and γ be the standard ordered bases for R^2 and R^3.
   a) $\begin{bmatrix} 1 & 3 \\ 0 & 0 \\ 2 & -4 \end{bmatrix}$
   b) $\begin{bmatrix} 1 & 0 & 2 \\ 3 & 0 & -4 \end{bmatrix}$
   c) $\begin{bmatrix} 1 & 0 \\ 3 & 2 \\ 0 & -4 \end{bmatrix}$
   d) None of these

13) $T : R^3 \to R^3$ is linear transformation given by $T(x, y, z) = (y, z, x)$ then ____.
   a) T is one-one and onto
   b) T is one-one but not onto
   c) T is onto but not one-one
   d) None of these

14) Let $T : R^3 \to R^3$ be linear transformation given by
   $T(x_1, x_2, x_3) = (x_1 + x_2 + x_3, \ x_1 - 2x_2, \ 2x_2 - x_3)$ Then $T(1, 1, 2) = ?$
   a) $(4, -1, 1)$
   b) $(4, -1, 0)$
   c) $(4, 0, 0)$
   d) None of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define integral domain.
   2) Prove that if R is ring then $a. 0 = 0 = 0. a \ \forall \ a \in R$.
   3) If x, y, z are vector in a vector space V such that $x + z = y + z$ then show that $x = y$
   4) Let V be inner product space and $x, y, z \ \in V$ then show that
      $$\langle x, y + z \rangle = \langle x, y \rangle + \langle x, z \rangle$$
   5) If $T : V_3 \to V_1$ is defined by $T(x_1, x_2, x_3) = x_1^2 + x_2^2 + x_3^2$ then show that is T non linear.

B) Write Notes on (Any Two)   **06**
   1) Show that every homomorphic image of commutative ring is commutative.
   2) Determine whether first vector can be written as linear combination of other two vector $(-2, 0, 3) \ (1, 3, 0) \ (2, 4, -1)$
   3) Prove that $\|cx\| = |c| \ \|x\|$ for all $c \in f$ and $x \in V$

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Let $V = R^3$ show that w is subspace of V where
      $$w = \{(a_1, a_2, a_3) \,/\, a_1 - 4a_2 - a_3 = 0\}$$
   2) Let be $\{V_1, V_2, \dots V_k\}$ the orthogonal set in V and $a_1, a_2, \dots a_k$ are scalars then prove that
      $$\left\| \sum_{i=1}^{k} a_i V_i \right\|^2 = \sum_{i=1}^{k} |a_i|^2 \ \|V_i\|^2$$
   3) If $T : R_2 \to R_2$ be linear transformation given by
      $T(1, 0) = (1, 4) \quad T(1, 1) = (2, 5)$ what is $T(2, 3)$

B) Answer the following questions. (Any One) 06

1) Verify that the $\left\{\begin{bmatrix} 1 & -3 & 2 \\ -4 & 0 & 5 \end{bmatrix}, \begin{bmatrix} -3 & 7 & 4 \\ 6 & -2 & -7 \end{bmatrix}, \begin{bmatrix} -2 & 3 & 11 \\ -1 & -3 & 2 \end{bmatrix}\right\}$ of $M_{3\times3}(R)$ is linearly dependent or linearly independent.

2) Let V be the vector space T, $U_1, U_2 \in L(V)$ then show that
   i) $T(U_1 + U_2) = T(U_1) + T(U_2)$
   ii) $T(U_1, U_2) = (TU_1) U_2$

Q.4 A) Answer the following questions. (Any Two) 10

1) Show that every field is an integral domain.

2) In vector space for each $x \in V$ and $a \in f$ prove that
   i) $0. x = 0$
   ii) $(-a)x = -(ax) = a(-x)$

3) If $T : V_3 \to V_3$ be linear transformation given by $T(x, y, z) = (3x, x - y, 2x + y + z)$ Find T^{-1}

B) Answer the following questions. (Any One) 04

1) If $T : V_3 \to V_3$ be linear transformation defined by $T(x_1, x_2, x_3) = (x_1, x_2, 0)$ Find $N(T)$ and $R(T)$

2) Let V be the vector space over field f, then prove that parallelogram law in inner product space
   $$\|x + y\|^2 + \|x - y\|^2 = 2\|x\|^2 + 2\|y\|^2$$

Q.5 Answer the following questions. (Any Two) 14

a) Show that the set of member of $a + b\sqrt{2}$ with a, b as rational number is a field.

b) Let V and W be vector space and let $T : V \to W$ be liner if V is finite dimensional then show that
   $$\text{nullity}(T) + \text{rank}(T) = \dim(V)$$

c) Let V be an inner product space over F then prove that
   $\|x + y\| \le \|x\| + \|y\|$ for all $x, y \in V$

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper – IX)
STATISTICAL INFERENCE – I

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                       2) Each question carries equal marks.
                       3) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   If T is unbiased for θ then $\emptyset(T)$ is unbiased for $\emptyset(\theta)$ if $\emptyset$ is _____.
     a) Linear   b) Continuous
     c) Onto   d) One-to-one

2)   If $T = t(X_1, X_2, \ldots X_n)$ is a sufficient statistic for θ and an unique maximum
     likelihood estimator $\hat{\theta}$ for θ exists, then _____.
     a) $\hat{\theta} = t(X_1, X_2, \ldots X_n)$ b) $\hat{\theta}$ is a function of t
     c) $\hat{\theta}$ is independent of t   d) none of the above

3)   Consistency of an estimator is a _____.
     a) Large sample property
     b) Small sample property
     c) property not related to sample size
     d) property applicable to any sample size

4)   Let $X_1, X_2, \ldots X_n$ be a sample from a distribution with p.d.f.
$$f(x, \theta) = e^{-(x-\theta)} \qquad x > \theta$$
$$= 0 \qquad \text{otherwise}$$
     Then a MLE for θ is
     a) $\sum \frac{x_i}{n}$ b) $\{\prod x_i\}^{\frac{1}{n}}$
     c) $\text{Min}(X_1, X_2, \ldots X_n)$ d) $\text{Max}(X_1, X_2, \ldots X_n)$

5)   The maximum likelihood function are necessarily _____.
     a) Unbiased   b) sufficient
     c) most efficient   d) Unique

6)   If t is a consistent estimator of θ then _____.
     a) t is also a consistent estimator of θ^2
     b) t^2 is also a consistent estimator of θ^2
     c) t^2 is also a consistent estimator of θ
     d) none of these

7)   If $X_1, X_2, \ldots X_n$ is a random sample from $N(\mu, \sigma^2)$ population, the sufficient
     statistic for μ is when σ is known _____.
     a) $\sum(x_i - \bar{x})$ b) $\frac{\bar{x}}{n}$
     c) $\sum x_i$ d) $\sum(x_i - \bar{x})^2$

8)   An estimator T_n is said to be consistent for $\phi(\theta)$ if
     a) $P\{|Tn - \emptyset(\theta)| > \epsilon\} = 1$ b) $\lim_{n \to \infty} P\{|T_n - \emptyset(\theta)| < \epsilon\} = 1$
     c) $\lim_{n \to \infty} P\{|T_n - \emptyset(\theta)| < \epsilon\} = 0$ d) None of these

9) Suppose $X_1, X_2, \ldots X_n$ is a random sample from $N(0, \sigma^2)$ then $S_0^2 = \frac{\Sigma x_i^2}{n}$ is an unbiased estimator of _____.

   a) σ^2
   b) σ^2/n
   c) $\frac{(n-1)}{n}\sigma^2$
   d) $\sigma^2 + \frac{\sigma^2}{n}$

10) Suppose X_1, X_2 is a random sample from Poisson (λ). If $T_1 = (X_1 + X_2)/2$ and $T_2 = (X_1 + 3X_2)/4$ then relative efficiency of T_1 with respect to T_2 is _____.
    a) 5/4
    b) 4/5
    c) ½
    d) 1

11) Pitman-Koopman form of probability distribution is used to determine estimator of the parameter.
    a) Unbiased
    b) sufficient
    c) efficient
    d) Consistent

12) A random sample of size n drawn from $U(0, \theta)$ distribution then estimator of the parameter θ by the method of moments is _____.
    a) $2\bar{x}$
    b) $\bar{x}$
    c) $(n + 1)X_{(n)}$
    d) $\bar{x}/2$

13) Suppose $X_1, X_2, \ldots X_n$ is a random sample of size n from distribution with probability density function
    $$f(x, \theta) = \begin{cases} e^{-(x-\theta)} & x \geq \theta \\ 0 & \text{otherwise} \end{cases}$$
    Then M.L.E. of θ is _____.
    a) $\sum X_i$
    b) $\max(X_1, X_2, \ldots X_n)$
    c) $\min(X_1, X_2, \ldots X_n)$
    d) $\prod X_i$

14) An estimator which converges to a parameter θ in probability as the sample size tends to infinity is said to be _____.
    a) Sufficient estimator
    b) efficient estimator
    c) consistent estimator
    d) unbiased estimator

Q.2 A) Answer the following questions. (Any Four) 08
   1) Prove or disprove: If the statistic T is an unbiased estimator of θ then $T + \theta$ is an unbiased estimator of 2θ
   2) Explain consistent estimator giving an illustration.
   3) Give one example of biased but consistent estimator.
   4) State Neyman-factorization theorem.
   5) Define Fisher information function $I(\theta)$

B) Answer the following questions. (Any Two) 06
   1) Show that Sample mean Square is unbiased estimator of Population Variance.
   2) If $x_1, x_2, \ldots x_n$ be a random sample of size n from $N(\mu, 1)$. Obtain the sufficient statistic for μ.
   3) Obtain likelihood function of a random sample $x_1, x_2, \ldots x_n$ from Poisson distribution with parameter λ.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Find moment estimator of θ if $f(x) = \begin{cases} \theta^x(1 - \theta) & x = 0,1,2, \ldots \\ 0 & \text{otherwise} \end{cases}$
   2) Show that Sample mean is sufficient statistic for parameter λ of Poisson distribution.

3) Show that there exists infinite number of unbiased estimators of parameter θ

B) Answer the following question. (Any One) 06
1) Find Fisher Information function for the parameter θ of Exponential distribution.
2) Prove that biased estimator is consistent if it's bias and variance both tends to zero as sample size tends to infinity.

Q.4 A) Answer the following questions. (Any Two) 10
1) Describe the method of minimum chi-square for the estimation of parameters.
2) x_1, x_2, x_3 a random sample from Poisson distribution with parameter λ. Let $T_1 = \frac{x_1+x_2+x_3}{3}$, $T_2 = \frac{2x_1+4x_2+2x_3}{8}$ show that T_1 and T_2 are two unbiased estimators of λ. Find the efficiency of T_2 and T_1
3) Based on a random sample of size n, obtain a sufficient estimator of θ for the following.
   a) $f(x,\theta) = \theta\, e^{\theta x}$ $x > 0$
   b) $f(x,\theta) = e^{-(x-\theta)}$ $x > \theta$

B) Answer the following question. (Any One) 04
1) Prove that if T is unbiased estimator of θ, then $\phi(T)$ is an unbiased estimator of $\phi(\theta)$ provided $\phi(.)$ is a linear function.
2) Prove that if T is consistent estimator of θ, then $\phi(T)$ is consistent estimator of $\phi(\theta)$ provided $\phi(.)$ is a continuous function.

Q.5 Answer the following questions. (Any Two) 14
a) State and prove Cramer-Rao inequality.
b) Show that M.V.U.E. of parameter θ is unique, if it exists.
c) Obtain estimator of θ by the method of a) moments and b) Likelihood for the following pdf
$$f(x,\theta) = \theta x^{\theta-1} \qquad 0 < x < 1 \qquad \theta > 0$$

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper – IX)
EARTH'S PHYSICS AND DYNAMICS

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) Satpura Mountain is an example of _____ mountain.
   a) fold   b) fault block
   c) volcanic   d) residual

2) The Tethys Sea was located between _____.
   a) Eurasia and North America   b) Antarctica and South India
   c) Africa and Antarctica   d) Eurasia and Africa

3) _____ postulated his hypothesis of isostasy considering the uniform density of the outer crust.
   a) Pratt   b) Airy
   c) Heiskanen   d) Hess

4) _____ means all land masses.
   a) Gondwana   b) Tethys
   c) Pangaea   d) Eurasia

5) The average thickness of a plate is about _____ km.
   a) 10   b) 100
   c) 500   d) 1000

6) The single super continent is known as _____.
   a) Tethys   b) Gondwana
   c) Panthalsa   d) Pangaea

7) _____ refers to the origin of mountain building.
   a) Orogenesis   b) Isostasy
   c) Epeirogenesis   d) Mountogenesis

8) Himalayan Mountain is the example of _____.
   a) Vocanic   b) Fold
   c) Fault   d) Residual

9) India was once part of _____.
   a) Laurasia   b) North America
   c) Gondwana   d) South America

10) The ocean basins are formed _____ million years back.
    a) 20   b) 200
    c) 2000   d) 20000

11) Which plate among the following plates is smaller?
    a) Antarctica   b) African
    c) Eurasia   d) China

12) An elevated surface having height less than 300m is known as _____.
   a) Mountain
   b) Ridge
   c) range
   d) Hill

13) This process makes new crust at the bottom of the ocean at a divergent boundary _____.
   a) Mid-Atlantic Ridge
   b) Seafloor spreading
   c) Subduction
   d) Hotspot

14) Process of collision of two plates with different densities is known as ___.
   a) Abduction
   b) Subduction
   c) Prediction
   d) Production

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What are two types of plate boundaries?
   2) Define subduction zone.
   3) Classification of mountains based on their height?
   4) Where benioff zone is located?
   5) What is the average thickness of lithosphere?

B) Write Notes on (Any Two)   **06**
   1) What is level of compensation?
   2) What are continental mountains?
   3) What are characteristics of Fold Mountains?

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe supporting evidences for continental drift.
   2) Explain in brief exogenetic forces.
   3) Explain mechanism of plate motion.

B) Answer the following questions. (Any One)   **06**
   1) Distinguish between plate margin and plate boundary.
   2) Describe evidences of sea floor spreading.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) What are orogenic movements?
   2) Explain residual mountains.
   3) Explain in brief sudden forces.

B) Answer the following questions. (Any One)   **04**
   1) Explain causes of plate motion.
   2) Describe block or fault mountain.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe hot plumes.
   b) Explain crustal movements.
   c) Explain concept of plate tectonics.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper – IX)
VIROLOGY

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                          2) Figures to the right indicate full marks.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**
   1)   One step growth experiment was devised by _____.
         a) Ellis & Delbruck   b) Watson & Crick
         c) Lederberg   d) Walksman

   2)   _____ lambda phage gene is responsible for the lysogenic state.
         a) Q   b) A
         c) R   d) Cl

   3)   _____ contain single stranded RNA as their genome.
         a) Pox viruses   b) Papova viruses
         c) Orthomyxo viruses   d) Parvo viruses

   4)   Genome of _____ virus is segmented.
         a) TMV   b) Influenza
         c) Adeno   d) Mammary Tumor

   5)   _____ DNA containing Oncogenic virus.
         a) Rous Sarcoma virus   b) Mammary Tumor virus
         c) EB virus   d) Leukemia virus

   6)   Polystyrene latex is used for enumeration of viruses in sample by _____.
         a) Pock method   b) Direct microscopic count
         c) Acid end point method   d) Hemagglutation assay

   7)   _____ contains linear double stranded DNA with cohesive ends as its
         genome.
         a) λ phage   b) Phi-X-174
         c) T4   d) MS2

   8)   _____ is temperate phage.
         a) λ phage   b) T4
         c) T3   d) $\ominus$X174

   9)   _____ phage contains 12 capsomers in its Capsid.
         a) T4   b) T2
         c) φX-174   d) Lambda

   10) Adeno viruses possess _____ capsid symmetry.
         a) Helical   b) Complex
         c) Icosahadral   d) Prolate icosahedral

   11) Embryoted chicken egg yolk is suitable medium for cultivation of _____
         virus.
         a) Herpes simplex virus   b) Hepatitis
         c) Adeno   d) Mammary tumor

12) Bovine spongiform encephalopathy disease is caused by _____.
   a) Viroids
   b) Adeno virus
   c) Prions
   d) CaMV

13) _____ virus possesses icosahedral capsid symmetry.
   a) Influenza
   b) Polio
   c) Rhabdo
   d) Vaccinia

14) Potato spindle tuber disease is caused by _____.
   a) Viroids
   b) TMV virus
   c) Prions
   d) CaMV

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is Envelop?
   2) What is Cro repressor? Give its role.
   3) What are Transformed Cells?
   4) What is viroid?
   5) Give the nature of Adeno virus genome.

B) Answer the following questions. (Any Two)   **06**
   1) Define Eclipse period.
   2) Define repression and induction.
   3) What is the role of CI, CII and CIII protein?

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe general properties of Viruses.
   2) Discuss briefly prevention and control of plant diseases.
   3) Describe briefly the methods used for cultivation of Animal viruses.

B) Answer the following questions. (Any One)   **06**
   1) Give the detailed account of one step growth experiment.
   2) Describe the types of Cancers.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Give brief account of Prions.
   2) Discuss the method used for isolation of Coliphages from sewage.
   3) Explain in detail intracellular development of influenza virus.

B) Answer the following questions. (Any One)   **04**
   1) Describe in detail the one step growth experiment.
   2) Describe the characteristics of cancerous cells.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain in detail Lytic cycle of T4 bacteriophage viruses.
   b) What is lysogeny? Discuss briefly the lysogeny of λ phage.
   c) Discuss briefly methods used for enumeration of viruses.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper – IX)
LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

Day & Date: Monday, 07-10-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagram wherever necessary.
4) Use of log table and calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) The first integrated circuit chip was developed by _____.
   a) C. V. Raman
   b) B. C. Shockley
   c) J. S. Kilby
   d) S. N. Bose

2) A diffused resistor in an integrated circuit _____.
   a) can be any value
   b) can be only of p-type
   c) is formed at the same time as one of the transistor regions
   d) is formed after the transistor diffusions

3) The foundation on which an IC is built is called as _____.
   a) wafer
   b) plate
   c) base
   d) insulator

4) A log amplifier has _____ in the feedback loop.
   a) a BJT
   b) a resistor
   c) a capacitor
   d) inductor

5) To rectify voltage less than 0.6 V _____ is used.
   a) Tunnel diode
   b) Varicap
   c) Precision diode
   d) LED

6) In sample and hold circuit, Op-amp is used as _____.
   a) adder
   b) oscillator
   c) buffer
   d) amplifier

7) _____ filter has maximum flat pass and stop bands.
   a) Butterworth
   b) Elliptic
   c) Chebyshev
   d) None of these

8) In second order low pass filter the number of RC combination is _____.
   a) four
   b) two
   c) three
   d) one

9) _____ IC gives -5V regulated output.
   a) 7905
   b) 7805
   c) 7105
   d) 7405

10) In IC regulator _____ is used to increase the current capacity of the regulator.
   a) reference voltage source
   b) pass transistor
   c) error amplifier
   d) none of these

11) A voltage regulator is a circuit which _____.
   a) maintains a constant d.c. output voltage inspite of the fluctuations in a.c. input voltage or load current
   b) converts the a.c. voltage to d.c. voltage
   c) smoothens the a.c. variations in d.c. output voltage
   d) none of these

12) _____ IC corresponds to PLL.
   a) IC 555
   b) IC 556
   c) IC 547
   d) IC 565

13) The all pass filter is used when _____.
   a) phase shift is important
   b) high roll-off rates are needed
   c) a rippled stop band is important
   d) none of these

14) In a PLL, to obtain lock, the signal frequency must _____.
   a) come within the lock range
   b) be less than the capture frequency
   c) come within the capture range
   d) be greater than the capture frequency

Q.2 A) Answer the following questions. (Any Four) 08
   1) Why aluminum is preferred for metallization in IC technology?
   2) What is the purpose of having input and output capacitors in three terminal IC regulators?
   3) What do you mean by passive and active filters?
   4) Define lock range and capture range in PLL.
   5) What are the advantages of IC voltage regulator?

B) Write Notes on (Any Two) 06
   1) Fabrication of resistor in IC
   2) Series Op-amp regulator
   3) Application of PLL as FM demodulator

Q.3 A) Answer the following questions. (Any Two) 08
   1) Explain Epitaxial process of IC fabrication.
   2) Explain clamper circuit using Op-amp and draw its I/P-0/P waveforms.
   3) Draw the pin configuration of IC LM 317 and obtain the equation for its output voltage.

B) Answer the following question. (Any One) 06
   1) Explain principle and working of PLL.
   2) Explain narrow band stop filter.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Explain Precision full wave rectifier using Op-amp.
   2) Explain F to V converter using LM 331.
   3) Explain active peak detector.

B) Answer the following question. (Any One) 04
   1) Draw the Circuit diagram of clipper and explain it with input and output waveforms.
   2) Draw the circuit diagram of second order low pass filter. Calculate cut off frequency of second order low pass filter, if $R_1 = R_2 = 1\ k\Omega$ and $C_1 = C_2 = 0.1\ \mu F$.

Q.5 **Answer the following questions. (Any two)** **14**
    a) What is an Integrated circuit? What are its advantages and limitations over the discrete circuits? Explain fabrication of diode in IC.
    b) Explain log and Antilog amplifier using Op-amp.
    c) Explain the use of PLL as
       i) Frequency multiplier
       ii) FSK demodulator

Seat No.

B.Sc.(Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Geography (Paper - II)
GEOMORPHOLOGY - II

Day & Date: Wednesday, 20-11-2019　　　　　　　　　　Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Neat diagrams and must be drawn wherever necessary.
　　　　　　　4) Use of maps stencil is allowed.

Q.1　Select the correct alternatives from the following rewrite the sentence.　08

1) Sea caves is formed due to the erosional work of _____.
   a) Coastal (sea waves)　　　　b) Glacial
   c) Karst　　　　　　　　　　d) River

2) Cirque is formed due to the _____ work of Glacial.
   a) Erosional　　　　　　　　b) Depositional
   c) Trasportational　　　　　　d) All of above

3) 'Rapids' is formed due to the _____ work of river.
   a) Depositional　　　　　　　b) Erosional
   c) Transporation　　　　　　　d) All of above

4) Potholes landform is related to _____.
   a) Wind　　　　　　　　　　b) River
   c) Underground water　　　　d) Glacier

5) 'V' shaped valley is formed to the _____ work of river.
   a) Depositional　　　　　　　b) Erosional
   c) Transperatation　　　　　　d) None of these

6) Mushroom is formed by the erosional work of _____.
   a) River　　　　　　　　　　b) Wind
   c) Glacier　　　　　　　　　d) Underground water

7) Sand dunes are formed by the depositional work _____.
   a) Wind　　　　　　　　　　b) River
   c) Underground water　　　　d) Glacier

8) Waterfall is product of erosion work of _____.
   a) Wind　　　　　　　　　　b) Glacier
   c) River　　　　　　　　　　d) Underground water

Q.2　Answer the following questions. (Any Four)　08
1) Define the term mass wasting.
2) State the types of chemical weathering.
3) State the names of landforms formed by erosional work of sea waves (costal).
4) What is mean of Glacier?
5) What is mean by sea cliff?
6) State the name of landforms formed by erosional work of wind.

Q.3 **Answer the following questions. (Any Two)** 08
1) Describe types of moraines
2) Physical weathering
3) Explain the shifting of Sand Dunes

Q.4 **Answer the following questions. (Any Two)** 08
1) Explain the ox-bow lake with diagram
2) Explain the Bar Khans with diagram
3) State the Youth stage of cycle of erosion.

Q.5 **Answer the following questions. (Any One)** 08
1) Explain the landform associated with depositional work of river.
2) Describe the erosional Landforms associated with ground water (Karst).

SLR-DK-150

Seat No.

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper – IX)
VISUAL PROGRAMMING USING C++

Day & Date: Monday, 07-10-2019
Time: 11:30 AM To 02:00 PM

Max. Marks: 70

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) Which of the following .NET components can be used to remove unused references from the managed heap?
   a) CLR
   b) Class Loader
   c) Garbage Collector
   d) None of the above

2) Which of the following assemblies can be stored in Global Assembly Cache?
   a) Private Assemblies
   b) Public Assemblies
   c) Protected Assemblies
   d) Friend Assemblies

3) Which of these keywords is not a part of exception handling?
   a) try
   b) finally
   c) thrown
   d) catch

4) How many times can a constructor be called during lifetime of the object?
   a) As many times as we call it
   b) Only once
   c) Depends upon a Project Setting made in Visual Studio.NET
   d) Any number of times

5) How many enumerators will exist if four threads are simultaneously working on an ArrayList object?
   a) 4
   b) 3
   c) 2
   d) 1

6) Disadvantages of Explicit type conversion are that it _____.
   a) make program memory heavier
   b) results in loss of data
   c) is potentially Unsafe
   d) is memory consuming

7) Process of defining a method in terms of itself, that is a method that calls itself is _____.
   a) recursion
   b) abstraction
   c) encapsulation
   d) polymorphism

8) A Class declared protected becomes member of subclass of which type _____
   a) Public member
   b) Private members
   c) protected members
   d) Static members

9) An inheritance mechanism facilitates _____.
   a) the Use of existing functionality of base class
   b) Overriding the existing functionality of base class
   c) Implementation of new functionality in the derived class
   d) All of the above

10) To fully abstract a class from its implementation we use _____.
    a) objects   b) packages
    c) interfaces   d) function definitions

11) Which of these access specifiers must be used for main() method?
    a) Private   b) public
    c) protected   d) none of these

12) Destruction of an object _____.
    a) cleans up memory   b) deletes the class
    c) un initializes the object   d) both b and c

13) Namespace contains _____.
    a) Classes   b) Interface
    c) both a & b   d) None of the above

14) What does CIL stands for?
    a) Command Information Library
    b) Computational Intelligence Laboratory
    c) Community Information Line
    d) Common Intermediate Language

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Define Interfaces.
2) Explain Hybrid inheritance.
3) Differentiate between value type and reference type.
4) Explain Enumerations.
5) Explain Stack non-generic collection.

B) Write Notes on (Any Two)   **06**
1) Properties
2) Bitwise operator
3) Method overloading

Q.3 A) Answer the following questions. (Any two)   **08**
1) Explain the parameter passing techniques.
2) What is abstract method explain with suitable example.
3) Explain life cycle of thread.

B) Answer the following questions. (Any One)   **06**
1) Explain the different File Handling classes.
2) Define an Interface. Write a program to implement a property through interface.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain need of operator overloading with suitable example.
2) Write a C# program to demonstrate Method overloading.
3) Write a program to handle custom exception.

B) Answer the following questions. (Any One)   **04**
1) Write a program to read and write the text to the file.
2) What is type casting and how it is done in C#?

Q.5 Answer the following questions. (Any Two)   **14**
a) Explain .Net Framework with suitable block diagram in detail.
b) Explain access specifies used in C# in detail
c) What is Operator Overloading? Write a program to overload unary ++ operator.

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Physics (Special Paper – X)
SOLID STATE PHYSICS

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Neat diagrams must be drawn wherever necessary.
 4) Use of log table or calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) The packing density of FCC structure is _____.
    a) 0.74   b) 0.68
    c) 0.52   d) 1

2) Number of atoms present in unit cell of hcp structure is _____.
    a) 2   b) 4
    c) 6   d) 7

3) Who discovered X-rays?
    a) Rutherford   b) Bohr
    c) Rontgen   d) Einstein

4) Powder method of X-ray diffraction is used for the analysis of _____
    crystals.
    a) Cubic   b) Trigonal
    c) Monoclinic   d) Triclinic

5) The Fermi-Dirac distribution function is given as f (E) = _____.
    a) $\dfrac{1}{exp\left(\frac{E-E_f}{kT}\right)}$ b) $\dfrac{1}{exp\left(\frac{E-E_f}{kT}\right)+1}$

    c) $\dfrac{1}{exp\left(\frac{E-E_f}{kT}\right)-1}$ d) $\dfrac{1}{exp\left(\frac{E_f-E}{kT}\right)-1}$

6) At room temperature, the amount of energy that an electron can gain from
    thermal source is nearly equal to _____.
    a) 0.03 eV   b) 3 eV
    c) 3 MeV   d) 3 V

7) Fermi energy of metal depends upon _____.
    a) size of metal   b) temperature of metal
    c) free electron density   d) length of metal

8) The effective mass of electron is given as m*= _____.
    a) $\dfrac{\hbar^2}{\left(d^2E/dk^2\right)}$ b) $\dfrac{h^2}{\left(d^2E/dk^2\right)}$

    c) d^2E/dk^2 d) $\hbar^2 \cdot \dfrac{d^2E}{dk^2}$

9) If charge carriers are electrons, then the sign of Hall coefficient R_H is ____.
    a) positive   b) negative
    c) both   d) null

10) The band gap energy of diamond is _____.
  a) 0.2 eV   b) 0.7 eV
  c) 7 eV   d) 2.7 eV

11) The magnetic susceptibility of diamagnetic materials is _____.
  a) zero   b) negative
  c) positive   d) infinity

12) According to Curie law, the susceptibility χ is _____.
  a) directly proportional to absolute temperature T
  b) inversely proportional to absolute temperature T
  c) inversely proportional to absolute temperature T^2
  d) inversely proportional to square root of absolute temperature T

13) The superconductors which strictly follow he Meissner effect are called _____ superconductors.
  a) Type-I   b) Type-II
  c) Type-III   d) Semiconducting

14) At _____ temperature, a metal becomes a superconductor.
  a) Curie   b) Neel
  c) Critical   d) Meissner

Q.2 A) Answer the following (Any Four)   **08**
  1) An X-ray beam of wavelength 1.262 A^o incidents on a calcite crystal with lattice spacing d= 3.035 A^o. What may be glancing angle for first order reflection?
  2) Determine Miller indices for the planes (2a, 4b, c /2).
  3) State any four properties of metal.
  4) Draw one dimensional periodic potential model of metal (Kronig-Penny model of metal).
  5) Define magnetic susceptibility.

B) Answer the following (Any Two)   **06**
  1) Show that the reciprocal of reciprocal lattice is the direct lattice.
  2) Write note on Ferrimagnetism.
  3) What are the applications of superconductors?

Q.3 A) Answer the following (Any two)   **08**
  1) Show that every reciprocal lattice vector is normal to the lattice plane of the crystal lattice.
  2) Show that packing fraction of simple cubic is 0.52.
  3) Write note on ferrites.

B) Answer the following (Any One)   **06**
  1) Derive the expression for electrical conductivity, thermal conductivity and Widemann-Franz relation for metal.
  2) Derive and expression for potential energy, kinetic energy and total energy of an electron in an isolated atom.

Q.4 A) Answer the following (Any Two)   **10**
  1) Derive an expression for the interplaner spacing for the plane (hkl) type in the cubic structure.
  2) Explain Braggs' law in reciprocal lattice.
  3) Explain Hysteresis in Ferromagnetic materials.

B) Answer the following (Any One)   **04**
  1) Explain the effect of magnetic field on superconductor.
  2) State and explain Meissner effect.

Q.5 **Answer the following (Any two)** **14**
  a) Describe the seven systems of crystals with suitable diagram.
  b) Discuss Sommerfeld's model of metal and hence derive the expression for energy of a free electron in metal.
  c) Distinguish between metals, semiconductors and insulators on the basis of band theory of solids.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Special Paper- X)
INORGANIC CHEMISTRY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagram and give equations wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) In the molecular orbital diagram, electrons present in NBMO are _____ electrons.
   a) metal
   b) ligand
   c) metal & ligand
   d) none of these

2) According to CFT bonding between metal and ligand is _____ in nature.
   a) coordinate
   b) covalent
   c) ionic
   d) metallic

3) Artificial transmutation was first reported by _____.
   a) Rutherford
   b) Irene Curie
   c) Chadwick
   d) Meri Curie

4) The radiant energy from sun is due to _____.
   a) chemical reaction
   b) nuclear fusion
   c) nuclear fission
   d) artificial transmutation

5) The radioactive element Plutonium not occurring naturally hence obtained in large amount by transmutation of _____ element.
   a) ^{238}U
   b) ^{233}U
   c) ^{235}U
   d) ^{232}Th

6) The chlorides of _____ and _____ maintains appropriate viscosity of blood.
   a) Sodium, Potassium
   b) Calcium, Magnesium
   c) Iron, Copper
   d) Silver, Gold

7) The binding power of haemoglobin is dependent on partial pressure of _____.
   a) Hydrogen
   b) H_2O
   c) Oxygen
   d) Nitrogen

8) The _____ metal ion is involved in blood clotting.
   a) Ca
   b) Cd
   c) Fe
   d) Zn

9) The decomposition of hydrogen peroxide may be efficiently controlled by addition of drop of sulphuric acid. Hence sulphuric acid acts as _____ catalyst.
   a) auto
   b) enzyme
   c) positive
   d) Negative

10) In the manufacture of sulphuric acid by contact process the As_2O_3 present in the reactants acts as _____.
   a) promoter
   b) inducer
   c) poison
   d) activator

11) According to intermediate compound formation theory, catalyst _____ the activation energy of complex.
   a) lowers
   b) raises
   c) keep same
   d) lowers as well as increases

12) The deficiency of element _____ to plants may cause chlorosis.
   a) Phosphorus
   b) Calcium
   c) Potassium
   d) Iron

13) The Guano is _____ fertilizer.
   a) complete and natural
   b) complete and synthetic
   c) incomplete
   d) Mixed

14) When gypsum is not easily available, then _____ is used to absorb ammonia to manufacture ammonium sulphate.
   a) 40% HCl
   b) 60% HNO_3
   c) 60% H_2SO_4
   d) 50% H_2SO_4

Q.2 A) Attempt any four of the following questions. 08
   1) In octahedral field crystal field splitting energy Δ_0 is always higher than tetrahedral field splitting energy Δ_t, i.e. $\Delta_o > \Delta_t$. Why?
   2) Discuss artificial radioactivity with suitable example.
   3) Distinguish deoxyhaemoglobin and oxyhaemoglobin.
   4) The colour of $KMnO_4$ vanishes slowly in the beginning during its reaction with oxalic acid but fastens after some time. Why?
   5) What are mixed fertilizers? Give any four most important advantages of these fertilizers.

B) Write the Notes on (Any Two) 06
   1) Spectrochemical series
   2) Applications of catalysis
   3) Triple super phosphate

Q.3 A) Attempt any two of the following questions. 08
   1) What is crystal field stabilization energy? Calculate CFSE for d^4 case for octahedral complex in weak field and strong field complexes.
   2) Write short note on chain reaction.
   3) Describe the oxygen binding curves of Haemoglobin and Myoglobin.

B) Attempt any one of the following questions. 06
   1) On the basis of CFT explain the formation of $[Co(NH_3)_6]^{3+}$ complex ion. Comment on its spin and stability.
   2) What are different applications of radioisotopes as tracers? Explain in detail structural determination of PCl_5.

Q.4 A) Attempt any two of the following questions. 10
   1) Give the important types of nuclear reactions. Explain Nuclear fusion in detail.
   2) What are the different theories of catalytic reactions? Discuss any one of them in detail.
   3) How is urea manufactured? Why it is considered as superior nitrogenous fertilizer.

    B)   **Attempt any one of the following questions.**   **04**
        1)   Mention various factors affecting on the Crystal field splitting of d orbitals. Explain any one in detail.
        2)   Give the structure of Myoglobin and explain its function.

Q.5   **Attempt any two of the following questions.**   **14**
    a)   On the basis of MOT, explain the complex $[CoF_6]^{-3}$ and comment on its magnetic properties.
    b)   What is Nuclear Reactor? Why Thorium preferred in FBR? Explain the construction and working of FBR for generation of nuclear energy.
    c)   Which elements are essential for biological processes? Explain the role of calcium in biological processes.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper - X)
GENETICS

Day & Date: Wednesday, 09-10-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) In polygenic inheritance, traits are determined by _____.
   a) Multiple alleles at a single locus
   b) the interaction of multiple genes
   c) Two dominant alleles on a gene
   d) One gene being masked by another

2) The size of a gene pool _____.
   a) always increases b) always decreases
   c) fluctuates over time d) stays constant

3) When colorblind female married with healthy male, then their offspring will be _____.
   a) colorblind daughters b) colorblind sons
   c) colorblind daughters and sons d) normal

4) In *Drosophila,* chromosomes in normal male are _____.
   a) 2A +XY b) 2A+XXY
   c) 2A+XX d) None of the above

5) In man, _____ pairs of autosomes are present.
   a) 44 b) 23
   c) 46 d) 22

6) Extranuclear inheritance commonly occurs in _____.
   a) nucleus b) cytoplasmic organelles
   c) ribosomes d) cell membrane

7) The inheritance of plastid in *Mirabilis jalapa* was first time described by _____.
   a) Correns b) Mendel
   c) Griffith d) Bridge

8) The chemical _____ induces polyploidy.
   a) 2,4 D b) Cytokinin
   c) Giberelic acid d) Colchicin

9) The physical mutagen is _____.
   a) alkylating agents b) X ray
   c) base analogs d) acridine dye

10) Mutations are mainly responsible for _____.
    a) variation in organism
    b) constancy in organism
    c) maintaining genetic continuity between the parent and the offspring
    d) increasing the population rate.

11) Acridine causes _____.
   a) transition
   b) transversions
   c) substitution mutation
   d) frame shift

12) Monosomic lines will be _____.
   a) N
   b) n-1
   c) 2n-1
   d) 2n-2

13) *Triticum aestivum* is _____.
   a) autohexaploid
   b) allohexaploid
   c) diploid
   d) tetraploid

14) The proportion of different genotypes in a sample is called _____.
   a) emigration
   b) gene frequency
   c) genotypic frequency
   d) relative fitness

Q.2 **A)** **Attempt any four of the following questions.**   **08**
   1) What is role of autosome?
   2) Write the name of two alkylating agents.
   3) What is mean by polygenic inheritance?
   4) Define gene pool.
   5) What is trisomy?

   B) **Write the short notes on (Any Two)**   **06**
   1) Sex linked inheritance: Haemophilia
   2) Chemical mutagen: Base analogs
   3) Significance of cytoplasmic inheritance

Q.3 **A)** **Attempt any two of the following questions.**   **08**
   1) Explain Hardy-Weinberg equilibrium.
   2) Describe in brief physical mutagens.
   3) Explain in brief XX-XO female -male sex determination.

   B) **Attempt any one of the following questions.**   **06**
   1) What is chromosomal aberration? Explain in brief inversion.
   2) Give an account of Bridge's experiment: Balance concept of sex determination in *Drosophila.*

Q.4 **A)** **Attempt any two of the following questions.**   **10**
   1) Give an account of chemical mutagen
   2) Explain Mitochondrial inheritance.
   3) Describe the genetic significance of deletion.

   B) **Attempt any one of the following questions.**   **04**
   1) Explain molecular basis of mutation.
   2) Write a note on holandric gene.

Q.5 **Attempt any two of the following questions.**   **14**
   a) What is polyploidy? Describe in brief allopolyploid with suitable example.
   b) Write characteristics of extra chromosomal inheritance.
   c) What is sex determination? Explain in brief autosomes and sex chromosomes.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper- X)
DEVELOPMENTAL BIOLOGY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.
                3) Draw neat and labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) When is an unborn baby most at risk of developing a birth defect _____?
    a) First trimester   b) Second trimester
    c) Last trimester   d) All 9 months

2) The gut or digestive tract of a vertebrate arises from the _____.
    a) vegetal pole   b) primitive streak
    c) Archenteron   d) somites

3) Anterior end of primitive streak is occupied by _____.
    a) mesodermal cells   b) notochordal cells
    c) endodermal cells   d) ectodermal cells

4) Extra or missing chromosomes trigger genetic birth defects. What factor greatly increases the risk for an abnormal number of chromosomes in the fetus?
    a) Older age of the mother   b) Father's diet
    c) Mother's diet   d) None of the above

5) Number of pairs of somites present in 24 hrs chick embryo is _____.
    a) 4   b) 6
    c) 8   d) 5

6) Nerve Cord cells are originated from _____.
    a) Neuro-ectoderm   b) notochord
    c) Mesoderm   d) endoderm

7) In human being, the egg are _____.
    a) microlecithal   b) macrolecithal
    c) megalecithal   d) alecithal

8) In human the placenta is _____.
    a) haemochorial   b) endothelial
    c) epithiochorial   d) syndesmochorial

9) Fertilization of ova in human take place in _____.
    a) ovary   b) vagina
    c) fallopian tube   d) uterus

10) Insect eggs are the characteristics of _____ Egg.
    a) Polylecithal   b) Homolecithal
    c) Centrolecithal   d) Telolecithal

11) Blood islands present in _____ hrs of Chick embryo.
    a) 18   b) 24
    c) 33   d) 72

12) Ultrasound' is a reflection of _____.
    a) soft tissues only   b) hard tissues only
    c) both soft and hard tissues   d) hard muscles only

13) In which type of eggs, the blastomeres, if separated, develop into whole embryo _____.
    a) Mosaic   b) Regulative
    c) Cleidoic   d) Non-cleidoic

14) Which type of eggs contains high amount of yolk _____.
    a) Microlecithal   b) Mesolecithal
    c) Megalecithal   d) Alecithal

Q.2 **A)** **Attempt any four of the following questions.**   **08**
    1) Draw a labeled diagram of Sperm of Amphioxus.
    2) Regulative type of egg.
    3) Draw a figure of Haemochorial placenta with example.
    4) Blastula of Amphioxus.
    5) Chalaza

    B) **Write the short notes on (Any Two)**   **06**
    1) Give an account on Gastrulation of Chick
    2) Write note on effect of drugs on miscarriage.
    3) Give an account on functions of placenta.

Q.3 **A)** **Attempt any two of the following questions.**   **08**
    1) Write a note on Spermatogenesis.
    2) Note on three germ layer formation in Amphioxus.
    3) Give an account on Notogenesis in Amphioxus.

    B) **Attempt any one of the following questions.**   **06**
    1) Give an account on structure of hen's egg.
    2) Give an account on Holoblastic type of cleavage with suitable examples.

Q.4 **A)** **Attempt any two of the following questions.**   **10**
    1) Give an account on structure of 48 hrs Chick embryo.
    2) Give an account on uses of ultrasound.
    3) Give an account on process of fertilization in Amphioxus.

    B) **Attempt any one of the following questions.**   **04**
    1) Give an account on different types of eggs on the basis of presence and absence of egg shell.
    2) Give note on Meroblastic cleavage.

Q.5 **Attempt any two of the following questions.**   **14**
    a) Give an account on 72 hrs of Chick Development.
    b) Describe in detail extra embryonic membranes in chick with their significance in chick.
    c) Give an account on Oogenesis.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov- 2019
Mathematics (Special Paper X)
COMPLEX ANALYSIS

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) If the principal part contain an infinite number of non zero terms of $(z - a)$ then $z = a$ is known as _____.
   - a) Pole
   - b) Isolated singularity
   - c) Essential singularity
   - d) Removable singularity

2) A zero of an analytic function $f(z)$ is a value of z for which _____.
   - a) $f(z) = 0$
   - b) $f(z) = 1$
   - c) $f(z) \neq 1$
   - d) $f(z) \neq 0$

3) If $e^{ax} \cos y$ is harmonic, then a is _____.
   - a) i
   - b) 0
   - c) -1
   - d) π

4) If the imaginary part of an analytic function $f(z)$ is $2xy + y$ then the real part is _____.
   - a) $x^2 + y^2 - y$
   - b) $x^2 - y^2 - x$
   - c) $x^2 - y^2 + x$
   - d) $x^2 - y^2 + y$

5) $f(z) = |\bar{z}|^2$ is _____.
   - a) differentiable and analytic every where
   - b) not differentiable at $z = 0$ but analytic at $z = 0$
   - c) differentiable at $z = 1$ and not analytic at $z = 1$ only
   - d) differentiable at $z = 0$ but not analytic at $z = 0$

6) The series $\sum (-1)^{n+1} \dfrac{z^{2n-1}}{(2n-1)!}$ when $|z| < \infty$ represents
   - a) $\sin z$
   - b) $\cos z$
   - c) $\log(1 - z)$
   - d) $\log(1 + z)$

7) If C is a circle $|z| = r > 0$, then $\displaystyle\int_C \dfrac{dz}{z^2}$ is equal to _____.
   - a) πi
   - b) 0
   - c) $2\pi i$
   - d) $\dfrac{1}{2\pi i}$

8) Residue of $\dfrac{1}{\sin z - \cos z}$ at $z = \dfrac{\pi}{4}$ is _____.
   - a) $\dfrac{1}{\sqrt{2}}$
   - b) $\sqrt{2}$
   - c) $\dfrac{1}{2}$
   - d) 0

9) Let $f(z) = \sum\limits_{n=0}^{\infty} a_n(z - z_0)^n$ be analytic in a domain.

If $a_0 = a_1 = a_2 = \cdots = a_{m-1} = 0$ and $a_m \neq 0$, then $f(z)$ is said to have a _____
   a) pole of order $m - 1$ at $z = z_0$
   b) zero of order $m - 1$ at $z = z_0$
   c) pole of order m at $z = z_0$
   d) zero of order m at $z = z_0$

10) The function $f(z) = e^x \,(\cos ky + i \sin ky)$, $z = x + iy$, is analytic iff $k =$_____
   a) 1
   b) 2
   c) 0
   d) π

11) Which of the following is correct for $w = f(z)$?
   a) $\dfrac{dw}{dz} = -\dfrac{\partial w}{\partial x}$
   b) $\dfrac{dw}{dz} = \dfrac{\partial w}{\partial y}$
   c) $\dfrac{dw}{dz} = -\dfrac{\partial w}{\partial y}$
   d) $\dfrac{dw}{dz} = \dfrac{\partial w}{\partial x}$

12) Residue of $\dfrac{z^2}{z^3 + 2}$ at $z = \infty$ is _____.
   a) 1
   b) 0
   c) -1
   d) ∞

13) Residue of $\dfrac{1}{z(1 - z^2)}$ at $z = 1$ is _____.
   a) 1
   b) -1
   c) $-\dfrac{1}{2}$
   d) 2

14) If L is a straight line from the point $(1,0)$ to the point $(1,1)$ then the value of the integral $\int_L \bar{z}\,dz$ is _____.
   a) $\dfrac{1}{2} + i$
   b) $\dfrac{1}{2} - i$
   c) $1 + \dfrac{1}{2}i$
   d) $1 + i$

Q.2 A) Answer the following questions. (Any Four) 08

1) Expand $f(z) = \dfrac{z - 1}{z + 1}$ as a Taylor's series about $z = 0$.

2) Prove that the function $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ satisfies Laplace's equation.

3) Using the $C - R$ equations, show that $w = f(z) = \sin z$ is analytic function.

4) Find all zeros and poles of $f(z) = \dfrac{2z + 1}{z^2 - z - 2}$

5) Evaluate $\displaystyle\int_0^{1+i} z\,dz$ along the line $z = 0$ to $z = 1 + i$

B) Write the Notes on (Any Two) 06

1) To prove that $\dfrac{\partial^2}{\partial x^2} + \dfrac{\partial^2}{\partial y^2} = 4\dfrac{\partial^2}{\partial z \, \partial \bar{z}}$

2) Find residue of $f(z) = \dfrac{1}{(z^2 + a^2)^2}$ at $z = ia$

3) Find the Laurent series of the function $f(z) = \dfrac{1}{z^2(1 - z)}$ about $z = 0$

Q.3 A) Answer the following questions. (Any two) 08

1) If $u = x^2 - y^2, v = \frac{-y}{(x^2-y^2)}$, then show that both u and v satisfy Laplace's equation, but $u + iv$ is not an analytic function of z.

2) Evaluate the residue of $f(z)$, where $f(z) = \frac{e^z}{z^2(z^2+9)}$ at $z = -3i, +3i$

3) Evaluate $\int_C \bar{z} \, dz$ from $z = 0$ to $z = 4 + 2i$ along the curve C given by $z = t^2 + i \, t$.

B) Answer the following questions. (Any One) 06

1) If $f(z) = u + iv$ is an analytic function and $z = re^{i\theta}$ where u, v, r, θ are all real, show that Cauchy-Riemann equations are
$$\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \theta} \quad , \quad \frac{\partial v}{\partial r} = -\frac{1}{r}\frac{\partial u}{\partial \theta}$$

2) Prove that the function $\sin[C(z + \frac{1}{z})]$ can be expanded in a series of the type
$$\sum_{n=0}^{\infty} a_n z^n + \sum_{n=1}^{\infty} b_n z^{-n} \quad \text{in which the coefficients of both } z^n \text{ and } z^{-n} \text{ are}$$
$$\frac{1}{2\pi}\int_0^{2\pi} \sin(2C\cos\theta)\cos n\theta \, d\theta$$

Q.4 A) Answer the following questions. (Any Two) 10

1) If $u + v = \frac{2\sin 2x}{e^{2y}+e^{-2y}-2\cos 2x}$ and $f(z) = u + iv$ is an analytic function of z, then find $f(z)$ in terms of z.

2) Using residue theorem, evaluate $\int_C \frac{e^z}{z(z-1)^2} dz$

   where C is circle $|z| = 2$

3) State and prove Cauchy's Fundamental Theorem.

B) Answer the following questions. (Any One) 04

1) Explain Milne's Thomson's method for constructing of analytic function.

2) Prove that $\int_0^{2\pi} \frac{d\theta}{a + b\cos\theta} = \frac{2\pi}{\sqrt{a^2 - b^2}} \quad , \quad a > b > 0$

Q.5 Answer the following questions. (Any two) 14

a) State and prove Cauchy's Residue Theorem.

b) Prove that $\int_0^{2\pi} \frac{\sin^2 \theta 2\theta}{a + b\cos\theta} = \frac{2\pi}{b^2}\left[a - \sqrt{(a^2 - b^2)}\right]$ where $a > b > 0$

c) Find the values of the integral
$$\int_0^{1+i} (x - y + ix^2)dz$$

   i) along the straight line from $z = 0$ to $z = 1 + i$
   ii) along the real axis from $z = 0$ to $z = 1$ and then along a line parallel to imaginary axis from $z = 1$ to $z = 1 + i$

Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper – X)
PROBABILITY DISTRIBUTIONS

Day & Date: Wednesday, 09-10-2019　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Use of scientific calculators and statistical tables is allowed.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　　14

1)　If $X \to L(\mu = 1, \lambda = 2)$, then $p(X < 1) =$ _____.
　　a)　$P(X > 1)$　　　　　　　　b)　0
　　c)　both (a) and (b)　　　　　d)　neither (a) nor (b)

2)　If X is a Weibull (0.5, 2) r.v., then $E(X^2) =$ _____.
　　a)　1　　　　　　　　　　　　b)　4
　　c)　0.25　　　　　　　　　　d)　none of these

3)　If X is a Laplace (0, 1) r.v., then $V(X) =$ _____.
　　a)　1　　　　　　　　　　　　b)　0.5
　　c)　2　　　　　　　　　　　　d)　none of these

4)　For _____ distribution mean = median = mode.
　　a)　Laplace　　　　　　　　　b)　Logistic
　　c)　both (a) and (b)　　　　　d)　neither (a) nor (b)

5)　If X is a Pareto (α, β) r.v., then the curve is _____.
　　a)　positively skewed　　　　b)　symmetric about β
　　c)　negatively skewed　　　　d)　symmetric about α

6)　If X is a $LN(\mu, \sigma^2)$ r.v., then mean = _____.
　　a)　$e^{\mu - \sigma^2}$　　　　　　　　b)　$e^{\mu + \frac{1}{2}\sigma^2}$
　　c)　$e^{\mu + \sigma^2}$　　　　　　　　d)　e^{μ}

7)　For Cauchy distribution _____ does not exist.
　　a)　moments　　　　　　　　　b)　Quartiles
　　c)　both (a) and (b)　　　　　d)　neither (a) nor (b)

8)　If (X, Y) is B.N. $(\mu_2, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$, then $V(Y|X = x) > V(X|Y = y)$ if _____.
　　a)　$\sigma_1^2 > \sigma_2^2$　　　　　　　b)　$\sigma_1^2 < \sigma_2^2$
　　c)　$\sigma_1^2 = \sigma_2^2$　　　　　　　d)　$\rho = 0.5$

9)　If $X \to L(\mu, \lambda)$ then, $\mu_3 =$ _____.
　　a)　$\frac{2}{\lambda^2}$　　　　　　　　　b)　μ
　　c)　0　　　　　　　　　　　　d)　None of these

10)　If $X \to$ Pareto$(3, 0.5)$, then _____.
　　a)　μ_r' is infinite　　　　　b)　variance is infinite
　　c)　both (a) and (b)　　　　　d)　neither (a) nor (b)

11)　If $t \to t_{(n)}$, then $t \to C(0, 1)$ if _____.
　　a)　$n = 4$　　　　　　　　　　b)　$n = 3$
　　c)　$n = 2$　　　　　　　　　　d)　$n = 1$

12) If $X \rightarrow N(\mu, \sigma^2)$ then Y = _____ is lognormal (μ, σ^2).
   a) e^x
   b) $\log(X)$
   c) $\log\left(\frac{(x-\mu)}{\sigma}\right)$
   d) none of these

13) Mean of truncated binomial distribution, truncated at $X = 0$ is = _____.
   a) $\frac{np}{q^n}$
   b) $\frac{np}{1-q^{-n}}$
   c) $\frac{np}{1-q^n}$
   d) none of these

14) If X is a truncated poisson (0.5) r.v. truncated at $X = 0$, then $P(X > 1) =$ _____.
   a) 1
   b) 0
   c) 0.7707
   d) 0.2293

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Sketch the curve for Laplace(μ, λ) pdf.
   2) Define $LN(\mu, \sigma^2)$ distribution.
   3) If $X \rightarrow$ logistic(μ, σ), state its CDF.
   4) Identify the identical distribution of Weibull $(\alpha, 1)$
   5) If (X, Y) is B.N.$(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$, then find covariance $(2X, 3Y)$.

B) Answer the following questions. (Any Two)   **06**
   1) For $(X, Y) \rightarrow BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$, show that $V(Y|X = 2) \leq V(Y)$.
   2) Show that geometric distribution is a special case of power series distribution.
   3) If $X \rightarrow C(0,1)$ distribution, then find the distribution of $Y = \mu + \lambda X$

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Find mean of truncated poisson (λ) distribution, truncated at $X = 0$.
   2) State and prove the relationship between standard normal variate and Cauchy variate.
   3) If $X \rightarrow L(\mu, \lambda)$ then find the mean deviation about mean.

B) Answer the following questions. (Any One)   **06**
   1) For lognormal (μ, σ^2) distribution find its mean and variance.
   2) If $X \rightarrow$ logistic (μ, σ), obtain its CDF. Hence obtain Q1, Q3 and quartile deviation.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) If $X \rightarrow$ Weibull (α, β), find the distribution of $Y = \left(\frac{X}{\alpha}\right)^\beta$
   2) If $X \rightarrow L(\mu, \lambda)$ then find its moment generating function.
   3) Obtain the pdf of truncated normal r.v., truncated below A. Also find mean of this truncated r.v

B) Answer the following questions. (Any One)   **04**
   1) For $(X, Y) \rightarrow BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$, state the distribution $Z = AX + BY + C$. Hence obtain the distribution of
    i) $X + Y$
    ii) $X - Y$
   2) Define logistic (μ, σ) distribution and obtain its mean.

Q.5 Answer the following questions. (Any Two)   **14**
   a) For lognormal (μ, σ^2) distribution find its CDF and hence three quartiles.
   b) If $X \rightarrow$ Weibull (α, β), find mean and variance.
   c) For $(X, Y) \rightarrow BN(0, 0, \sigma_1^2, \sigma_2^2, \rho)$ then find the distribution of $U = \frac{X}{Y}$

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper- X)
GEOMORPHOLOGY

Day & Date: Wednesday, 09-10-2019　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　 2) Figures to the right indicate full marks.
　　　　　　　 3) Draw neat labeled diagrams wherever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　14
1) Broad and flat valleys with braided channels, absence of down cutting of the valleys and extensive flood plains are the characteristics of _____ stage in the fluvial evolution.
　a)　youth　　　　　　　　　　b)　mature
　c)　old　　　　　　　　　　　d)　none of the above

2) On a steeper slope, the shear stress or tangential component of gravity, gt, _____, and the perpendicular component of gravity, gp, _____.
　a)　remain stable - decreases　b)　decreases - remain stable
　c)　increases - decreases　　　d)　decreases - increases

3) Careful recording of minor displacement with various instruments, in the landslide prone area is called _____.
　a)　monitoring　　　　　　　b)　control
　c)　mitigation　　　　　　　d)　prevention

4) No river can erode vertically beyond _____.
　a)　Mean Sea Level　　　　　b)　local base level
　c)　valley floor　　　　　　　d)　interfluve

5) A high land between two streams known as _____.
　a)　point bars　　　　　　　b)　spits
　c)　subtracts　　　　　　　　d)　drainage divide

6) The slope is stable at angles between 35^0 and 37^0 is called as _____.
　a)　cliff slope　　　　　　　b)　angle of dispose
　c)　angle of repose　　　　　d)　least slope

7) A landscape produced by the effect of many geomorphic cycle of development is called as _____.
　a)　monocyclic　　　　　　　b)　multicyclic
　c)　exhumed　　　　　　　　d)　resurrected

8) The end product of normal cycle of erosion is called _____.
　a)　peneplain　　　　　　　b)　pedeplain
　c)　monodnock　　　　　　　d)　all of these

9) Who developed the concept of 'dynamic equilibrium' in landscape development?
　a)　W. M. Davies　　　　　　b)　G. K. Gilbert
　c)　James Hutton　　　　　　d)　J. W. Powell

10) A steep river with a high discharge and a large supply of readily mobile bedload is likely to have which of the following channel forms?
   a) Meandering   b) Straight
   c) Braided   d) Sinuous

11) Plateaus, mesas and buttes are the features formed over the terrain containing _____.
   a) Inclined sedimentary beds   b) horizontal lava flows or beds
   c) massive granitic rocks   d) metamorphic rocks

12) The "Inversion of relief" is found in _____ region.
   a) folded   b) faulted
   c) non-jointed   d) highly jointed

13) Transportation power of the stream is proportional to the sixth power of its velocity is _____ law.
   a) Gilbert sixth power law   b) Thornbury sixth power law
   c) Chorley sixth power law   d) none of the above

14) From the following table, choose the correct pairs of time scale.
   A) micro-temporal   1. Cyclic time
   B) meso-temporal   2. Graded time
   C) mega-temporal   3. Steady time
   D) macro-temporal
   a) D-2, B-1, A-3   b) A-3, B-2, C-1
   c) B-2, A-1, D-1   d) A-1, B-2, C-3

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) How normal cycle of erosion begins?
   2) Describe valleys in the youth stage.
   3) What is rejuvenation?
   4) What is polycyclic landscape?
   5) What are slope elements?

B) Write Notes on (Any Two)   **06**
   1) Explain eustatic rejuvenation.
   2) Describe spatial scale
   3) Tectonic slope

Q.3 A) Answer the following questions. (Any two)   **08**
   1) What is transitional sliding?
   2) What is compound landscape?
   3) What is subsidence?

B) Answer the following questions. (Any One)   **06**
   1) What are causes of mass movement?
   2) What is monitoring and control on mass movement?

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain in detail the role of water in mass movement.
   2) What are topographic expressions of rejuvenation?
   3) Explain factors which increase shearing forces in mass movement.

B) Answer the following questions. (Any One)   **04**
   1) Why free face is called as slope of derivation?
   2) What is topographic discordance?

Q.5 Answer the following questions. (Any two)   **14**
   a) What are various elements of slope?
   b) Explain fluvial cycle of erosion in brief.
   c) Classification of mass movement.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper- X)
AGRICULTURAL MICROBIOLOGY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Carbon dioxide makes up approximately _____% of the atmosphere.
       a) 0.47   b) 0.03
       c) 21   d) 98

2)   _____ is the main nitrogen reservoir in the biosphere.
       a) Ocean   b) rocks
       c) atmosphere   d) organism

3)   _____ is the sedimentary cycle.
       a) Phosphorus cycle   b) Hydrogen cycle
       c) Oxygen cycle   d) Nitrogen cycle

4)   Insecticides generally attack _____ system.
       a) respiratory   b) Mascular
       c) nervous   d) circulatory

5)   Green manuring increases the crop yield by _____%.
       a) 5-10   b) 30-50
       c) 15-25   d) 70-80

6)   _____ is the major component of the Bordeaux mixture.
       a) sodium chloride   b) calcium chloride
       c) copper sulphate   d) Magnesium sulphate

7)   Podzol soil is the type of soil from area where rainfall is _____.
       a) average   b) limited
       c) nil   d) Abundant

8)   _____ is the most abundant compound of plant cell wall.
       a) hemicelluloses   b) cellulose
       c) lignin   d) pectin

9)   The flagellated Protozoon belonging to class _____ are dominant in soil.
       a) Sporogia   b) Mastigophora
       c) Microsporidea   d) Cilliate

10)   Coniferaldehyde is the product produced after the degradation of _____.
       a) Lignin   b) Cellulose
       c) Pesticide   d) Methane

11)   In vermincomposting on an average _____ number of adult earthworms
       are necessary.
       a) 2000   b) 20000
       c) 20   d) 200

12) Oily spots on pomegranate are caused by member of _____.
   a) Erwinia
   b) Xanthomonas
   c) Pseudomonas
   d) Bacillus

13) In farm yard Mannre the proportion of cattle dung and urine is _____.
   a) 1:1
   b) 2:1
   c) 3:1
   d) 1:2

14) The importance of ecosystem lies in _____.
   a) Bacterial degradation
   b) CO_2 production
   c) Oxygen production
   d) Flow of energy

Q.2 A) Attempt any four of the following questions.   **08**
   1) What is ecosystem?
   2) What is soft rot?
   3) Define term 'pesticide'.
   4) What is green manure?
   5) What are the sources of sulphur in atmosphere?

B) Write notes on any two.   **06**
   1) Give significance of vermicompost.
   2) Draw structure of cellulose.
   3) Give role of soil enzymes.

Q.3 A) Attempt any two of the following questions.   **08**
   1) Explain structure and properties of soil.
   2) Explain whip smut of sugarcane.
   3) Explain biodegradation of lignin.

B) Attempt any one of the following questions.   **06**
   1) With suitable examples explain genetically modified crops.
   2) What are pesticides? Explain biodegradation of pesticides.

Q.4 A) Attempt any two of the following questions.   **10**
   1) Explain Bacillus thuriengensis as bioinsecticide.
   2) Write a note on composition, production & significance of Town Compost.
   3) What is plant pathology? Give common symptoms produced by plants due to plant pathogens.

B) Attempt any one of the following questions.   **04**
   1) Explain oily spots on pomegranate.
   2) Write a note on biodegradation of hemicelluloses.

Q.5 Attempt any two of the following questions.   **14**
   a) Write an essay on Azo - Rhizo Biofertilizers.
   b) Write an essay on control of plant diseases.
   c) Explain in detail - 'Nitrogen cycle'.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper- X)
FUNDAMENTALS OF MICROCONTROLLER

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
         2) Draw neat labeled diagram wherever necessary.
         3) Use of Log-table and calculator is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The microcontroller 8051 is _____ bit microcontroller.
   a) 12   b) 8
   c) 16   d) 4

2) Which of the following bits of PSW are used to select register banks?
   a) RS0 & RS1   b) RS1 only
   c) RS0 only   d) OV

3) The Reset input required for microcontroller 8051 is _____.
   a) Active Low   b) 1 Volt
   c) 2 Volt   d) Active High

4) Upon completion of timer operation _____ flag of TCON bit set.
   a) TR   b) TI
   c) RI   d) TF

5) Which of the following instruction is of direct addressing type?
   a) MOV A,@R0   b) ADD A, #05H
   c) MOV A, 50H   d) MUL AB

6) After execution of DIV AB instruction, the quotient and remainder are present in _____.
   a) A and B Registers   b) Stack memory
   c) R0 and R1 of Bank 0   d) PSW and SBUF

7) If A=0F H, the result after executing the instruction- AND A, #0F0H will be ____.
   a) FF H   b) 00 H
   c) 0F H   d) F0H

8) To configure Port 1 in input mode, which of the following instruction should be executed _____.
   a) MOV P1, 0FFH   b) MOV P1, #00H
   c) MOV P1, #0FFH   d) MOV P1, 00H

9) SJMP instruction is of _____ addressing method.
   a) Long   b) Relative
   c) Absolute   d) All of these

10) Standard baud rate for serial communication with computer is _____.
   a) 110   b) 2400
   c) 9600   d) 5200

11) Which of the following flag will set after completion of serial transmission ____?
   a) TI   b) RI
   c) TF   d) TR

12) To ensure the serial communication as per RS 232 standards, which of the following line driver IC is most suitable?
   a) 74244
   b) Max 35
   c) LM337
   d) Max 232

13) If M1 and M0 bits of TMOD register are adjusted to 1 and 0, respectively, then the timer 0 will be configured in _____ mode
   a) Mode 0 :13 bit timer
   b) Mode 116 bit timer
   c) Mode 2 8-bit Auto reload mode
   d) Mode 1 11 bit timer

14) Which of the following interrupt has highest priority?
   a) External hardware interrupt- INT0
   b) Timer 0 overflow interrupt- TF0
   c) Timer 1 overflow interrupt- TF1
   d) Serial communication interrupt- RI/TI

Q.2 A) Answer the following questions. (Any Four)　　　　　　　　　**08**
   1) Draw diagram of clock circuit for 8051 microcontroller.
   2) Write a note on TMOD register.
   3) Mention the addressing modes of 8051 microcontroller.
   4) What are alternate functions of Port 3?
   5) Mention any 4 boolean instructions.

B) Write Notes on (Any Two)　　　　　　　　　**06**
   1) Write a note on PSW register.
   2) Write assembly language program to ON-OFF the LED connected at port pin P2.1.
   3) Write a note on modes of the timers of 8051 microcontroller.

Q.3 A) Answer the following questions. (Any two)　　　　　　　　　**08**
   1) Explain organization of on chip memory of microcontroller 8051.
   2) Define instruction and Give classification of Instruction Set.
   3) What do you mean by synchronous and Asynchronous serial communication?

B) Answer the following questions. (Any One)　　　　　　　　　**06**
   1) Draw Pin structure of microcontroller 8051 and explain control signals in brief.
   2) What do you mean by interrupt? Explain priority of the interrupts.

Q.4 A) Answer the following questions. (Any Two)　　　　　　　　　**10**
   1) Mention salient features of microcontroller.
   2) With suitable example explain the instruction MUL AB and DIV AB.
   3) Two numbers have been stored in the internal memory locations 50H and 51H. Write assembly language program to add these number and store results in the register R5.

B) Answer the following questions. (Any One)　　　　　　　　　**04**
   1) Write a note on relative addressing of 8051 microcontroller.
   2) List at least 8 SFRs of microcontroller 8051.

Q.5 Answer the following questions. (Any two)　　　　　　　　　**14**
   a) Draw block diagram of microcontroller 8051 and Explain it in brief.
   b) Write an Assembly Language Program to generate a square wave of 4 KHz on port pin P2.4 using Timer-1 in Mode-2. Assume a crystal frequency of 12 MHz.
   c) What do you mean by serial communication? With the help of suitable SFRs explain the configuration of serial port for transmission of the data to computer.

Seat No.		Set	P

B.Sc.(Semester - I) (New) (CBCS) Examination Oct/Nov-2019
ZOOLOGY (Paper - I)
ANIMAL DIVERSITY - I

Day & Date: Thursday, 14-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
                          2) Figures to the right indicate full marks.

Q.1   Select the correct alternatives from the following rewrite the sentence.   08

1)   _____ is function of pinacocytes.
   a) Nutrition   b) Reproduction
   c) Protection   d) Excretion

2)   Earthworm is belongs to class _____.
   a) Oligochaeta   b) Archiannelida
   c) Polychaeta   d) Hirudinea

3)   _____ of following are molluscan marine organism with eight transverse
      plates.
   a) Bivalve   b) Chiton
   c) Dentalism   d) Pila

4)   Clitellum of earthworm is present on segment number _____.
   a) 14, 15 and 16   b) 17, 18 and 19
   c) 4, 5 and 6   d) 20, 22 and 24

5)   _____ is larva of starfish.
   a) Bipinnaria   b) Auricularia
   c) Doliolaria   d) Echinopluteus

6)   Echinoderms are _____ symmetry.
   a) Radially   b) Bilateral
   c) Asymmetric   d) Spherical

7)   Tiedmanns bodies are found in animals belong to phylum _____.
   a) Annelida   b) Echinodermata
   c) Arthropoda   d) Mollusca

8)   _____ are metamerically segmented.
   a) Porifera   b) Annelida
   c) Arthropoda   d) Cnidaria

Q.2   Answer the following questions. (Any Four)   08

1)   General characters of phylum platyhelmithes.
2)   Multiple fission.
3)   Cysticercus in tapeworm.
4)   Ascaris sexual dimorphism.
5)   What are tube feet?
6)   Types of hooks in tapeworm.

Q.3 **Answer the following questions. (Any Two)** 08
　　1)　Describe the significance of torsion.
　　2)　Describe morphological structure of hexaactenelida (Hyalonema).
　　3)　Give an account on mature proglottids of tape worm with diagram.

Q.4 **Answer the following questions. (Any Two)** 08
　　1)　Describe the structure of ommatidium.
　　2)　Describe general characters of class insects.
　　3)　Explain polyp.

Q.5 **Answer the following questions. (Any One)** 08
　　1)　Give an account on mastigophora and ciliophora.
　　2)　General characters of *Ascaris lumbricoides.* Add a note of its parasitic adaptations.

Seat No.			**Set**	**P**

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper – X)
CORE JAVA

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Exceptions observed at compile time are called _____.
   a) unchecked exception   b) checked exception
   c) a & b   d) None

2) _____ is default access specifier in java.
   a) default   b) private
   c) public   d) protected

3) _____ keyword stops inheritance.
   a) this   b) super
   c) final   d) int

4) _____ is the super class for all java classes.
   a) Abstract class   b) Super class
   c) Object class   d) Static class

5) A class is _____ data type.
   a) Predefined   b) User defined
   c) both a and b   d) none of these

6) All event handling classes belongs to _____ package.
   a) javax.awt.*   b) java.awt.event.*
   c) java.awt.*   d) java.swing.*

7) Which of these operators is used to allocate memory to array variable in Java?
   a) malloc   b) alloc
   c) new   d) none of these

8) Which of the following methods are public and abstract?
   a) interface   b) class
   c) abstract class   d) anonymous class

9) The process of creating object from sequence of bytes is called _____.
   a) composition   b) decomposition
   c) serialization   d) deserialization

10) By using _____ method we can start execution of a thread again.
    a) resume()   b) suspend()
    c) wait()   d) stop()

11) In OOP, new classes can be defined by extending existing classes. This is an example of :
    a) Encapsulation   b) Interface
    c) Polymorphism   d) Inheritance

12) _____ method used to compare two strings in java.
    a) compare()   b) compareTo()
    c) equals()   d) equalTo()

13) The wrapping up of data and functions into a single unit is called _____.
    a) message passing   b) abstraction
    c) polymorphism   d) encapsulation

14) A package is a collection of
    a) classes   b) interfaces
    c) editing tools   d) both a and b

Q.2 A) Answer the following (Any Four)   **08**
    1) What is Data abstraction?
    2) Define Data Type. List out any four built in data types.
    3) Define Function recursion.
    4) Define local variable with syntax.
    5) Define cast operator with syntax.

B) Write Notes on (Any Two)   **06**
    1) Structure of Java program with neat diagram.
    2) For each loop with its syntax.
    3) Object and reference object.

Q.3 A) Answer the following (Any two)   **08**
    1) What is variable? Explain types of variable.
    2) State the difference between C++ and Java.
    3) Write a java program to print all prime numbers between 1 to 50

B) Answer the following (Any One)   **06**
    1) What is Constructor? Explain parameterized constructor with any program.
    2) What is an Applet? Explain Applet life cycle with a neat diagram.

Q.4 A) Answer the following (Any Two)   **10**
    1) Explain 'this' keyword with a program.
    2) What is Method overloading? Demonstrate with small program.
    3) Write any Java program to stop further Inheritance process.

B) Answer the following (Any One)   **04**
    1) Explain Array with syntax, List out types of array.
    2) Write a java program to print whether given number is Armstrong or not.

Q.5 Answer the following (Any two)   **14**
    a) Explain basic concepts of object oriented programming.
    b) Explain Exception handling with syntax. Write any java program to handle Arithmetic Exception.
    c) Explain characteristics of Java.

Seat No.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Physics (Special Paper - XI)
CLASSICAL MECHANICS

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Use of log table or calculator is allowed.
           4) Neat diagrams must be drawn wherever necessary.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The Lagrangian function 'L' is expressed as _____.
    a) $L = TV$ b) $L = T + V$
    c) $L = T/V$ d) $L = T - V$

2) A frame of reference rotating with respect to a fixed frame is _____.
    a) A non- inertial frame   b) Located at a point
    c) An inertial frame   d) Located at infinity

3) The centrifugal acceleration has the maximum value at the _____.
    a) South pole   b) Line of Capricorn
    c) North pole   d) Equator

4) If the total torque acting on a particle is zero, then its _____.
    a) Angular momentum is conserved
    b) Linear momentum is conserved
    c) Linear and angular momentum are conserved
    d) Total energy is conserved

5) The angular momentum vector is given by _____.
    a) $\vec{L} = \vec{P} \times \vec{R}$ b) $\vec{L} = \vec{P}.\vec{R}$
    c) $\vec{L} = \vec{R} \times \vec{P}$ d) $\vec{L} = \vec{RP}$

6) In case of projectile, in absence of air resistance, the nature of trajectory is _____.
    a) Circular   b) Parabolic
    c) Elliptical   d) Hyperbolic

7) The constraints on a bead of a uniformly rotating wire in a force free space is _____.
    a) Rheonomous   b) Scleronomous
    c) holonomic   d) nonholonomic

8) In a cyclone in southern hemisphere the wind whirls in the _____ direction.
    a) Opposite   b) Clockwise
    c) Anti - clockwise   d) In same

9) For a rigid body, the distance between any two of its constituents particles is _____.
    a) Constant   b) Zero
    c) Unity   d) Infinite

10) In rotational motion of a rigid body, the directions of the angular momentum vector and the angular velocity vector are _____.
   a) Antiparallel to each other   b) Different
   c) The same   d) At right angle to each other

11) The brachistochrone problem show that, the transit time of a particle from a higher to a lower point under the influence of gravity is _____.
   a) Moderate   b) Maximum
   c) Minimum   d) Infinite

12) If the amplitude of oscillations remains the same then the motion is called _____.
   a) Damped   b) Overdamped
   c) Undamped   d) Critically damped

13) The toral energy of a system of coupled pendulums is _____.
   a) Only kinetic
   b) Kinetic energy is always half of potential energy
   c) Partly kinetic and partly potential
   d) Only potential

14) A rigid body moving freely in space has _____ degrees of freedom.
   a) 4   b) 3
   c) 6   d) 9

Q.2 A) Answer the following questions. (Any Four)   08
   1) State conservation theorem of angular momentum of a particle.
   2) What are coupled oscillations?
   3) State Euler's theorem about the motion of a rigid body.
   4) What do you mean by normal modes and normal co-ordinates?
   5) Define holonomic and non holonomic constraints.

B) Write Notes (Any Two)   06
   1) Symmetric and antisymmetric normal modes of oscillations
   2) Motion of particle in space using Cartesian co-ordinates
   3) Angular momentum of a rigid body

Q.3 A) Answer the following questions. (Any Two)   08
   1) Obtain an expression for range of projectile in the resistive medium.
   2) Explain coriolis force.
   3) Derive an expression for kinetic energy of a rigid body in component form.

B) Answer the following questions. (Any One)   06
   1) State and prove the conservation theorem for energy of system of particles.
   2) State Hamilton's principle and obtain Lagrangian equation from Hamilton's principle.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Explain effect of coriolis force on flight of missile.
   2) Show that the shortest distance between any two points in a plane is a straight line passing through them.
   3) Show that frequency of antisymmetric mode is greater than that of symmetric mode.

B) Answer the following questions. (Any One)   04
   1) Set up the Lagrangian for the motion of linear harmonic oscillator.
   2) A particle is restricted to move along the inner Surface of a fixed hemispherical tank. Determine degrees of freedom of the particle.

Q.5 **Answer the following questions. (Any Two)** **14**
  a) State D'Alembert's principle. Obtain Lagrange's equation from D'Alembert's principle.
  b) Show that the angular acceleration of a particle is same in fixed and rotating co-ordinate systems.
  c) Derive Euler's equations of motion of a rigid body.

Seat No.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Special Paper – XI)
ORGANIC CHEMISTRY

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams wherever necessary.
4) Write balanced chemical equations wherever necessary.
5) Spectroscopic data chart supplied by university is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   _____ signals are observed in H^1-NMR spectrum of propanoic acid.
   a)   2   b)   3
   c)   8   d)   4

2)   Mass spectrometry involves separation of ions depending on _____ ratio.
   a)   Mass/Charge   b)   Charge/Mass
   c)   Carbon/Hydrogen   d)   Proton/Electron

3)   Number of fundamental vibrations for linear molecules is given by formula _____.
   a)   (3n-6)   b)   (3n-5)
   c)   (6n-3)   d)   (5n-3)

4)   Infra red spectroscopy is mainly used for detection of _____.
   a)   nature protons   b)   electronic structure
   c)   functional groups   d)   molecular weight

5)   _____ is an example of non-magnetic nuclei.
   a) $_6C^{12}$ b) $_6C^{13}$
   c) $_1H^1$ d) $_7N^{14}$

6)   Lowest value of chemical shift for methyl protons will be observed for _____.
   a) CH_3-CH_2R   b) CH_3-NH-R
   c) CH_3-O-R   d) CH_3-S-R

7)   Methyl group in acetic acid appears in the form of _____ in the PMR spectrum.
   a)   doublet   b)   triplet
   c)   quartet   d)   singlet

8)   Acetophenone can be converted into Alpha-methyl benzyl alcohol by _____.
   a)   Stobbe condensation   b)   Oppenauer oxidation
   c)   MPV reduction   d)   W. M. rearrangement

9)   Acetamide can be converted into methyl amine by _____.
   a)   hydrolysis   b)   Stobbe condensation
   c)   Hofmann rearrangement   d)   MPV reduction

10) _____ conformation of cyclohexane has minimum potential energy.
   a)   Chair   b)   Boat
   c)   Half chair   d)   Twist boat

11) Addition of bromine to trans-2-butene gives _____.
    a) recemic-2,3-dibromobutane
    b) meso-2,3-dibromobutane
    c) d-2,3-dibromobutane
    d) l-2,3-dibromobutane

12) On reaction with sodium hydroxide active methylene compounds forms _____.
    a) sodium salt
    b) δ-carbocations
    c) β-carbocations
    d) α-carbocations

13) Diethyl malonate is diethyl ester of _____.
    a) butane-dioic acid
    b) propane-dioic acid
    c) malic acid
    d) succinic acid

14) In mass spectrometry the determination of molecular weight can be done by _____.
    a) Molecular ion peak
    b) Base peak
    c) Isotope ion peak
    d) Rearrangement ion peak

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Why TMS is used as an internal standard in NMR spectroscopy?
2) Explain types of out of plane bending vibrations.
3) Write keto and enol structures of ethyl aceto acetate.
4) Define what is Stobbe condensation? Give one example.
5) Define the terms stereo selective and stereo specific reactions.

B) Write notes on (Any Two)   **06**
1) Application of ethyl aceto acetate in synthesis of crotonic acid and succinic acid.
2) Wittig reaction.
3) Mass spectrometry in molecular weight determination.

Q.3 A) Answer the following questions. (AnyTwo)   **08**
1) Explain the relative stability of two conformers of t-butyl cyclohexane with energy diagram.
2) Explain mechanism of Oppenauer oxidation with example.
3) Discuss the PMR spectrum of ethyl bromide, comment on splitting pattern of signals.

B) Answer the following questions. (Any One)   **06**
1) How will you monitor following transformations with the help of given spectroscopic method?
    i) Conversion of 2-butanone into 2-butanol by IR spectroscopy.
    ii) Conversion of ethene into 1, 2-dibromoethane by Mass-Spectrometry.
2) How will you prepare acetic acid, butanoic acid and 2-methyl butanoic acid starting from ethyl aceto acetate?

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Write the limitations of Baeyer's strain theory and comment on theory of strain less rings.
2) How will you synthesize barbituric acid, β-methyl crotonic acid and n-valeric acid from diethylmalonate?
3) Explain the concept of shielding and deshielding with example.

B) Answer the following questions. (Any One)   **04**
1) Explain Wagner - Meerwein rearrangement with example.

2) Match the following.
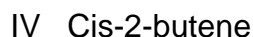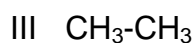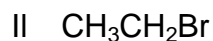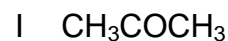
Group A		Group B	
I	CH_3COCH_3	I	m/z = 30 in Mass spectrum
II	CH_3CH_2Br	II	Coupling Constant J= 6-8 Hz in PMR
III	$CH_3\text{-}CH_3$	III	IR absorption band at 2720 cm^{-1}
IV	Cis-2-butene	IV	IR absorption band at 1720 cm^{-1}
		V	Triplet and Quartet in PMR

Q.5 **Answer the following questions. (Any Two)** **14**

a) What are conformers? Draw different conformers of cyclohexane and explain their stability.

b) A compound with molecular formula $C_3H_5O_2Br$ shows IR bands at 1710, 3300, cm^{-1} and has following PMR data δ: 2.5(t, 2H), 3.6(t, 2H), 11.22(s,1H, exchangeable with D_2O), and give peaks at m/z -154,152 in ratio 1:1, deduce the structure of the compound and assign the IR and NMR and m/z data values.

c) A compound with molecular formula C_3H_7ON shows IR bands at 1400, 1670, 3350 cm^{-1}. When it is heated with Br_2/KOH it forms compound with molecular formula C_2H_7N which gives three signals in PMR and has IR bands at 1220, 3550, cm^{-1} . Name the reaction involved in the transformation and comment on spectroscopic data of compounds A and B.

Characteristic Infrared Absorptions of Functional Groups

GROUP	FREQUENCY RANGE cm^{-1}	INTENSITY
A. Alkyl		
C – H (stretching)	2853 – 2962	(m – s)
Isopropyl – CH(CH$_3$)$_2$	1380 – 1385	(s)
	and 1365 – 1370	(s)
tert – Butyl – C (CH$_3$)$_3$	1385 – 1395	(m)
	and – 1365	(s)
B. Alkenyl		
C–H (stretching)	3010 – 3095	(m)
C = C (stretching)	1620 – 1680	(v)
R – CH = CH$_2$	985 – 1000	(s)
	and 905 – 920	(s)
R$_2$C = CH$_2$ (out of plane	880 – 900	(s)
cis – RCH = CHR C–H bendings)	675 – 730	(s)
trans – RCH = CHR	960 – 975	(s)
C. Alkynyl		
≡ C – H (stretching)	– 3300	(s)
C ≡ C (stretching)	2100 – 2260	(v)
D. Aromatic		
Ar – H (stretching)	– 3030	(v)
Aromatic substitution type (C–H out-of-plane bendings)		
Monosubstituted	690 – 710	(very s)
	and 730 – 770	(very s)
o – Disubstituted	735 – 770	(s)
m – Disubstituted	680 – 725	(s)
	and 750 – 810	(very s)
p – Disubstituted	800 – 840	(very s)
E. Alcohols, Phenols, Carboxylic Acids		
OH (alcohols, phenols, dilute solutions)	3590 – 3650	(sharp v)
OH (alcohols, phenols, hydrogen bonded)	3200 – 3550	(broad s)
OH (carboxylic acids, hydrogen bonded)	2500 – 3000	(broad v)
F. Aldehydes, Ketones, Esters and Carboxylic Acids		
C = O stretch 1720	1630 – 1780	(s)
aldehydes – 1720 {Stre 2700 – 2900	1690 – 1740	(s)
ketones	1680 – 1750	(s)
esters	1735 – 1750	(s)
carboxylic acids	1710 – 1780	(s)
amides	1630 – 1690	(s)
G. Amines		
N – H	3300 – 3500	(m)
H. Nitriles		
C ≡ N	2220 – 2260	(m)

TABLE – 2
Approximate Proton Chemical Shifts in NMR

TYPE OF PROTON	CHEMICAL SHIFT, DELTA, PPM (δ)
1° Alkyl, RCH_3	0.8 – 1.0
2° Alkyl, RCH_2R	1.2 – 1.4
3° Alkyl R_3CH	1.4 – 1.7
Allylic, $R_2C = C - CH_3$	1.6 – 1.9
Benzylic, $ArCH_3$	2.2 – 2.5
Alkyl chloride RCH_2Cl	3.6 – 3.8
Alkyl bromide, RCH_2Br	3.4 – 3.6
Alkyl iodide, RCH_2I	3.1 – 3.3
Ether, $ROCH_2R$	3.3 – 3.9
Alcohol, $HOCH_2R$	3.3 – 4.0
Ketone, $RCCH_3$	2.1 – 2.6
Aldehyde, RCH	9.5 – 9.6
Vinylic, $R_2C = CH_2$	4.6 – 5.0
Vinylic $R_2C = CH$	5.2 – 5.7
Aromatic, ArH	6.0 – 9.5
Acetylenic, $RC \equiv CH$	2.5 – 3.1
Alcohol hydroxyl, ROH	0.5 – 6.0[a]
Carboxylic, RCOH	10 – 1.3[a]
Phenolic, ArOH	4.5 – 7.7[a]
Amino R– NH_2	1.0 – 5.0

$$\text{Ester } R - \overset{\overset{O}{\|}}{C} - O - CH_2 - R \quad 4 \text{ to } 4.5$$

$$N - CH_3 \quad 2.3$$

[a] The chemical shifts of these groups vary in different solvents and with temperature and concentration.

TABLE – 3
U.V. Absorption rules for Diene Chromosphores

1) Parent	215 nm
2) Each extra conjugation	30 nm
3) Homoannular	39 nm
4) Exocyclic double bond	05 nm
5) Each alkyl (R) substituent directly attached to double bonded carbon	05 nm

U.V. Absorption rules for Enone System

1) Parent	215 nm
2) Each extra conjugation	30 nm
3) Homoannular	35 nm
4) Substituents	
a) Alkyl group at α	10 nm
b) Alkyl group at β	12 nm
c) Alkyl group at γ, δ	18 nm

– OH, – OR, Cl, Br   5 (nm)
– SR, (30 nm)
– NR, (60 nm)

	α	β	γ
Cl	15	12	
OH, OR	35	30	
SR		85	
NR		95	
O		75	
Acyl	6	6	6

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper – XI)
PLANT PHYSIOLOGY

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Draw neat labeled diagrams wherever necessary.
           3) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Transpiration is less at _____.
   a) Low atmospheric humidity   b) High atmospheric humidity
   c) Dry environment   d) High wind velocity

2) Stomata open and close due to _____.
   a) circadian rhythm
   b) turgor pressure of guard cells
   c) genetic clock
   d) pressure of gases inside the leaves

3) Hormone that promote cell division in plants is _____.
   a) Auxin   b) Cytokinin
   c) Gibberellin   d) Ethylene

4) In soil, the water available for root absorption is _____.
   a) gravitational water   b) capillary water
   c) hygroscopic water   d) combined water

5) Translocation of carbohydrate nutrients usually occurs in the form of ____.
   a) glucose   b) maltose
   c) starch   d) sucrose

6) Bidirectional translocation of solutes takes place in _____.
   a) parenchyma   b) cambium
   c) xylem   d) phloem

7) _____ elements is not an essential micronutrient.
   a) Zn   b) Cu
   c) Ca   d) Mn

8) A plant requires magnesium for _____.
   a) protein synthesis   b) chlorophyll synthesis
   c) cell wall development   d) holding cells together

9) Munch hypothesis accounts for translocation of organic solutes only in _____.
   a) upward direction   b) downward direction
   c) both a and b   d) none of them

10) Passive absorption of minerals depends on _____.
   a) Temperature
   b) Temperature and metabolic inhibitor
   c) Metabolic inhibitor
   d) Humidity

11) _____ is responsible for senescence.
   a) ABA
   b) auxin
   c) GA
   d) cytokinin

12) Water potential of solution is always _____.
   a) less than zero
   b) greater than zero
   c) equal to zero
   d) one

13) Guttation occurs through _____.
   a) Stomata
   b) Hydathodes
   c) Flowers
   d) Fruits

14) Natural growth inhibitor in plant is _____.
   a) Gibberellin
   b) Cytokinin
   c) Abscisic acid
   d) Auxin

Q.2 A) Answer the following questions (Any Four)   08
   1) Define turgor pressure.
   2) Define water potential.
   3) Define guttation.
   4) What is active absorption?
   5) Give chemical structure of IAA.

   B) Write Notes (Any Two)   06
   1) Physiological role of ethylene
   2) Role of calcium
   3) Passive absorption

Q.3 A) Answer the following questions (Any two)   08
   1) State two functions of calcium and nitrogen in plants.
   2) Explain cohesion-tension theory for ascent of sap.
   3) Explain the practical role of gibberellins in agriculture.

   B) Answer the following question (Any One)   06
   1) Explain the physiological role of auxin and cytokinin.
   2) Explain the difference between Transpiration and Guttation.

Q.4 A) Answer the following questions (Any Two)   10
   1) Explain the mechanism for source sink transport for photoassimilates
      in phloem.
   2) Give deficiency symptoms and role Magnesium in plants.
   3) Describe the practical applications of gibberellins.

   B) Answer the following question (Any One)   04
   1) Explain the factors affecting transpiration.
   2) Describe the active uptake of nutrients in plants.

Q.5 Answer the following questions (Any two)   14
   a) Explain components of water potential.
   b) Explain the mechanism of transpiration in plants.
   c) Describe the process of phloem loading and unloading in plants.

Seat No.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper - XI)
COMPARATIVE ANATOMY OF CHORDATES

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Neat diagrams must be drawn wherever necessary

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) Lungs of pigeon are provided with _____ air sacs.
　　a) Ten   b) Nine
　　c) Eight   d) Four

2) Lobi inferiors are present in brain of _____.
　　a) Elasmobranches   b) Mammals
　　c) Reptiles   d) Amphibians

3) Horns of cattle are derivatives of _____ integuments in vertebrates.
　　a) Epidermis   b) Dermis
　　c) Keratin   d) Connective tissue

4) Gills of _____ have filiform gill lamellae.
　　a) Cartilage Fish   b) Bony Fish
　　c) Ascidian tadpole   d) Frog Tadpole

5) Opisthonephros kidney is found in _____.
　　a) Scoliodon   b) Frog
　　c) Birds   d) Mammals

6) _____ is one of the contributory bone of pectoral girdle of vertebrates.
　　a) Ilium   b) Coracoid
　　c) Scapula   d) Pterygoid

7) Four chambered heart present in _____.
　　a) Frog   b) Cow
　　c) Labeo   d) Lizard

8) Femoral gland is present in _____.
　　a) Amphibia   b) Aves
　　c) Reptiles   d) Mammals

9) Sinus venosus is on the way of disappearance in _____ group of vertebrates.
　　a) Avian   b) Reptilian
　　c) Mammalian   d) Amphibian

10) Pons varolli is present in _____ group of vertebrates.
　　a) Pisces   b) Amphibians
　　c) Reptiles   d) Mammals

11) Foramen panizzae found as a bridge connecting two systemic aortae at the point of their crossing is found in _____.
　　a) Mammal   b) Birds
　　c) Reptiles   d) Fishes

12) _____ shows incomplete four chambered heart.
   a) Reptile   b) Birds
   c) Mammals   d) Fishes

13) Optic lobes are divided into two each and hence are called corpora quadrigemina is found in _____.
   a) frog   b) fish
   c) lizard   d) rat

14) Stomach of ruminant mammals' shows _____ chambered.
   a) two   b) three
   c) four   d) five

Q.2 A) Answer the following questions. (Any Four)   08
   1) Gills of bony fishes
   2) Brain of bird
   3) Membranous labyrinth in scoliodon
   4) Heart of frog
   5) Avian kidney

B) Write Notes (Any Two)   06
   1) Describe the type of cutaneous respiration
   2) Fore gut in birds
   3) Function of mammalian skin

Q.3 A) Answer the following questions. (Any Two)   08
   1) Ventricles in vertebrate brain
   2) Describe the aortic arches in reptiles
   3) Air sacs in bird

B) Answer the following questions. (Any One)   06
   1) Hepatic portal system
   2) Mesonephros kidney

Q.4 A) Answer the following questions. (Any Two)   10
   1) Describe lungs of reptiles.
   2) Describe alimentary canal of frog.
   3) Give an account on four chambered heart of vertebrate.

B) Answer the following questions. (Any One)   04
   1) Describe Mammary glands in Rat.
   2) Describe Placoid scales.

Q.5 Answer the following questions. (Any Two)   14
   a) Describe brain of scoliodon and compare with that you have studied compare with that of brain of frog.
   b) Give an account of glandular derivatives of integument in vertebrates.
   c) Give comparative account on scales of Cartilagenous and bony fishes.

Seat No.		**Set**	**P**

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov- 2019
Mathematics (Special Paper - XI)
INTEGRAL CALCULUS

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   The integral $\int_a^b f(x)dx$ is said to be improper if _____.
   a)   both the limits are finite
   b)   f(x) is bounded in [a, b]
   c)   one or both the limits of integration are infinite
   d)   None of these

2) $\int_a^b \dfrac{dx}{(x-a)^P}$ is convergent if _____.
   a) $P > 1$ b) $P = 1$
   c) $P < 1$ d)   None of these

3)   The improper integral $\int_0^\infty \dfrac{x^{2n}}{1+x^{2m}}\,dx$ is convergent if _____.
   a) $n < m$ b) $n > m$
   c) $n = m$ d)   None of these

4)   If $\int_a^\infty |f(x)|\,dx$ is convergent then the integral $\int_a^\infty f(x)\,dx$ is _____.
   a)   conditionally convergent   b)   uniformly convergent
   c)   absolutely convergent   d)   none of these

5) $\int_0^1 \dfrac{dx}{\sqrt{x}}$ is _____.
   a)   Convergent   b)   Divergent
   c)   Conditionally convergent   d)   None of these

6)   The value of $\int_0^1 x^3(1-x)^2 dx$ is _____.
   a) $\dfrac{1}{60}$ b) $\dfrac{1}{120}$
   c) $\dfrac{1}{30}$ d)   None of these

7) $\displaystyle\int_{0}^{\pi/2} \sqrt{\tan\theta}\, d\theta$ = _____.

   a) π

   b) $\pi/2$

   c) $\pi/\sqrt{2}$

   d) None of these

8) Another form of $\beta(m,n)$ is _____.

   a) $\displaystyle\int_{0}^{\infty} \frac{x^{m-1}}{(1+x)^n}\, dx$

   b) $\displaystyle\int_{0}^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}}\, dx$

   c) $\displaystyle\int_{0}^{\infty} \frac{x^{n-1}}{(1+x)^m}$

   d) None of these

9) The value of $\overline{\left\lvert -\tfrac{1}{2} \right.}$

   a) $-2\sqrt{\pi}$

   b) $\frac{-8\sqrt{\pi}}{15}$

   c) $\frac{4\sqrt{\pi}}{3}$

   d) None of these

10) If $0 < p < 1$ then $\overline{\lvert p}$ $\overline{\lvert 1-p}$

   a) 1

   b) $\pi/2$

   c) $\dfrac{\pi}{\sin p\pi}$

   d) None of these

11) The area bounded by the curve $y = \phi(x)$ the $x-$axis and the lines $x = a$ and $x = b\ (a < b)$ is given by _____.

   a) $\displaystyle\int_{a}^{b}\int_{0}^{\phi(x)} y\, dx\, dy$

   b) $\displaystyle\int_{a}^{b}\int_{0}^{\phi(x)} dx\, dy$

   c) $\displaystyle\int_{o}^{b}\int_{a}^{\phi(x)} dx\, dy$

   d) None of these

12) $\displaystyle\int_{1}^{2}\int_{0}^{3y} y\, dy\, dx$ = _____.

   a) 3

   b) 5

   c) 7

   d) None of these

13) The value of $\displaystyle\int_{0}^{\pi/2}\int_{0}^{a\cos\theta} r\sin\theta\, dr\, d\theta$ is _____.

   a) $a^2/6$

   b) $a^2/3$

   c) $a^2/2$

   d) None of these

14) Change the variable in $\iint f(x,y)\,dx\,dy$ from the variables x, y to u, v we use the formula.

   a) $dxdy = dudv$

   b) $dxdy = ududv$

   c) $dxdy = Jdudv$

   d) None of these

Q.2 **A)** **Answer the following questions. (Any Four)** 08

1) Compute $\left\lceil 1/2 \right.$

2) Show that $\beta(m, n) = \beta(n, m)$

3) Examine the convergence of $\int_0^1 \dfrac{dx}{x^3(1 + x^2)}$

4) Examine the convergence of $\int_0^\infty \dfrac{dx}{1 + x^2}$

5) Evaluate $\int_0^1 \int_{x^2}^{2-x} y\, dy dx$

B) **Write Notes on (Any Two)** 06

1) Test the convergence of $\int_0^1 \dfrac{\cos x}{\sqrt{x}} dx$

2) Evaluate $\int_0^{\pi/2} \sin^4\theta \cos^5\theta d\theta$

3) Evaluate $\iint (x^2 + y^2) dx dy$ over the region bounded by $x = 0$ & $x + y = 1$

Q.3 **A)** **Answer the following questions. (Any Two)** 08

1) Show that the improper integral $\int_a^\infty \dfrac{dx}{x^p}$ converges if and only if p > 1 and divergent if $p \le 1$.

2) Show that $\beta(m, n) = \beta(m + 1, n) + \beta(m, n + 1)$

3) Show that the area of the curve $r = a(1 + \cos\theta)$ is $3a^2 \pi/2$.

B) **Answer the following questions. (Any One)** 06

1) State and prove Abel's test for the improper integral of a product of two functions.

2) State and prove relation between Beta and Gamma function.

Q.4 **A)** **Answer the following questions. (Any Two)** 10

1) If f(x) and g(x) are positive and $\lim\limits_{x\to\infty} \dfrac{f(x)}{g(x)} = L$ where L is non zero finite number then show that two integral $\int_a^\infty f(x) dx$ and $\int_a^\infty g(x) dx$ behaves alike.

2) Show that $\int_0^{\pi/2} \dfrac{d\theta}{\sqrt{\sin\theta}} \int_0^{\pi/2} \sqrt{\sin\theta} d\theta = \pi$

3) Evaluate $\int_0^{2a} \int_0^{\sqrt{2ax - x^2}} xy\, dx dy$ by changing the order of integration.

B) **Answer the following questions. (Any One)** 04
    1) Show that every absolutely convergent integral is convergent

    2) Evaluate $\displaystyle\int_0^\infty e^{-a^2x^2}dx$

Q.5 **Answer the following questions. (Any two)** 14
  a) State and prove Cauchy's test for convergence at ∞ and hence show that

$$\int_0^\infty \frac{\sin x}{x}dx \quad \text{is convergent.}$$

  b) Show that $2^{m-1}\ \overline{|m}\ \overline{|m+1/2}\ =\ \sqrt{\pi}\ \overline{|2m}$

  c) Using the transformation $x^2/y = u,\ y^2/x = v$ find $\iint x^2y^2 dxdy$ over the area

    bounded by four parabolas $y^2 = 4x, y^2 = 8x, x^2 = 4y, x^2 = 8y$.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper - XI)
SAMPLING TECHNIQUES

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The sampling interval in systematic sampling is _____.
    a) $\dfrac{n}{N}$ b) $1 - \dfrac{n}{N}$
    c) $\dfrac{N}{n}$ d) $1 - \dfrac{N}{n}$

2) The probability of selection varies at each draw in _____.
    a) SRSWR   b) SRSWOR
    c) both a) and b)   d) neither a) nor b)

3) The discrepancy between estimate and population parameter is known as: _____.
    a) human error   b) non- sampling error
    c) sampling error   d) none of these

4) The most important factor in determining the size of a sample is _____.
    a) the availability of resources   b) purpose of the survey
    c) heterogeneity of population   d) none of these

5) Circular systematic sampling first used by _____.
    a) W. G. Cochran   b) M. H. Hansen
    c) D. B. Lahiri   d) C. R. Rao

6) In presence of linear trend _____ method is more efficient.
    a) Stratified   b) Systematic
    c) SRSWOR   d) SRSWR

7) _____ errors can be reduced more easily.
    a) Sampling   b) Non sampling
    c) Random   d) Standard

8) The total number of possible samples of size n, drawn from population size N by SRSWOR is _____.
    a) N   b) n
    c) N^n d) $\binom{N}{n}$

9) Stratified random sampling belongs to the category of _____.
    a) subjective sampling   b) controlled sampling
    c) judgement sampling   d) none of these

10) In stratified random sampling with Neyman's optimum allocation the size of the sample from ith stratum is _____.

a) $ni = nPi$

b) $ni = \dfrac{n}{N}$

c) $n_i = npiSi$

d) $n_i = n\dfrac{pisi}{\sum pisi}\ where\ pi = \dfrac{Ni}{N}$

11) The ratio estimator of population mean $(\overline{Y})$ is given by _____.

a) $\dfrac{\overline{x}}{\overline{y}}\overline{X}$

b) $\dfrac{\overline{y}}{\overline{x}}\overline{X}$

c) $\dfrac{\overline{x}}{\overline{X}}\overline{y}$

d) $\dfrac{\overline{X}}{\overline{x}}\overline{Y}$

12) How many types of optimum allocation are in common use?

a) one

b) two

c) three

d) none of these

13) In _____ sampling all the elements in different groups of the population are used as sample.

a) Stratified

b) systematic

c) two-stage

d) cluster

14) In case of systematic sampling, the estimator of population total X is given by _____.

a) $\overline{X}_{sys}$

b) $N\overline{X}_{sys}$

c) $\overline{X}^2{}_{sys}$

d) $\left[\dfrac{N-1}{N}\right]\overline{X}_{sys}$

Q.2 A) Answer the following questions. (Any Four) 08
1) Define sampling unit and sampling frame.
2) Explain non sampling errors.
3) Give two real life situations where systematic sampling is appropriate.
4) State unbiased estimator for population total in regression method of estimation.
5) Describe proportional allocation.

B) Answer the following questions. (Any Two) 06
1) State any two limitations of systematic sampling.
2) State an unbiased estimator of population total in stratified sampling.
3) Explain non random sampling.

Q.3 A) Answer the following questions. (Any Two) 08
1) Give real life situation of two stage sampling.
2) Show that ratio estimator is a biased estimator. Obtain an expression for the bias in estimator.
3) State the difference between ratio and regression estimators.

B) Answer the following questions. (Any One) 06
1) Explain regression estimators of population mean and population total.
2) Describe cluster sampling. Show that sample mean is unbiased estimator of population mean.

Q.4 A) Answer the following questions. (Any Two) 10
1) With usual notations show that $V(\overline{Y}_{st})_P \leq V(\overline{Y}_n)_{R.}$
2) Describe stratified random sampling procedure and state unbiased estimator of population total.
3) Describe sampling for proportion and obtain unbiased estimator of population proportion.

    B)   **Answer the following questions. (Any One)**   **04**

      1)   With usual notations show that: $E(\overline{Y}_{lr}) \neq \overline{Y}$

      2)   Give advantages of sampling over census.

Q.5 **Answer the following questions. (Any Two)**   **14**

    a)   Describe the method of determining the sample size (n), in case of simple random sampling for estimating p for given margin of error and confidence coefficient.

    b)   Write a note on two stage and multi stage sampling.

    c)   Obtain an unbiased estimator of population total and derive its standard error in case of systematic sampling.

Seat No.	

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper - XI)
STRATIGRAPHY OF INDIA PART - I

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.
             3) Neat diagrams must be drawn wherever necessary.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) William Smith has postulated on principle of stratigraphy that is principle of
_____.
  a) Uniformitarianism   b) order of superposition
  c) faunal succession   d) none of these

2) A xenolith of sandstone is found in granitic dome. Which one is the younger?
  a) Xenolith
  b) granite
  c) both are of same age
  d) They don't have any age relation

3) Which one of the following is Chronostratigraphic unit?
  a) Formation   b) group
  c) bed   d) Eonothem

4) Which one of the following is NOT a craton?
  a) Satpura   b) Bastar
  c) Eastern Dharwar   d) Western Dharwar

5) Which one of the following is a part of Eastern Dharwar Craton (EDC)?
  a) Chitradurg group   b) Kolar group
  c) Sargur group   d) None of these

6) Bailadila group is belongs to _____ Craton.
  a) Dharwar   b) Baster
  c) Singhbhum   d) Bundelkhand

7) Older Metamorphic Tonalite Gneiss (OMTG) belongs to _____ Craton.
  a) Baster   b) Dharwar
  c) Singhbhum   d) Bundelkhand

8) "Purana" basins are now called as _____ basins.
  a) Proterozoic   b) intra-continental
  c) epi-cratonic   d) All of these

9) Which one of the following groups of Vindhyan basin is oldest?
  a) Bhander   b) Rewa
  c) Semri   d) Kaimur

10) Which one of the following groups of Cuddapah supergcoup is youngest?
  a) Kurnool   b) Nallamalai
  c) Chitravati   d) Papaghni

11) Apart from Indian cratonic low-grade granite-grrenstone terrains found in _____.
   a) Africa
   b) Canada
   c) none of these
   d) Both a and b

12) The age of oldest rocks on Indian Peninsula is _____ Ma.
   a) 3500
   b) 4600
   c) 3300
   d) 2800

13) Satpura mobile belt is bounded by _____.
   a) CITZ
   b) CISZ
   c) Both
   d) None of these

14) Crescent shaped Cuddapah basin is trending _____.
   a) N-S
   b) E-W
   c) SSW-SSE
   d) None of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Describe a Member in lithostratigraphy.
   2) Define Craton.
   3) Name the two major groups in Western Dharwar Craton (WDC).
   4) Name any two granulite belts in Bastar Craton.
   5) List out any four names of Proterozoic basins.

B) Write Notes. (Any Two)   **06**
   1) Describe in brief "Principle of Inclusions".
   2) Explain depositional environment of Kurnool group.
   3) Describe in brief 'Charnockite series'.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Write note on 'Closepet granite'.
   2) Write note on 'Bundelkhand granite'.
   3) Describe Nellore Schist belt of Eastern Ghats Mobile belt.

B) Answer the following questions. (Any One)   **06**
   1) Write a note on 'Bhilwara supergroup'.
   2) Describe composite stratigraphy of first cycle of Precambrian of Himalaya.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe in brief western charnockite zone of Eastern Ghats Mobile belt.
   2) Write Precambrian stratigraphic table of Lesser Himalaya.
   3) Write a note on Bagalkot group of Kaladgi basin.

B) Answer the following questions. (Any One)   **04**
   1) Write stratigraphic sequence of Eastern Dharwar Craton (EDC).
   2) Write a note on Mewar gneiss.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe in brief classification of Aravalli supergroup.
   b) Distribution, lithology and economic importance of sausar group.
   c) Explain stratigraphy of Cuddapah supergroup.

Seat No.	

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper – XI)
IMMUNOLOGY

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagram wherever required.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) A plasma cell secretes _____.
 a) Antibody of a single specificity related to that on the surface of the parent B-cell
 b) Antibody of two antigen specificities
 c) The antigen it recognizes
 d) Many different types of antibody

2) A complement component which is strongly chemotactic for neutrophils is _____.
 a) C9   b) C5a
 c) C3   d) C3b

3) Which immunoglobulin class crosses the placenta to provide a high level of passive immunity at birth?
 a) IgA   b) IgE
 c) IgG   d) IgM

4) HAT medium is used to _____.
 a) Immortalize B-lymphocytes
 b) Select for hybrids in the hybridoma technique
 c) Culture B-lymphocytes
 d) Fuse B-lymphocytes to myeloma cells

5) Cytokines _____.
 a) Are usually high molecular weight
 b) are pleiotropic
 c) Generally act at long range
 d) Produce very stable long-lived messenger RNA

6) Bombay phenotype can be (Oh) can be detected by using _____.
 a) Anti-H   b) Anti-A
 c) Anti-B   d) Anti-D

7) Autoantibodies against acetyl-choline receptors are produced in _____.
 a) Rheumatoid arthritis   b) Myasthenia gravis
 c) Goodpasture's syndrome d) Pernicious anaemia

8) Which of the following is used as fusion enhancing agent while getting hybridoma cells?
 a) Polyethyleneglycol (PEG)   b) Polyphenol alcohol
 c) Surfactants   d) Hydrocarbons

9) IgM _____.
   a) Is usually of high affinity
   b) Has the same number of constant domains as IgG
   c) Is a weak bacterial agglutinator
   d) Is the main class of the 'natural antibodies'

10) The failure to reject or inactivate self reactive cells results in _____.
    a) positive selection   b) autoimmunity
    c) negative selection   d) suppression

11) Which of the following cell has maximum phagocytic activity?
    a) T-lymphocyte   b) B-lymphocyte
    c) Plasma cell   d) Macrophage

12) Which cell type produces antibodies?
    a) Macrophages   b) T-lymphocytes
    c) NK   d) Plasma cells

13) Immunological unresponsiveness to self antigens is called _____.
    a) Tolerogen   b) Memory
    c) Acquired immunity   d) Tolerance

14) Anaphylaxis is _____ hypersensitivity reaction.
    a) Type I   b) Type III
    c) Type IV   d) Type II

Q.2 A) Answer the following questions. (Any Four) 08
   1) What is Anti H antibody?
   2) What is HAT medium?
   3) What is Macrophage?
   4) Explain the Rheumatoid arthritis.
   5) What is complement?

B) Write notes on. (Any Two) 06
   1) Subtypes of T lymphocytes
   2) Uses of monoclonal antibodies
   3) What are the blood transfusion reactions and complications?

Q.3 A) Answer the following questions. (Any Two) 08
   1) Write in brief Burnet's Clonal selection theory.
   2) What are Cytokines?
   3) Use of HLA typing.

B) Answer the following questions. (Any One) 06
   1) ABO blood group system and Bombay blood group.
   2) Biological effects of complement.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Classical Complement activation pathway.
   2) Humoral and cell mediated immunity.
   3) Immunological tolerance.

B) Answer the following questions. (Any One) 04
   1) D^u variant and other subtypes of Rh blood group.
   2) Major histocompatibility complex (MHC) gene complex.

Q.5 Answer the following questions. (Any two) 14
   a) Describe mechanism of Anaphylaxis.
   b) Monoclonal antibody production.
   c) Arthus reaction and serum sickness.

Seat No.

B.Sc.(Semester – V) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper – XI)
SENSORS AND TRANSDUCERS

Day & Date: Thursday, 10-10-2019　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Use of calculator is allowed.
　　　　　　　　4) Draw neat labeled diagram wherever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　The behavior of a measurement system subjected to rapidly changing input quantity is called _____.
　　a)　fidelity　　　　　　　　　b)　dynamic error
　　c)　dynamic response　　　　d)　measurement lag

2)　A measure of consistency of measurement is _____.
　　a)　resolution　　　　　　　b)　accuracy
　　c)　precision　　　　　　　　d)　error

3)　Load cell uses _____ as transducer.
　　a)　strain gauge　　　　　　b)　capacitor
　　c)　inductor　　　　　　　　d)　none of these

4)　Identify the passive transducer from the given transducers _____.
　　a)　LVDT　　　　　　　　　b)　Thermocouple
　　c)　Photo-voltaic cell　　　　d)　Piezo-electric transducer

5)　Identify the active transducer from the given transducers _____.
　　a)　LVDT　　　　　　　　　b)　Thermocouple
　　c)　Strain gauge　　　　　　d)　Thermistor

6)　The principle of operation of an LVDT is based on variation of _____.
　　a)　Self inductance　　　　　b)　Mutual inductance
　　c)　Reluctance　　　　　　　d)　Conductance

7)　The photoconductive material used in LDR is _____.
　　a)　gallium arsenide　　　　b)　gallium phosphide
　　c)　cadmium sulphide　　　　d)　silicon dioxide

8)　_____ is produced when photoconductive cell is connected to load.
　　a)　Light　　　　　　　　　b)　Electric current
　　c)　Heat　　　　　　　　　d)　Voltage

9)　In capacitive transducers the capacitance is increased if the spacing of plates is _____.
　　a)　Increased　　　　　　　b)　decreased
　　c)　both a and b　　　　　　d)　none of these

10)　Thermistor has _____Temperature coefficient.
　　a)　Negative　　　　　　　b)　Positive
　　c)　both + ve and – ve　　　d)　none of these

11) What will happen to resistance, if length of conductor is increased?
   a) Decreases
   b) No change
   c) Increases
   d) Doubles

12) Photoconductive cell consists of _____.
   a) CdS
   b) Si
   c) Quartz
   d) None of these

13) The sensitivity of IC LM35 temperature transducer is _____.
   a) $10\,mV/°F$
   b) $10\,mV/°K$
   c) $10\,mV/°C$
   d) $10\,\mu V/°C$

14) LDR's are also called _____.
   a) Photo voltaic cell
   b) Photo resistive cell
   c) Photo emissive cell
   d) All of the mentioned

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Enlist the sources of error.
   2) What is the basic needs of measurement?
   3) Write the definition of Sensor.
   4) What is actuator?
   5) Distinguish between bonded and unbonded strain gauge.

B) Write notes on. (Any Two)   **06**
   1) What is Passive transducer? Give two examples.
   2) Write a note on Potentiometer.
   3) What is need of system calibration?

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Write a note on capacitor microphone.
   2) Enlist the temperature transducers.
   3) Write a note on resistance pressure transducer.

B) Answer the following questions. (Any One)   **06**
   1) Give the principle of operation of capacitive transducer.
   2) Explain the PIR sensor.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain in brief piezoelectric transducer.
   2) Give brief account of static and dynamic characteristics of instrument.
   3) Explain the construction and working of Electromagnetic Relay.

B) Answer the following questions. (Any One)   **04**
   1) Explain working of LVDT with neat diagram.
   2) Draw the block diagram of measurement system and explain in brief.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain the principle, construction and operation of bonded strain gauge.
   b) Explain photovoltaic cell as a transducer.
   c) Explain the Hall effect transducer.

Seat No.

B.Sc.(Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Paper - II)
ANIMAL DIVERSITY - II

Day & Date: Friday, 15-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
                         2) Figures to the right indicate full marks.

Q.1 Select the correct alternatives from the following and rewrite the sentence.   08

1) Axolotl is the name given to larva of _____.
    a) Aurelia   b) Ambystoma
    c) Amphioxus   d) Amia

2) Myxine is found in _____.
    a) Lake   b) Pond
    c) River   d) Sea

3) Flying frog is _____.
    a) Hyla   b) Pipa
    c) Bufo   d) Rhacopholes

4) Which of the following is the feature of mammals?
    a) Hair   b) Cold blooded
    c) Pentadactyle limb   d) Absence of jaws

5) Lancelet is _____.
    a) Herdmania   b) Salpa
    c) Branchiostoma   d) Dolioum

6) Persistence of larva traits is known as _____.
    a) Neoteny   b) Pedogenesis
    c) Parthenogenesis   d) Paedomorphosis

7) Sting ray is belongs to class _____.
    a) Placodermi   b) Chondrichthyes
    c) Osterchthyes   d) Dipnoi

8) Summer sleep of frog is known as _____.
    a) Aestivation   b) Hibernation
    c) Paedogenesis   d) Neotery

Q.2 Answer the following questions. (Any Four)   08

1) Falconiformes any two characters
2) Fish manure
3) Morphological characters of agnatha
4) Sea squirt
5) Sphenodon a living fossil belongs to which order?
6) Differentiate between toad and frog

Q.3 Answer the following questions. (Any Two)   **08**
    1) Describe primitive character of cyclostomata.
    2) Describe effect of cobra bite on man.
    3) Describe any four differences between lizards and snakes.

Q.4 Answer the following questions. (Any Two)   **08**
    1) Describe the characteristics of class osteichthyes.
    2) Give general characters of class amphibian any 4.
    3) Explain characters of class thaliacea.

Q.5 Answer the following questions. (Any One)   **08**
    1) Describe the morphological flight adaptation in birds.
    2) Write an account on egg laying mammals.

Seat No.

B.Sc.(Semester – V) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper – XI)
OPERATING SYSTEM

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) _____ is requirement for the solution to critical section problem.
   a) Mutual exclusion   b) Progress
   c) Bounded Waiting   d) All of above

2) _____ is not the state of the process.
   a) Blocked   b) Running
   c) Ready   d) Privileged

3) PCB stands for _____.
   a) Program Control Block   b) Program Central Block
   c) Process Control Block   d) Process Central Block

4) To enable a process to be larger than the amount of memory allocated to it, we can use _____.
   a) Overlays   b) Fragmentation
   c) Paging   d) Segmentation

5) Physical memory is broken into fixed size blocks called _____.
   a) Document   b) Pages
   c) Frames   d) Packets

6) Banker's algorithm is for _____.
   a) Deadlock avoidance   b) Deadlock prevention
   c) Deadlock recovery   d) None

7) For DEADLOCK DETECTION _____ Graph is used in Single Instance Resource Type.
   a) Resource Allocation   b) Variant
   c) Wait-For-a   d) None

8) If time slice is too short in RR scheduling then it suffers from _____.
   a) High waiting time   b) High turnaround time
   c) High Context Switch time   d) High Turned wait time

9) _____ scheduler select which processes should be brought into the ready queue.
   a) Real-term   b) Long-term
   c) Mid-term   d) Short-term

10) A page fault occurs when _____.
    a) the deadlock happens   b) the segmentation starts
    c) the page is found in memory   d) the page is not found in memory

11) Virus Protection is NOT function of O.S.
    a) True   b) False

12) For non sharable resources like a printer, mutual exclusion must exist.
    a) True   b) False

13) Producer consumer problem can be solved using Two Process solutions.
    a) True   b) False

14) The process affects on another and affected by another process is known as Independent process.
    a) True   b) False

Q.2 A) Answer the following questions. (Any Four)   08
    1) Define Thrashing.
    2) What is Race condition?
    3) Define Throughput.
    4) What is Dynamic Loading?
    5) Define Logical Address Space.

B) Answer the following questions. (Any Two)   06
    1) Differentiate between Program and Process.
    2) Define Semaphore with its operations.
    3) Define fragmentation with its Types.

Q.3 A) Answer the following questions. (Any Two)   08
    1) Explain TWO LEVEL Directory Structure in brief.
    2) Write note on Critical Section problem.
    3) Draw RAG for following System scenario.
       $P1-> R1, R2-> P1, P2-> R3, R1-> P3, P4-> R3, R1-> P4$

B) Answer the following questions. (Any One)   06
    1) Explain Free Space Management Methods.
    2) Explain PCB with Diagram.

Q.4 A) Answer the following questions. (Any Two)   10
    1) Define Deadlock and FOUR necessary conditions to occur deadlock.
    2) Explain Producer - Consumer Problem.
    3) Explain Swapping with advantages and disadvantages.

B) Answer the following questions. (Any One)   04
    1) Explain Contiguous Memory Allocation with FIXED Partitions.
    2) List out FOUR differences between Kernel Thread and User Thread.

Q.5 Answer the following questions. (Any Two)   14
  a) Define O.S. and explain various functions of O.S.
  b) Calculate Number of Page Fault Rate for following Reference String with Frame Size = 3 using,
    1) FIFO
    2) Optimal
    3) LRU
       5,0,2,1,0,3,0,2,4,3,0,3,2,1,3,0,1,5
  c) Consider following System snapshot,

Process	Arrival Time	CPU Burst
P1	0	8
P2	1	20
P3	2	3
P4	3	6
P5	4	12

Prepare Gantt chart and calculate average waiting time and average turnaround time using,
1) Pre-emptive SJF scheduling algorithm.
2) RR scheduling algorithm with Time Slice= 5 m/s.

Seat No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Physics (Special Paper - XII)
NUCLEAR PHYSICS

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Neat diagrams must be drawn wherever necessary.
              4) Use of log table and calculator is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) β particles are _____.
   a) photon   b) Electron
   c) positron   d) Neutron

2) Negative packing fraction indicates _____.
   a) greater stability   b) less stability
   c) total stability   d) no stability

3) The principle of phase stability is incorporated in _____.
   a) Betatron   b) Cyclotron
   c) Synchrotron   d) Synchrocyclotron

4) 1 amu = _____.
   a) $1 \times 10^{-20} kg$ b) $1 \times 10^{-8} kg$
   c) $1.66 \times 10^{-27} kg$ d) $2 \times 10^{-20} kg$

5) When Q value is positive the nuclear reaction is _____ nuclear reaction.
   a) Endoergic   b) Pick-up
   c) Endothermic   d) Exothermic

6) In G M counter the central electrode wire is kept at _____ potential.
   a) positive   b) Negative
   c) zero   d) Infinite

7) If Quadrupole moment, Q> 0, then charge distribution of nucleus is _____.
   a) circular   b) Spherical
   c) oblate spherical   d) prolate spheroid

8) The counting rate of Scintillation counter is _____ than G M counter.
   a) faster   b) Slower
   c) very slower   d) Moderate

9) k-electron capture reaction is always accompanied by emission of _____ particle.
   a) neutrino   b) Proton
   c) nucleons   d) Electron

10) Einstein's energy relation is given as _____.
   a) $E = 2\,mgh$ b) $E = \Delta MC^2$
   c) $E = \frac{1}{2}\,MV^2$ d) $E = \Delta M/C^2$

11) Nucleus is _____ in shape.
   a) circular   b) Elliptical
   c) spherical   d) Ellipsoid

12) Neutrino Hypothesis was postulated by _____.
   a) Rutherford
   b) Pauli
   c) Einstein
   d) Thomson

13) Photons are _____.
   a) Bosons
   b) Fermions
   c) both (a) & (b)
   d) none of (a) & (b)

14) $_6C^{12} + _0n^1 =$ _____ $C^{11} + 2_0n$ _____.
   a) 4,2
   b) 2,4
   c) 6,1
   d) 1,6

Q.2 A) Answer the following questions. (Any Four) 08
1) State the properties of α particles.
2) What is Recovery Time?
3) Draw neat diagram of Wilson Cloud Chamber.
4) Define amu.
5) Mass number of an atom is 70 & its atomic mass is 70.80613amu. Find mass defect of the atom.

B) Write short notes (Any Two) 06
1) Pick-up Reaction
2) Nuclear Radius
3) Neutrons are best projectile particles, explain.

Q.3 A) Answer the following questions. (Any Two) 08
1) Write a note on Electric Quadrupole Moment.
2) The atomic mass of Carbon is 16.97015 amu and mass number is 16. Calculate the Packing fraction for Carbon.
3) Explain the continuous nature of β- ray spectrum.

B) Answer the following questions. (Any One) 06
1) Define Nuclear reaction cross-section. Discuss the geometrical significance of Nuclear reaction cross-section.
2) Explain the construction and working of Scintillation counter.

Q.4 A) Answer the following questions. (Any Two) 10
1) Define Packing Fraction. Explain the nature of Packing Fraction curve.
2) Calculate the Q value of the following nuclear reaction & comment on the result.
   $_{13}Al^{27} + _2He^4 \rightarrow _{15}P^{31} + _1H^1$
   Given:- Mass of $= _{13}Al^{27} = 26.986892$ amu
   Mass of $_2He^4 = 4.0026034$ amu.
   Mass of $_{15}P^{31} = 30.973765$amu.
   Mass of $_1H^1 = 1.007825$ amu
3) What are Elementary Particles? Give the classification of Elementary particles.
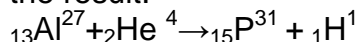
B) Answer the following questions. (Any One) 04
1) Discuss advantages and disadvantages of Cyclotron.
2) Write a note on α-ray spectrometer.

Q.5 Answer the following questions. (Any Two) 14
1) State the principle of Phase stability & explain the working of Betatron. Derive the expression for resonance condition and kinetic energy gained by the electron.
2) Explain the construction & working of G M Counter. State the advantages of G M Counter.
3) Define Binding Energy and state its unit. Hence derive Semi-empirical Binding energy formula for nucleus on the basis of liquid drop model.

Seat No.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Physics(Special Paper – XII)
ENERGY STUDIES

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Neat diagrams must be drawn wherever necessary.
              4) Use of log table and calculator is allowed.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1)   kWh is the unit of _____.
     a) electrical energy   b) electrical power
     c) mechanical power   d) thermal energy

2)   First law of thermodynamics is the law of conversion of _____.
     a) momentum   b) Energy
     c) mass   d) Heat

3)   Energy is _____.
     a) rate of doing work   b) efficiency of moving a body
     c) Capacity to do work   d) tendency of rest

4)   The MKS unit of Solar constant is _____.
     a) W/m^2 b) V/m
     c) A/m d) N/m^2

5)   Clarity index is always between _____.
     a) 1 and 0   b) 1 and 100
     c) 0 and 1   d) 0 and 1000

6)   Solar PV system panel consists of _____.
     a) PV cells   b) Strings of PV cells
     c) Modules of PV cells   d) Strings & Modules of PV cells

7)   Wind energy is manifestation of _____.
     a) heat energy   b) solar energy
     c) geothermal energy   d) mechanical energy

8)   S.I. unit of wind power density is _____.
     a) J/m^2 b) kW/m^2
     c) W/cm^2 d) W/m^2

9)   India's potential for electrical power from wind power is _____.
     a) negligible   b) 50 MW
     c) 20000 MW   d) 100kW

10) Algae in the presence of sunlight and organic waste forms _____.
     a) methane   b) carbon dioxide
     c) biomass   d) Ethanol

11) The origin of biomass energy is _____.
     a) photosynthesis   b) Fermentation
     c) oxidation   d) Reduction

12) Ocean waves are caused due to _____.
   a) gravitational attraction between Moon and Ocean water.
   b) spinning of Earth.
   c) revolution of Earth around Sun
   d) big mass of Earth

13) The radiation emitted from atmosphere of the Earth is _____.
   a) short wave   b) long wave
   c) medium wave   d) FM wave

14) Climate and weather at a place occur in the _____.
   a) stratosphere   b) Mesosphere
   c) troposphere   d) Ionosphere

Q.2 A) Answer the following questions. (Any four)   **08**
   1) What do you mean by renewable sources of energy?
   2) Define Solar isolation.
   3) What is Photosynthesis?
   4) Draw the diagram of Simple single effect type energy conversion plant.
   5) Define adiabatic lapse rate.

B) Write notes on. (Any Two)   **06**
   1) Structure of big oceans.
   2) Ethanol.
   3) Wind energy quantum.

Q.3 A) Answer the following questions. (Any two)   **08**
   1) Write a note on Nuclear energy.
   2) What is Pyrolysis? Explain how biomass is converted into gases, liquids and solids by Pyrolysis.
   3) What is ocean wave energy? Explain how electrical energy is extracted from ocean waves?

B) Answer the following questions. (Any one)   **06**
   1) Explain the process of Energy Transport in the Atmosphere and to the Poles.
   2) What are Mono, Twin and Three-blade HAWT? State their advantages and disadvantages.

Q.4 A) Answer the following questions. (Any two)   **10**
   1) Write a note on vertical motion of humid air.
   2) Write a note on the prospects of Solar PV panel system.
   3) Explain formation of El Nino effect.

B) Answer the following questions. (Any one)   **04**
   1) Discuss the different forms of Energy.
   2) Explain Cumulus cloud formation.

Q.5 Answer the following questions. (Any two)   **14**
   1) Define Energy Chain. Discuss the different resources of energy.
   2) Define power of a Solar PV cell and explain its variation by means of I_c verses V_c curve. When is the efficiency of Solar PV cell maximum?
   3) Give the construction and working of Horizontal Axis Propeller Type Wind Turbine Generator.

Seat No.

B.Sc. (Semester-V) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Special Paper – XII)
ANALYTICAL AND INDUSTRIAL PHYSICAL CHEMISTRY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.
         3) Draw neat diagrams and give equations wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) _____ is the logarithm of reciprocal of transmission.
   a) Opacity   b) Optical density
   c) Extinction coefficient   d) Intensity

2) A device measuring a response of photocell is called _____.
   a) ammeter   b) Voltmeter
   c) galvanometer   d) Multimeter

3) Reduction potential of calomel electrode with saturated KCl solution at 298K is _____.
   a) 0.2458V   b) 0.2800V
   c) 0.6998V   d) 0.4540V

4) The molecular formula of quinhydrone is _____.
   a) $C_6H_4(OH)_2$ b) $C_6H_4O_2$
   c) $C_6H_4O_2.C_6H_4(OH)_2$ d) $C_6H_4(OH)_2.C_6H_4(OH)_2$

5) The emf of the cell measured on potentiometer is expressed as _____.
   a) $E_{cell} = E_R + E_L$ b) $E_{cell} = E_L - E_R$
   c) $E_{cell} = E_R/E_L$ d) $E_{cell} = E_R - E_L$

6) In chromium plating _____ is used as anode.
   a) zinc   b) Silver
   c) lead   d) Copper

7) Pickling means cleaning of article by the action of _____.
   a) base   b) Acid
   c) water   d) Benzene

8) Sample used for analysis in flame photometry is usually in _____ form.
   a) liquid   b) Solid
   c) gaseous   d) all of these

9) The material most commonly used in making prism in flame photometry is _____.
   a) glass   b) Metal
   c) quartz   d) Ceramics

10) In flame photometry the element is detected on the basis of _____.
   a) frequency   b) wavelength of colour
   c) intensity of colour   d) Energy

11) The emf of standard cell is _____ volts.
   a) 1.18   b) 1.81
   c) 1.018   d) 1.081

12) The equivalent conductance is given by the relation, $\lambda = $ _____
    a) $1000. \text{k}/N$ b) $100. \text{k}/N$
    c) $1000. \text{k}/M$ d) $100. \text{k}/M$

13) Electrolyte used for determination of cell constant is _____.
    a) NaCl   b) KCl
    c) HCl   d) NH_4Cl

14) The electrodes used in conductivity cell are _____.
    a) silver   b) Zinc
    c) copper   d) Platinum

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Define the terms-
        i) Transmittance
        ii) Optical density
    2) Draw basic circuit of direct reading potentiometer.
    3) Give the Faraday's second law of electrolysis.
    4) What are the advantages of premix burner?
    5) Mention various types of conductometric titrations.

B) Write notes on. (Any Two)   **06**
    1) Theory of colorimetry.
    2) Lundergarph burner.
    3) Glass electrode.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) What are the advantages of potentiometric titrations?
    2) What is meant by:-
        i) Cathode efficiency
        ii) Anode efficiency.
    3) Discuss the nature of conductometric titration curve obtained between strong acid and strong base.

B) Answer the following questions. (Any One)   **06**
    1) State Beer's law. Under what conditions the law can't be valid.
    2) What is flame photometry? Explain its general principle.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) What are the applications of flame photometry in qualitative and quantitative analysis?
    2) What is anodizing? Explain sulphuric acid process used in anodizing.
    3) Describe construction and working of a single cell photoelectric colorimeter.

B) Answer the following questions. (Any One)   **04**
    1) What is potentiometric titration? Explain the location of end point by classical and analytical methods in potentiometric titrations.
    2) Define cell constant. Explain the methods used to determine the cell constant.

Q.5 Answer the following questions. (Any Two)   **14**
    a) Explain construction and working of quinhydrone electrode. How it is used to determine the pH of a solution?
    b) Describe in detail the electroplating of chromium. Give its applications.
    c) Describe in detail experimental determination of equivalent conductance by Wheatstone bridge.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper - XII)
PLANT BREEDING

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) From very early days, the man mainly used _____ as the important
   method for improvement of core plants.
   a) Biotechnological method   b) Polyploidy
   c) Selection   d) Mutational breeding

2) _____ is the name of very eminent agricultural scientist from India.
   a) Poehlman   b) W.L. Johannsen
   c) Dr. V. K. Agarwal   d) Dr. M. S. Swaminathan

3) _____ is /are the important method/s of plant breeding.
   a) Selection   b) Biotechnological methods
   c) Mutational breeding   d) All of these

4) _____ is the important variety of Groundnut obtained by mass selection.
   a) Gangapuri   b) R.S-10
   c) Neelam   d) Niphad -4

5) The number of plant individuals required is less in _____ method.
   a) Bulk   b) Pedigree
   c) Back-cross   d) All of these

6) The removal of stamens from a female flower before anthesis is called
   _____.
   a) Isolation   b) Emasculation
   c) Bagging   d) Pollination

7) Four inbreed lines of Maize are crossed. The cross is _____.
   a) Double cross   b) Dihybrid cross
   c) Single cross   d) Top class

8) The artificial mutation is called _____ mutation.
   a) Induced   b) Spontaneous
   c) Micro   d) Gene

9) Polyploidy is induced through _____.
   a) Irradication   b) Mutagenic chemicals
   c) Ethylene   d) Colchicine

10) Polygenic inheritance is very common in determining characteristics that
    are _____.
    a) Qualitative in nature
    b) Quantitative in nature
    c) Primarily hidden
    d) Not in keeping with mendelian genetics.

11) Varities developed by pureline methods are _____.
   a) Homozygous and not uniform.
   b) Heterozygous and not uniform.
   c) Homozygous and uniform.
   d) Heterozygous and uniform.

12) The quickest method of plant breeding is _____.
   a) Selection   b) Hybridization
   c) Mutation   d) Introduction

13) A plant breeder wants to develop a disease resistant variety, he should do first _____.
   a) Mutation   b) Selection
   c) Hybridization   d) Production of crop

14) A cross between F_1 generation and recessive parents is known as _____.
   a) Monohybrid cross   b) Back-cross
   c) Dihybrid cross   d) Mass selection

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define distant hybridization.
   2) What is germ plasm?
   3) Give two merits of pure line selection.
   4) Define plant breeding.
   5) Define mutation.

B) Write short notes (Any Two)   **06**
   1) Chemical mutagens
   2) Mass selection
   3) Pedigree method

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Explain macro and micro mutations.
   2) Give an achievements of back-cross method.
   3) Describe polygenic inheritance.

B) Answer the following questions. (Any One)   **06**
   1) Describe in brief the procedure of hybridization.
   2) Give in brief major practical achievements of mutation breeding in India.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Give an account of aims and objectives of plant breeding.
   2) Define multiple gene hypothesis and evaluate its significance.
   3) Describe the procedure of pure line selection in plant breeding.

B) Answer the following questions. (Any One)   **04**
   1) Explain clonal selection.
   2) Give the centres of origin of crop plants. (any four)

Q.5 Answer the following questions. (Any Two)   **14**
   1) Enlist physical mutagens. Describe any two.
   2) Describe in brief the role of biotechnology in crop improvement.
   3) Describe in brief the scope of plant breeding.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper – XII)
NURSERY AND GARDENING

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Neat diagrams must be drawn wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**
1) The sole purpose of all nurseries is to provide young plant or sampling to _____.
    a) garden   b) Farm
    c) agriculture   d) all of these

2) A nursery plant centre offers its customers all types of young plants that are _____.
    a) local   b) Imported
    c) exotic   d) all of these

3) Some of the fruit trees survive and produce fruits for about _____ years.
    a) 100   b) 200
    c) 300   d) 400

4) The name gymnosperm mean _____ a reference to the absence of an ovary.
    a) enclose seed   b) naked seed
    c) both a and b   d) none of these

5) The seed is covered by _____ distinct seed coats.
    a) four   b) Three
    c) two   d) One

6) The most of the common monocotyledonous seeds are _____.
    a) exalbuminous   b) Albuminous
    c) both a and b   d) none of these

7) Certain chemicals are used for breaking of seed dormancy _____.
    a) potassium   b) Nitrate
    c) thiourea   d) all of these

8) The seed bank at Berry Botanical Garden in _____.
    a) U.S.A   b) Africa
    c) Australia   d) Asia

9) There are different factors affect the viability of seed are _____.
    a) mechanical damage   b) Deterioration
    c) moisture content   d) all of these

10) Genetic erosion in agricultural and livestock is the loss of _____ genetic diversity.
    a) biological   b) Chemical
    c) mechanical   d) Physical

11) T or shield budding is widely useful method for fruits plants like _____.
   a) citrus
   b) Guava
   c) pear
   d) all of these

12) Gardening is a human activity used to produce _____ food.
   a) edible
   b) non-edible
   c) both a and b
   d) none of these

13) The gardening is divided into _____ types.
   a) one
   b) Two
   c) three
   d) Four

14) In agriculture and gardening _____ is the technique of moving plant from one location to another.
   a) transplanting
   b) Replanting
   c) both a and b
   d) none of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define nursery.
   2) What is seed dormancy?
   3) Define vegetative propagation.
   4) What is gardening?
   5) Define sowing.

B) Write shot notes (Any Two)   **06**
   1) Write the general character of sowing.
   2) Explain the raising of seedlings.
   3) Give the general character of vegetative propagation.

Q.3 A) Answer the following questions. (Any two)   **08**
   1) Explain the scope of nursery.
   2) Describe the structure of seed.
   3) Write the general character of seed certification.

B) Answer the following questions. (Any One)   **06**
   1) Explain the landscape gardening.
   2) Describe the stem cutting (soft wood stem cutting) studied by you.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain the objective of gardening.
   2) Describe the simple and air layering.
   3) Write on seed bank studied by you.

B) Answer the following questions. (Any One)   **04**
   1) Explain the cultivation of cabbage with respect to soil preparation, harvest and yield.
   2) Give the objective of nursery.

Q.5 Answer the following questions. (Any two)   **14**
   1) Explain the home gardening studied by you.
   2) Describe the cultivation methods of brinjal.
   3) Give the cultivation methods of onion.

SLR-DK-177

Seat No.

Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper - XII)
BIOSTATISTICS, BIOINFORMATICS, MEDICAL ZOOLOGY AND EVOLUTIONARY BIOLOGY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) _____ is an output device in computer appliances.
   a) Pen drive   b) Monitor
   c) UPS   d) CPU

2) _____ is a measurement of central tendency.
   a) Standard deviation   b) Frequency distribution
   c) Mean   d) Dispersion

3) The applications of statistics in the biological science is called _____.
   a) Bioinformatics   b) Biotechnology
   c) Biostatistics   d) Biochemistry

4) The systematic arrangement of data in a table is called as _____.
   a) Standard deviation   b) Histogram
   c) Coefficient correlation   d) Classification and tabulation

5) _____ is defined as a systematic arrangement of data in rows and sentences.
   a) Tabulation   b) Frequency distribution
   c) Co-relation   d) Histogram

6) The command Ctrl+A is used for _____ in the bioinformatics.
   a) to delete all   b) to save all
   c) to select all   d) to cut all

7) The profused salivation in man is due dog bite is called as _____.
   a) TB   b) Dengue
   c) Swine flue   d) Rabies

8) The pathological agent _____ is responsible for the disease, tuberculosis (TB).
   a) Bacteria   b) Virus
   c) Mosquito   d) Plasmodium

9) The pathogenic agent of the disease Ebola is _____.
   a) Amoeba   b) Paramoecium
   c) Mosquito   d) Filarial worm

10) A mathematical relationship was developed to explain the equilibrium frequencies and allele is called _____.
   a) Genetic law   b) Hardy-Weinberg law
   c) Mendel's law   d) Darwin's law

11) In the perfect +ve correlation the value of 'r' is _____.
    a) +01   b) +1
    c) 0.5   d) −1

12) The disease tuberculosis is caused by the pathogenic agent _____.
    a) Bacteria   b) Virus
    c) Fasciola   d) Mosquito

13) In a statistical table the headings of columns are known as _____.
    a) Foot note   b) Stub
    c) Title   d) Caption

14) The systematic arrangement of data in column in the graph is called ____.
    a) Frequency curve   b) Histogram
    c) Ogive curve   d) Frequency distribution

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) BLAST.
    2) Classification.
    3) Genetic drift.
    4) Scatter diagram.
    5) Mode.

B) Write notes on (Any Two)   **06**
    1) Entrez.
    2) Malaria.
    3) Standard error.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Give an account of pathogenesis and treatment of fasciolasis.
    2) Describe applications of search engines in bioinformatics.
    3) Explain karl pearson's coefficient correlation.

B) Answer the following questions. (Any One)   **06**
    1) Computer processing unit
    2) Define median. Calculate median from following data.
       22,31,41,34,31,15,54,25,32,60.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Describe the Hardy-Weinberg law of equilibrium.
    2) Give an account of dengue disease.
    3) The marks obtained from 40 students in an examination is given
       below. Prepare a continuous frequency distribution by taking an
       interval of 10 marks.
       30,45,48,55,39,49,55,12,18,21,33,43,44,10,38,19,26,41,35,37,

       41,46,33,51,58,58,17,19,23,26,29,36,57,36,36,44,43,27,19,43.

B) Answer the following questions. (Any One)   **04**
    1) Define statistical table. Describe its different parts.
    2) Give an account on symptoms and treatment of HIV.

Q.5 Answer the following questions. (Any two)   **14**
    1) Give an account of disease tuberculosis (TB).
    2) Describe the three levels of bioinformatics.
    3) What are the measurements of central tendency? Describe the mean.

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper - XII)
BIODIVERSITY AND CONSERVATION BIOLOGY

Day & Date: Friday, 11-10-2019　　　　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Draw neat labeled diagrams wherever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　_____ is a space-based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth.
　　a)　GIS　　　　　　　　　　b)　GPS
　　c)　GBIF　　　　　　　　　d)　DDBJ

2)　The Government of India enacted Wildlife (Protection) Act in the year ____ for the protection of wildlife in the country.
　　a)　1973　　　　　　　　　b)　1974
　　c)　1972　　　　　　　　　d)　2002

3)　_____ publishes the Red-list of species.
　　a)　WWF　　　　　　　　　b)　IUCN
　　c)　MAB　　　　　　　　　d)　IBWL

4)　First cloned animal was _____.
　　a)　Dolly sheep　　　　　　b)　Dog
　　c)　Mule　　　　　　　　　d)　Cat

5)　The one-horned rhinoceros is found in _____ sanctuary.
　　a)　Bhitar Kanika　　　　　b)　Bandipur
　　c)　Kaziranga　　　　　　　d)　Corbett park

6)　Mass extinction is defined as _____.
　　a)　Loss of 95 percent of species
　　b)　An asteroid impact
　　c)　A boundary between geological periods
　　d)　A loss of 50 percent of species

7)　IUCN stands for _____.
　　a)　International Unity on Community and Nationality
　　b)　Indian Union Congress Nation
　　c)　International Union for the Conservation of Nature
　　d)　Inter-state Unity of Culture Nature

8)　_____ is used for cryopreservation at -196°C temperature.
　　a)　Liquid N2　　　　　　　b)　Free N2
　　c)　liquid Co2　　　　　　　d)　Solid N2

9)　Gir National Park is famous for _____.
　　a)　Tiger　　　　　　　　　b)　Asiatic Lion
　　c)　Leopard　　　　　　　　d)　Deer

10) _____ contains maximum diversity and endemic species in India.
   a) Sundarbans and Rann of Kutch
   b) Eastern Ghat and West Bengal
   c) East Himalaya and Western Ghat
   d) Kerala and Punjab

11) _____ the first international agreement on climate change.
   a) Red List
   b) Montreal Protocol
   c) International Union for the Conservation of Nature (IUCN)
   d) Kyoto Protocol

12) India has _____ animal sanctuaries.
   a) 89   b) 543
   c) 492   d) 34

13) _____ gives a complete list endangered flora & fauna.
   a) Red Data Book   b) WWF
   c) National Wildlife Action Plan   d) World Education Book

14) The term 'Remote Sensing' was coined by _____.
   a) Evelyn L. Pruit   b) Gaspard Felix Tournachon
   c) Wilbur Wright   d) N. J. Collar

Q.2 A) Answer the following questions. (Any Four)   08
   1) Radio Collar.
   2) Cryopreservation.
   3) Keystone species.
   4) Invasive species.
   5) Molecular markers.

B) Write notes. (Any Two)   06
   1) Indirect values of biodiversity
   2) Biodiversity Informatics
   3) Child labour Act. 1986

Q.3 A) Answer the following questions. (Any Two)   08
   1) Explain in brief diversity indices.
   2) Explain role of wild life institutes in biodiversity conservation.
   3) Discuss criteria for categorization of threatened species.

B) Answer the following questions. (Any One)   06
   1) Define biodiversity and add a note on scope of biodiversity science.
   2) Explain human-wildlife conflict with respect to Great Indian Bustard.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Role of NGOs in biodiversity conservation.
   2) Causes and consequences of climate change.
   3) Sacred grooves in India & their importance.

B) Answer the following questions. (Any One)   04
   1) Define biodiversity hotspots & discuss any two biodiversity hotspots.
   2) Explain Wildlife Protection Act-1972.

Q.5 Answer the following questions. (Any Two)   14
   1) Define extinction and add a note the process of extinction.
   2) Give an account of major national parks and sanctuaries in Maharashtra.
   3) Discuss captive breeding and cloning as a method for biodiversity conservation with suitable example.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Mathematics (Special Paper -XII)
PARTIAL DIFFERENTIAL EQUATION

Day & Date: Friday, 11-10-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) The equation $p \tan y + q \tan x = \sec^2 z$ is of order _____.
   a) 1
   b) 2
   c) 0
   d) None of these

2) The equation $\frac{\partial^2 z}{\partial x^2} = \left(1 + \frac{\partial z}{xy}\right)^{1/2}$ is _____.
   a) Linear
   b) quasi-linear
   c) semi-linear
   d) non-linear

3) The general solution of $xzp + yzq = xy$ is _____.
   a) $\phi\left(x/y, \ xy + z^2\right) = 0$
   b) $\phi\left(x/y, \ xy - z^2\right) = 0$
   c) $\phi\left(x/y, \ y - z^2\right) = 0$
   d) $\phi(xy, xy - z^2) = 0$

4) The general solution of $xp - yq = xy$ is _____.
   a) $\phi\left(\frac{x}{y}, xe^{-z/(xy)}\right) = 0$
   b) $\phi\left(xy, xe^{-z/(xy)}\right) = 0$
   c) $\phi\left(xy, xe^{+z/(xy)}\right) = 0$
   d) $\phi\left(x/y, xe^{z/(xy)}\right) = 0$

5) The first order partial differential equations $p = P(x,y), q = Q(x,y)$ are compatible if and only if _____.
   a) $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$
   b) $\frac{\partial P}{\partial x} = \frac{\partial Q}{\partial y}$
   c) $\frac{\partial P}{\partial y} = -\frac{\partial Q}{\partial x}$
   d) $\frac{\partial P}{\partial x} = -\frac{\partial Q}{\partial y}$

6) The complete integral of $f(p,q) = 0$ is _____.
   a) $z = ax + by + c$
   b) $z = ax - yF(a) + c$
   c) $z = ax + yF(a) + c$
   d) None of these

7) The complete integral of $pq = k$ is _____.
   a) $z = ax + by + c$
   b) $z = ax + \frac{k}{a}y + c$
   c) $z = ax - \frac{k}{a}y + c$
   d) None of these

8) The complete integral of $z = px + qy + p^2 + q^2$ is _____.
   a) $z = ax + by + c$
   b) $z = ax - by + a^2 - b^2$
   c) $z = ax + by + a^2 + b^2$
   d) None of these

9) The solution of equation $\left(\frac{y^2 z}{x}\right) p + xzq = y^2$ is _____.
   a) $\phi(x^3 - y^3, x^2 - z^2) = 0$
   b) $\phi(x^3 - y^3, x^2 + z^2) = 0$
   c) $\phi(x^3 + y^3, x^2 - z^2) = 0$
   d) $\phi(x^3 + y^3, x^2 + z^2) = 0$

10) The P.I. of $(D^2 - 2DD^1 + D^{12})z = e^{x+2y}$ is = _____.
    a) $-e^{x+2y}$
    b) e^{x+2y}
    c) $\dfrac{1}{2}e^{x+2y}$
    d) $-\dfrac{1}{2}e^{x+2y}$

11) The solution of $r - 2s + t = 0$ is _____.
    a) $z = \phi_1(y - x) + \phi_2(y + x)$
    b) $z = \phi_1(y + x) + x\phi_2(y - x)$
    c) $z = \phi_1(y + x) + x\phi_2(y + x)$
    d) None of these

12) The required general solution of $(DD^1 + aD + bDD^1 + ab)z = 0 =$ _____.
    a) $z = e^{-bx}\,\phi_1(y) + e^{-ay}\,\phi_2(x)$
    b) $z = e^{-by}\,\phi_1(y) + e^{-ax}\,\phi_2(x)$
    c) $z = e^{bx}\,\phi_1(y) + e^{ay}\,\phi_2(x)$
    d) None of these

13) The P.I of $(D^2 - 4DD^1 + D - 1)z = e^{3x-2y}$ is _____.
    a) $\dfrac{1}{25}e^{3x-2y}$
    b) $\dfrac{1}{35}e^{3x-2y}$
    c) $-\dfrac{1}{25}e^{3x-2y}$
    d) $-\dfrac{1}{35}e^{3x-2y}$

14) If $a \neq 0$ then the general solution of the equation $(aD + bD^1 + c)z = 0$ is, z
    = _____.
    a) $e^{\frac{c}{a}x}\phi(ay - bx)$
    b) $e^{-\frac{c}{a}x}\phi(ay - bx)$
    c) $e^{\frac{c}{a}x}\phi(ax + by)$
    d) $e^{-\frac{c}{a}x}\phi(ax + by)$

Q.2 A) Attempt any four of the following.   **08**
    1) Eliminating arbitrary constant a and b from $z = (x^2 + a)(y^2 + b)$ to form the partial differential equation.
    2) Solve $xyp + y^2q = zxy - 2x^2$.
    3) Show that the differential equations $p = x^2 - ay;\ q = y^2 - ax$ are compatible and solve them.
    4) Find a complete integral of $q = 3p^2$.
    5) Solve $(D^3 - 6D^2D^1 + 11DD^{12} - 6D^{13})Z = 0$.

B) Attempt any two of the following.   **06**
    1) Solve $(D + 2D^1 - 3)(D^2 + D^1)z = 0$.
    2) Solve $z(x + y)p + z(x - y)q = x^2 + y^2$.
    3) Find a complete integral of $9(p^2z + q^2) = 4$.

Q.3 A) Attempt any two of the following.   **08**
    1) Explain the method of solving the equation of the form $f_1(x, p) = f_2(y, q)$.
    2) Solve $(y + z)p + (z + x)q = x + y$.
    3) Solve $(D - 1)(D - D^1 + 1)z = e^y$.

B) Attempt any one of the following.   **06**
    1) Find the integral surface of the partial differential equation $(x - y)p + (y - x - z)q = z$ through the circle $z = 1, x^2 + y^2 = 1$.
    2) Explain the method of finding c.f. of the linear homogeneous partial differential equation with constant coefficient namely $f(D, D^1)z = f(x, y)$ when the roots are distinct.

Q.4 A) Attempt any two of the following.   **10**
    1) Solve $(D^3 - 7DD^{12} - 6D^{13})Z = \sin(x + 2y) + e^{3x+y}$.
    2) Find complete and singular integrals of $4(1 + z^3) = 9z^4pq$.
    3) Solve $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$.

B) Attempt any one of the following. 04

    1) Explain the Lagrange's method of solving $Pp + Qq = R$ where $P, Q \text{ and } R$ are functions of $x, y \text{ and } z$.

    2) Solve $(D - D^1 - 1)(D - D^1 - 2)z = \sin(2x + 3y)$.

Q.5 Attempt any two of the following. 14

    1) Explain the Charpit's methods of solving partial differential equation $f(x, y, z, p, q) = 0$ where x and y are independent variable and $p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}$ and hence solve $zpq = p + q$.

    2) If $f(D, D^1)$ be homogeneous function of D, D^1 of degree 'n' then $\frac{1}{f(DD^1)} \phi^n(ax + by) = \frac{1}{f(ab)} \phi(ax + by)$ where $f(ab) \neq 0$ and ϕ^n being n^{th} derivative of ϕ with respect to $ax + by$ and hence solve $D^2 + 3DD^1 + 2D^{12})z = x + y$.

    3) solve $(D^3 - 4D^2D^1 + 5DD^{12} - 2D^{13})z = e^{y+2x} + (y + x)^{1/2}$.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Botany (Paper – I)
MICROBIOLOGY AND PSYCHOLOGY

Day & Date: Saturday, 16-11-2019　　　　　　　　　　Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1　Select the correct alternatives from the following and rewrite the sentence.　08
　　1)　Genus Nostoc is include in _____.
　　　　a)　Chlorophyta　　　　　　　　b)　Cyanophyta
　　　　c)　Phacophyta　　　　　　　　d)　Xanthophyta

　　2)　The site of Nitrogen fixation in NOSTOC is _____.
　　　　a)　Akinete　　　　　　　　　　b)　Aphanospcre
　　　　c)　Zoospore　　　　　　　　　d)　Heterocyst

　　3)　Viruses attacking bacteria is called _____.
　　　　a)　Tobacco mosaic virus　　　　b)　Influenza virus
　　　　c)　Mumps virus　　　　　　　　d)　Bacteriophage

　　4)　Bacillus bacteria are _____.
　　　　a)　Spherical　　　　　　　　　b)　Helical
　　　　c)　Rod shaped　　　　　　　　d)　Filamentous

　　5)　In Rhodophyta, _____ algae are present.
　　　　a)　Red　　　　　　　　　　　　b)　Blue
　　　　c)　Brown　　　　　　　　　　d)　Green

　　6)　Algae grows on high salt concentration is called as _____.
　　　　a)　Crysophytes　　　　　　　　b)　Epizoic
　　　　c)　Epiphytic　　　　　　　　　d)　Halophytic

　　7)　Algae are classified into major groups on the basis of _____.
　　　　a)　Nature of reserve food material　b)　Chemical composition of cell wall
　　　　c)　Vegetative characters　　　　d)　Types of pigment

　　8)　From the following _____ is member of cyanophyta.
　　　　a)　Chara　　　　　　　　　　　b)　Chlamydomonas
　　　　c)　Anabena　　　　　　　　　d)　Ulva

Q.2　Answer the following questions. (Any Four)　　　　　　　　08
　　1)　Define Isogamy.
　　2)　What is mean by parasitology?
　　3)　Enlist types of photosynthetic pigments found in algae.
　　4)　Give the definition of microorganism.
　　5)　Give any two functions of Heteroyst.
　　6)　What is fragmentation?

Q.3　Answer the following questions. (Any Two)　　　　　　　　08
　　1)　Explain and brief account of thallus structure in *Spirogyra*.
　　2)　Describe the structure of Heterocyst.
　　3)　Write salient features of division chlorophyta.

Q.4 **Answer the following questions. (Any Two)** 08
   1) Discuss in brief T_4 bacteriophage.
   2) Describe role of algae as bio-fertilizers.
   3) Give general characters of chlorophyta.

Q.5 **Answer the following questions. (Any One)** 08
   1) Explain scalariform conjugation in *Spirogyra* with suitable diagrams.
   2) Give a detail account of economic importance of bacteria.

| Seat No. | | **Set** | **P** |

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Mathematics (Special Paper – XII)
MATHEMATICAL ANALYSIS

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                         2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The value of the $\lim\limits_{x \to 0^+} \dfrac{\sin x}{\sqrt{x}}$ = _____ .
   a) 0   b) 1
   c) 2   d) ∞

2) A function is continuous at $x = a$ if _____.
   a) $\lim\limits_{x \to a^+} f(x) = \lim\limits_{x \to a^-} f(x)$ b) $\lim\limits_{x \to a^-} f(x) \neq \lim\limits_{x \to a^+} f(x)$
   c) $\lim\limits_{x \to a^-} f(x) = \lim\limits_{x \to a^-} f(x) = f(a)$ d) $\lim\limits_{x \to a^+} f(x) = f(a)$

3) Given $\in > 0$ there exist $\delta > 0$ such that $|f(x_1) - f(x_2)| < \in$ whenever $0 < |x_1 - x_2| < \delta$ is called _____ function.
   a) continuous   b) not continuous
   c) uniform   d) Bounded

4) The value of the $\lim\limits_{x \to 0^-} \dfrac{|x|}{x}$ = _____.
   a) 1   b) -1
   c) 0   d) ∞

5) A function $f(x)$ is differentiable in an interval if _____.
   a) $Lf'(a) \neq R f'(a)$
   b) $Lf'(a) = R f'(a)$
   c) $Lf'(a)$ and $R f'(a)$ exists
   d) $Lf'(a)$ and $R f'(a)$ does not exists

6) A function $f(x)$ is differentiable on a closed interval [a, b] and $f'(a)$ and $f'(b)$ are of opposite signs, then there exists at least one point c between a and b such that $f'(c) = 0$ is called _____.
   a) Cauchy's mean value theorem   b) Lagrange's mean value theorem
   c) Rolle's theorem   d) Darboux's theorem

7) The value of C =____ by the Rolle's theorem of the function $f(x) = x^3 - 4x$ on $[-2, 2]$
   a) -1 b) 1.3
   c) 1.91   d) 1.16

8) $\lim\limits_{n \to \infty} x^n e^{-x} =$ _____, for all n.
   a) 0   b) -1
   c) 1   d) n

9) By the addition theorem $E(x). E(-x)=$ _____.
   a) -1   b) 0
   c) 2   d) 1

10) The value of C = _____ by the Lagrange's mvt of the function $f(x) = x^2 - 7x + 10$ on closed interval [2, 5]
   a) $1/2$
   b) $3/2$
   c) $5/2$
   d) $7/2$

11) The Maclaurin's infinite expansion $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + $_____.for $-1 < x \leq 1$ is equal to _____.
   a) $\log x$
   b) $\log(1 + x)$
   c) $\log(1 - x)$
   d) $\log\left(\frac{1}{x}\right)$

12) By the logarithmic function (to the base e) $E\{L(y)\} = $_____, $y > 0$
   a) y
   b) E
   c) L
   d) $\log y$

13) If $L'\{E(x)\}. E(x) = $_____.
   a) x
   b) E^2
   c) 1
   d) 0

14) The negative variation function of $f(x) = 3x^2 - 2x^3$ for $-2 \leq x \leq 0$ is
   a) 28
   b) 29
   c) 30
   d) 27

Q.2 A) Answer the following questions. (Any Four) 08

1) Find the right hand limit and left hand limit of the function
$$f(x) \begin{cases} \frac{|x-4|}{x-4} & x \neq 4 \\ 0 & x = 4 \end{cases}$$

2) If $\lim_{x \to a} f(x)$ exists. Prove that it must be unique.

3) Evaluate $\lim_{x \to 0} \dfrac{e^{1/x}}{e^{1/x} + 1}$

4) Discuss the derivability of the function.
$$f(x) = x \quad if \quad 0 \leq x < 1$$
$$= 1 \quad if \quad x \geq 1$$

5) Define generalized power function a^x and show that $a^x . a^y = a^{x+y}$.

B) Answer the following questions. (Any Two) 06

1) If f and g are two functions defined on some neighbourhood of c such that
$$\lim_{x \to c}(f + g)x = l + m$$

2) A function which is derivable at a point is necessarily continuous at that point.

3) A bounded monotonic function is a function of bounded variation.

Q.3 A) Answer the following questions. (Any two) 08

1) Show that the function $f(x) = x^2$ is uniformly continuous on [-1,1]
2) State and prove Cauchy's mean value theorem.
3) The sum of two functions of bounded variation is also a bounded variation.

B) Answer the following questions. (Any One) 06

1) State and prove Taylors theorem.
2) Compute the positive, negative and the total variation functions of $f(x)$,where $f(x) = [x] - x \quad (0 \leq x \leq 2)$

Q.4 **A)** **Answer the following questions. (Any Two)** **10**

    1) Investigate the continuity of a function

$$f(x) = \begin{cases} \dfrac{e^{1/x} - e^{-1/x}}{e^{1/x} + e^{-1/x}} & when\ x \neq 0 \\ 1 & when\ x = 0 \end{cases}, at\ x = 0$$

    2) Show that

$$\frac{v-u}{1+v^2} < tan^{-1}v - tan^{-1}u < \frac{v-u}{1+u^2}, \text{ if } o < u < v$$

       and deduce that

$$\frac{\pi}{4} + \frac{3}{25} < tan^{-1}\left(\frac{4}{3}\right) < \frac{\pi}{4} + \frac{1}{6}$$

    3) Show that a continuous function not to be a function of bounded variation for the function

$$f(x) = \begin{cases} x\sin\dfrac{\pi}{x}, & when \quad 0 < x \leq 1 \\ 0, & when \quad x = 0 \end{cases}$$

B) **Answer the following questions. (Any One)** **04**

    1) Verify the generalized power function a^x is consistent for x is an integer or rational number.

    2) Show that the number θ which occurs in the Taylor's theorem with lagrange's form of remainder after n terms approaches the limit$\left(\dfrac{1}{n+1}\right)$as h approaches zero, provided $f^{n+1}(x)$ is continuous and different from zero at $x = a$.

Q.5 **Answer the following questions. (Any two)** **14**

    1) Define uniform continuity. Show that the function $f(x) = {}^{1}/_{x^2}$ is uniformly continuous on $[a, \infty]$, where $a > 0$; but not uniformly continuous on $(0, \infty)$

    2) State and prove Taylor's theorem remainder after n terms.

    3) If f is of bounded variation on [a, b] then it is also of bounded variation on [a, c] and [c, b], where c is a point of [a, b] and conversely. Also prove that $v(f, a, b) = v(f, a, c) + v(f, c, b)$.

Seat No.			**Set**	**P**

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper – XII)
OPERATIONS RESEARCH

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Neat diagrams must be drawn wherever necessary.
            4) Graph papers will be supplied if required.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1)   In graphical method of solving a LPP, the bounded region is known as
    _____ region.
    a)   solution   b)   basic solution
    c)   feasible solution   d)   Optimal

2)   In LPP the condition to be satisfied is _____.
    a)   Constraints have to be linear
    b)   Objective function have to be linear
    c)   both [a] and [b]
    d)   none of the these

3)   The feasible region of a L.P.P. has four extreme points: A(0,0), B(1,1),
    C(0,1) and D(1,0). Optimal solution for minimization problem with the
    objective function $z = 2x - 2y$ is _____.
    a)   a unique solution at C
    b)   a unique solution at D
    c)   an alternate solution at a line segment between A and B
    d)   An unbounded solution

4)   In final (optimum) simplex table, if net evaluation $z_j - c_j = 0$ for at least one
    non- basic variable, then there will be _____.
    a)   infeasible solution   b)   unbounded solution
    c)   no solution   d)   alternate solution

5)   The Penalty in VAM represents difference between _____ cost of
    respective row /column.
    a)   Two Largest   b)   smallest two
    c)   largest and smallest   d)   none of these

6)   In assignment problem the minimum number of lines covering all zeros in a
    reduced cost matrix of order 8 can be _____.
    a)   at the least 8   b)   8
    c)   at the most 8   d)   other than 8

7)   In non-degenerate solution of a transportation problem with m origins and
    n destinations, the number of allocated cells is _____.
    a)   Not equal to m+n-1   b)   Not equal to m+n+1
    c)   Equal to m+n+1   d)   None of these

8)   The procedure for solving the sequencing problem is known as _____.
    a)   S.M. John's algorithm   b)   S.M. Johnson's algorithm
    c)   S.M. Johny's algorithm   d)   none of these

9) In sequencing problem the time interval between starting the first job and completing the last job, including the idle time (if any), in a particular order by the given set of machines is known as _____
   a) total elapsed time
   b) total idle time
   c) total busy time
   d) none of these

10) Monte Carlo is _____.
    a) a technique for modeling
    b) a technique for simulation
    c) a person
    d) a company brand

11) _____ is not under the control of the decision maker.
    a) A state of nature
    b) A decision alternative
    c) both [a] and [b]
    d) none of these

12) Maximin decision making criteria is used under the environment _____.
    a) risk
    b) Certainty
    c) uncertainty
    d) all of these

13) A simulation model uses the mathematical expressions and logical relationship of the _____.
    a) real system
    b) computer model
    c) performance measures
    d) estimated inferences

14) In assignment problem if number of columns is equal to number of rows then _____.
    a) dummy column is added
    b) dummy row is added
    c) any column is deleted
    d) none of these

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Define a solution of a L.P.P.
2) Define a surplus variable.
3) When is a transportation problem said to be an unbalanced?
4) Define an Assignment Problem.
5) What is a decision alternative in decision making problem?

B) Answer the following question. (Any Two)   **06**
1) What is decision making under risk?
2) Write the dual of the following L.P.P. :
   $maximize\ z = x_1 + x_2 + 3x_3$
   Subject to:
   $$3x_1 + 2x_2 + x_3 \leq 3 \quad 2x_1 + x_2 + 2x_3 \leq 2$$
   and $x_1, x_2, x_3 \geq 0$
3) What is a sequencing problem?

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Write the mathematical form of a L.P.P. in its standard form.
2) Write the definition and properties of random numbers.
3) State the conditions required to be tested before converting a sequencing problem of n jobs with 3 machines into a sequencing problem of n jobs with 2 machines.

B) Answer the following questions. (Any One)   **06**
1) Write the procedure of North-West corner method.

2) Find initial basic feasible solution to the following transportation problem using Matrix Minima method:

	D1	D2	D3	D4	Availability
O1	23	27	16	18	30
O2	12	17	20	51	40
O3	22	28	12	32	53
Requirement	22	35	25	41	

Q.4 A) Answer the following questions. (Any Two)   10
1) Write the steps involved in the procedure of Monte Carlo simulation.
2) Give the procedure of generating n random observations from exponential distribution.
3) Find the IBFS of the following LPP :

$Maximize\ z = x_1 + x_2 + 3x_3$
Subject to:
$3x_1 + 2x_2 + x_3 \leq 3 \quad 2x_1 + x_2 + 2x_3 \leq 2$
And $x_1, x_2, x_3 \geq 0$

B) Answer the following question. (Any One)   04
1) Suggest the best strategy using the EMV Criteria for the following decision making problem:

Payoff (Profits) Table

Strategies	States of nature			
	S_1	S_2	S_3	S_4
D_1	20	15	12	-3
D_2	15	8	7	10
D_3	5	10	15	12
$P(S_i)$	0.3	0.4	0.2	0.1

2) Give the steps involved in minimax regret criterion.

Q.5 Answer the following questions. (Any Two)   14
1) Solve the following LPP graphically.

$Maximize\ z = 3x_1 + 4x_2$
Subject to: $4x_1 + 2x_2 \leq 80, \ 2x_1 + 5x_2 \leq 180$
and $x_1, x_2 \geq 0$.

2) The following assignment problem shows the costs of assigning five persons to five jobs. Determine the optimum assignment schedule.

		Job				
		1	2	3	4	5
	A	8	4	2	6	1
	B	0	9	5	5	4
Person	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

3) Find the optimal sequence in performing the following five jobs on two machines in the order M_1M_2 .Processing times (in hours) are given in the following table:

Job	1	2	3	4	5
Machine M_1	5	10	6	7	11
Machine M_2	8	6	2	3	4

Also find minimum total elapsed time and idle times for all machines.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper - XII)
REGRESSION ANALYSIS

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory and carry equal marks.
2) Figures to the right indicate full marks
4) Use of scientific calculators and statistical tables is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Which of the following is not a simple linear regression model, with usual assumptions?
   a) $Y = \beta_0 + \beta_1 X + \varepsilon$ b) $Y = \beta_0/\beta_1 X + \varepsilon$
   c) $Y = \mu + \beta X + \varepsilon$ d) $Y = \alpha + \beta X + \varepsilon$

2)   In the model $Y = \mu + \beta X + \varepsilon$ the term ε is known as _____.
   a) Regressor   b)   Error
   c) Response   d)   Independent varia

3)   In the simple linear regression model, errors are _____.
   a)   normally distributed   b)   Independent
   c)   both a) and b)   d)   None of the above

4)   In multiple regression model, for variable selection we use _____.
   a)   forward selection   b)   backward elimination
   c)   both a) and b)   d)   none of these

5)   The adjusted R-square lies in the interval _____.
   a)   -1 to 1   b)   0 to 1
   c)   0 to ∞   d) $-\infty$ to ∞

6)   The multiple regression model, assumes that errors are _____.
   a)   Normally distributed   b)   t-distributed
   c)   chi-square distributed   d)   None of these

7)   If we have set of n-observations on the variables in the simple linear regression model then, the error degrees of freedom are _____.
   a)   n-1   b)   n-2
   c)   n   d)   1

8)   Normal probability plot is used to _____.
   a)   verify the normality assumption of errors
   b)   assess the independence of errors
   c)   to verify that errors are uncorrelated
   d)   None of these

9)   Simple logistic regression assumes that the response variable is _____.
   a)   binary   b)   Poisson
   c)   normal   d)   none of these

10) Regression analysis can be used to _____.
    a) predict the yield of crop from given input of resources
    b) predict the yield of a chemical reaction given the reactant
    c) predict the annual sale given the advertisement cost
    d) all the above

11) In the multiple linear regression the regressors can be _____.
    a) discrete   b) Continuous
    c) both a) and b)   d) neither a) nor b)

12) In multiple regression model if there are p-covariates then there should be _____.
    a) at least p-observations on the response-covariates
    b) at most p-observations on the response-covariates
    c) exactly p-observations on the response-covariates
    d) none of these

13) Variable selection can be done using _____.
    a) Adjusted R^2 method   b) forward selection
    c) backward elimination   d) All the above

14) In testing $H_0 : \beta_1 = 0 \, Vs \, H_1 : \beta_1 \neq 0$, this hypothesis can be tested using _____.
    a) Z-test   b) t-test
    c) a) or b)   d) All the above

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) State the assumptions on errors in simple linear regression model.
    2) Write the simple logistic regression model.
    3) Define Standardized residuals.
    4) What do you mean by variable selection?
    5) Write the confidence interval for the parameters in the simple linear regression model.

B) Answer the following questions. (Any Two)   **06**
    1) Write down the test for testing significance of independent variable in simple linear regression model.
    2) Obtain the estimator of error variance in the simple linear regression model.
    3) Write down the multiple linear regression model with all the assumptions.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Obtain the least square estimates of the parameters in the multiple linear regression model.
    2) Complete the following ANOVA table.

Source of variation	d. f.	S. S.	M. S.	F-ratio
Regression	5	---	35	---
Residual	---	225	---	
Total	20	---		

    3) Obtain the least square estimators of the parameter in the simple linear regression model.

B) Answer the following questions. (Any One)   **06**
    1) What is Hat matrix write their properties.
    2) Write a note on construction of confidence intervals for σ^2.

Q.4 **A)** **Answer the following questions. (Any Two)** **10**
1) Obtain the test for testing the constant variance σ^2 in the simple linear Regression model.
2) Obtain the test for testing β_1 in simple linear regression.
3) What is difference between the simple linear regression and logistic regression?

B) **Answer the following questions. (Any One)** **04**
1) Write in detail any one variable selection procedure in linear regression analysis.
2) Obtain an unbiased estimate of the error variance σ^2 in the model - $Y = X\beta + \varepsilon$ where Y and β are the column vectors X is the coefficient matrix and ε is error in the model.

Q.5 **Answer the following questions. (Any Two)** **14**
1) Given $\overline{X}= 42.25$, $\overline{Y} = 131.5$, $S_{XX} = 5911.75$, $S_{Xy} = 2656.5$, Obtain
   a) $\hat{\beta}_1$ b) $\hat{\beta}_0$ c) Estimate response when $X = 5.5642$.
2) Describe different residual plots in the linear regression analysis.
3) Discuss the properties of parameters in the simple linear regression model.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper – XII)
APPLIED GEOLOGY PART – I

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14
1) Rock formation above the water table is _____.
   a) constitutes of acids   b) saturated with water
   c) filled with air   d) none of these

2) Over flowing bore-well in summer may be due to _____.
   a) heavy rain   b) artesian condition
   c) increase in temperature   d) dry lineament

3) The most efficient and rapid method of determination of sub-surface geology is _____.
   a) seismic method   b) gravity method
   c) magnetic method   d) electric resistivity method

4) Which of the following has low crushing strength and low porosity?
   a) Quartzite   b) vesicular basalt
   c) Gabbro   d) compact basalt

5) The length of the core obtained is called _____.
   a) core loss   b) core run
   c) core recovery   d) none of these

6) Check dams are constructed to control _____.
   a) Tsunamis   b) Flood
   c) Earthquake   d) Landslide

7) _____ is a process of collection and recharge of rainwater within bore well from rooftop in Urban areas.
   a) Trench recharge   b) Rainwater harvesting
   c) Flooding   d) Pit recharge

8) Strength of building stone mainly depends upon _____.
   a) mineral composition   b) texture
   c) structure   d) all of these

9) The resistance offered by the rocks to withstand weathering is called as _____.
   a) compressive strength   b) tensile strength
   c) durability   d) bulk density

10) Abutment is _____ surface of the valley upon which dam rests.
    a) vertical   b) sloping
    c) slippery   d) horizontal

11) Most desirable condition for tunnel alignment through folds is _____.
   a) crest
   b) trough
   c) limbs
   d) axis

12) Uncontrolled sedimentation in the reservoir is called _____.
   a) Silting
   b) Saltation
   c) Solution
   d) None of these

13) The upper surface of in the zone of saturation is called _____.
   a) water table
   b) aquifer
   c) spring
   d) aquitard

14) Confined aquifer produces _____.
   a) over flowing borewell
   b) artesian well
   c) spring
   d) all of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define dam.
   2) Give any four names of types of tunnels.
   3) Building stones of Maharashtra.
   4) Define Water table.
   5) What is Ground water?

B) Write short notes (Any Two)   **06**
   1) Porosity.
   2) Core recovery and core loss.
   3) Siltation process.

Q.3 A) Answer the following questions. (Any two)   **08**
   1) Explain desirable and undesirable conditions for dams in faulted region.
   2) Describe any two methods of ground water recharge.
   3) Explain Reservoir Induced Seismicity (RIS) with case study.

B) Answer the following questions. (Any One)   **06**
   1) Explain Electric resistivity method in ground water exploration.
   2) Describe sub-surface investigations to be carried before selection of engineering site.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Write a note on - Zones of groundwater.
   2) Write a note on - Arch and Buttress dams.
   3) Explain different sources of ground water.

B) Answer the following questions. (Any One)   **04**
   1) Describe durability of Building Stones.
   2) Write a note on - Rainwater Harvesting.

Q.5 Answer the following questions. (Any two)   **14**
   a) Define aquifer. Describe perched and unconfined aquifers.
   b) Define tunnels. Explain tunneling through inclined beds.
   c) Define Hydrology. Explain in detail Hydrological Cycle.

Seat No.

Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper - XII)
CRYSTALLOGRAPHY AND OPTICAL MINERALOGY

Day & Date: Friday, 11-10-2019　　　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Draw neat labeled diagrams wherever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) There are _____ elements of symmetry to describe any crystal.
   a) 2　　　　　　　　　　　　b) 3
   c) 4　　　　　　　　　　　　d) 1

2) Flat surface of a crystal is called as _____.
   a) Face　　　　　　　　　　b) edge
   c) solid angle　　　　　　　d) corner

3) Two faces of a crystal meets to form an _____.
   a) Corner　　　　　　　　　b) solid angle
   c) Center　　　　　　　　　d) edge

4) Cube is _____ form.
   a) Open　　　　　　　　　　b) closed
   c) Combination　　　　　　　d) twin

5) Basal pinacoid have _____ faces.
   a) 4　　　　　　　　　　　　b) 2
   c) 6　　　　　　　　　　　　d) 3

6) The solid angles are places for formation of _____ in cube.
   a) prism　　　　　　　　　　b) pinacoid
   c) octahedron　　　　　　　d) dodecahedron

7) There are _____ faces to prism.
   a) 3　　　　　　　　　　　　b) 2
   c) 4　　　　　　　　　　　　d) 1

8) Thick & distinct border of the mineral shows difference in R.I. as _____ relief.
   a) high　　　　　　　　　　b) low
   c) moderate　　　　　　　　d) very low

9) Cleavages in Calcite under microscope shows _____ R.I. as compared to mineral body.
   a) same　　　　　　　　　　b) different
   c) twinkling　　　　　　　　d) rhombic

10) Measure of the bending of a ray of light when passing from one medium into another is _____.
   a) refractive index　　　　　b) relief
   c) colour　　　　　　　　　d) cleavage

11) Mineral changing colour under polarized light of microscope is _____.
   a) Uniaxial
   b) Interference colour
   c) Optic sign
   d) Pleochroism

12) If R I of mineral is very less than the surrounding, the mineral shows _____ relief.
   a) negative
   b) positive
   c) correct
   d) indistinct

13) If R I of mineral is very high than the surrounding, the mineral shows _____ relief.
   a) Negative
   b) Positive
   c) Correct
   d) Indistinct

14) Mica Plate is _____.
   a) Form
   b) Upper nicol
   c) Analyzer
   d) Accessory plate

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define crystal.
   2) Define form of a crystal.
   3) What is element of symmetry?
   4) How many planes of symmetry are there for a cube?
   5) What is Becke line?

B) Answer the following questions. (Any Two)   **06**
   1) Describe Ditetragonal Pyramid.
   2) Describe immersion method.
   3) Describe RI of Quartz, Muscovite & Garnet.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe axes of symmetry of a Cube.
   2) Describe elements of symmetry of Monoclinic system crystal. Describe Clino-pinacoid.
   3) What is interference colour? Give one example & draw its diagram.

B) Answer the following questions. (Any One)   **06**
   1) Describe pinacoids of Orthorhombic system in detail, draw related diagrams.
   2) What is uniaxial mineral? Give two examples with reasons.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Draw and describe Dodecahedron.
   2) Sketch and describe Cube and Octahedron combination form.
   3) What is biaxial mineral? Give two examples with reasons.

B) Answer the following questions. (Any One)   **04**
   1) Define dome, describe types of dome. Draw related diagrams.
   2) Describe pleochroism & absorption with related examples & diagrams.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe Optic sign of minerals.
   b) Describe sign of elongation of mineral.
   c) Describe types of prisms, draw related diagrams.

Seat No.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper – XII)
INDUSTRIAL MICROBIOLOGY – I

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                          2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) _____ organism is used for bread production.
   a) *E. Coli*   b) *Yeast cells*
   c) *Streptococci spp*   d) *Lactobacilli spp*

2) Food poisoning is caused by _____.
   a) *Salmonella spp*   b) *Cladosporium spp*
   c) *Pseudomonas spp*   d) *Clostridium botulinum*

3) Aromatic flavor of milk is due to _____.
   a) *St. lactis*   b) *Actinomycetes spp*
   c) *Achromobacter spp*   d) *Alcaligens spp*

4) Curd contains _____ more than milk.
   a) Vit. A   b) Vit. B
   c) Vit. C   d) Vit. D

5) Woodruff and M. C. Danieal medium is used for _____ fermentation.
   a) Streptomycin   b) Penicillin
   c) Lysine   d) Biopolymer

6) Insulin produced by r-DNA technology is used for treating _____.
   a) Cancer   b) Diabetes
   c) Blood pressure   d) AIDS

7) Dual fermentation is used for production of _____.
   a) Streptomycin   b) Penicillin
   c) L-lysine   d) Citric acid

8) Aroma and bitterness in beer is because of _____.
   a) Hops   b) Malt
   c) Yeast   d) Sugar

9) _____ is used for pretreatment of must during wine fermentation.
   a) H_2SO_4 b) HCl
   c) SO_2 d) CO_2

10) *Saccharomyces cerevisiae* variety *ellipsoides* is used for production of
    _____.
    a) Lysine   b) Streptomycin
    c) r-DNA product   d) Wine

11) Rabbits are used for _____ testing.
    a) Allergen   b) Pyrogenicity
    c) Sterility   d) Toxicity

12) Activated charcoal is used in _____ chromatography.
    a) Gel   b) Affinity
    c) Adsorption   d) Ion exchange

13) In gel filtration chromatography, molecules are separated on the basis of _____.
    a) Shape   b) Size
    c) Mol. Wt   d) All of these

14) *Corynebacterium glutamicum* is used for production of _____.
    a) L-lysine   b) Streptomycin
    c) Insulin   d) Vit B_{12}

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Organism involved in Idli production.
2) List methods of food preservation.
3) What is rDNA product?
4) Non microbial spoilage of wines.
5) What is a pyrogen?

B) Write notes (Any Two)   **06**
1) Flocculation
2) Carcinogenicity testing
3) Food as a substrate

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Yogurt production
2) Spoilage of milk
3) Food Spoilage

B) Answer the following question. (Any One)   **06**
1) Production of Red table wine
2) Food Infection

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Streptomycin production
2) Bread fermentation
3) Precipitation and chromatography for recovery of product

B) Answer the following question. (Any One)   **04**
1) Post fermentation microbial spoilage of wine
2) Solvent Extraction

Q.5 Answer the following questions. (Any Two)   **14**
a) Describe in detail r-DNA product – Insulin production.
b) Explain any 4 down streaming process for extraction and purification of fermentation products.
c) Give details of production of cheese with its uses.

Seat No.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper – XII)
INDUSTRIAL MICROBIOLOGY - II

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   _____ is used in medium during citric acid production by Koji process.
   a) CSL   b) SWL
   c) Wheat bran   d) Whey

2)   Solvent extraction is also known as _____ extraction.
   a) Solid-gas   b) Liquid – liquid
   c) Solid-solid   d) Liquid – gas

3)   _____ enzyme is used for degradation of starchy material.
   a) Amylase   b) Caseinase
   c) Proteases   d) Cellulose

4)   _____ is type of hard cheese.
   a) Limburger   b) Roquefort
   c) Camembert   d) Cheddar

5)   Adsorption chromatography separates molecules due to their _____ for the surface of a solid matrix.
   a) Differential affinities   b) Solubility
   c) Size   d) Structure

6)   For yogurt production Lactobacillus bulgaricus and _____ is used as culture.
   a) Lactobacillus brevis   b) Streptococcus thermophilus
   c) Streptococcus fecalis   d) Lactobacillus lactis

7)   _____ the organism is used as design organism for sterilization program.
   a) B. Subtilis   b) B. Cereus
   c) B. Anthracis   d) B. Stearothermophilus

8)   _____ is acting as leavening agent in bread.
   a) Salt   b) Sugar
   c) Yeast   d) Protein

9)   Cell lysis is an important operation when product is _____.
   a) Toxic   b) Soluble
   c) Thermolobile   d) Intracellular

10) Black gram is used in production of _____.
   a) Cheese   b) Bread
   c) Idli   d) Curd

11) Alpha amylase randomly splits _____ bond linkage.
   a) $\alpha -1.6$, glycosidic   b) Peptide
   c) Hydrogen   d) $\alpha -1.4$, glycosidic

12) In fermentor contaminants enter through _____.
    a) Sterile media   b) Sterile air
    c) Sterile water   d) Entry and exit points

13) Activated charcoal is used in _____ chromatography.
    a) Gel   b) Ion exchange
    c) Affinity   d) Adsorption

14) Amylase production is completed within _____.
    a) 18 hours   b) 5 days
    c) 3 days   d) 2 hours.

Q.2 A) Answer the following questions. (Any Four)   **08**
     1) Uses and types of cheese
     2) Types of bread
     3) Bioethics
     4) Factors affecting Idli production
     5) Define Bioreactor

B) Write notes (Any Two)   **06**
     1) Biosafety
     2) Whole broth processing
     3) Yogurt Production

Q.3 A) Answer the following questions. (Any Two)   **08**
     1) Factors affecting fermentation Economics
     2) Cheese production
     3) Sterilization of fermentation media.

B) Answer the following questions. (Any One)   **06**
     1) Explain citric acid production.
     2) Explain Control of Contamination in fermentation production.

Q.4 A) Answer the following questions. (Any Two)   **10**
     1) Production of Bread – Explain.
     2) Vitamin B_{12} Production – Describe.
     3) Explain filtration and cross flow filtration as downstream processes.

B) Answer the following questions. (Any One)   **04**
     1) Precipitation and Chromatography
     2) Idli Production

Q.5 Answer the following questions. (Any two)   **14**
     a) Distillation and solvent extraction
     b) Amylase Production
     c) Explain sterilization of Bioreactor and other mechanical system.

Seat No.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper - XII)
BIOMEDICAL ELECTRONICS

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                      2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) The human body has contains _____ type of system.
    a) Electrical   b) Mechanical
    c) Chemical   d) all of these

2) The biopotential generated by the neuronal activity of the brain is _____.
    a) Electrocardiogram   b) Electromyogram
    c) Electroencephalogram   d) Electrogastrogram

3) The _____ equation defines the relation between potential across the membrane and the two concentrations of the ion.
    a) Coulomb   b) Ohm
    c) Nernst   d) Newton

4) The _____ Volt is the silver electrode potential with respect to the hydrogen.
    a) +0.799   b) 0.000
    c) -0.799   d) ±0.0799

5) The cell membrane in depolarization state _____ ions rushes into the cell.
    a) K^+ b) Cl^+
    c) Na^+ d) P^+

6) The typical EEG signal amplitude is _____.
    a) 50 μA   b) 50 mA
    c) 5 A   d) 50 nA

7) The _____ isolation technique offers the lowest isolation voltage.
    a) optical   b) Transformer
    c) capacitive   d) Inductive

8) The pattern of EEG electrodes on the head and the channels these electrodes are connected to is called _____.
    a) Orbit   b) selector
    c) montage   d) placement

9) The _____ mV is the resting potential of the cell.
    a) +20   b) +90
    c) -90   d) -20

10) The impedance of microelectrode is well into _____ ohms.
    a) few hundreds Ohms   b) Mega Ohms
    c) Kilo Ohms   d) few Ohms

11) The _____ electrode is small enough with respect to the size of the cell.
    a) Surface   b) Needle
    c) Micro   d) Pad

12) For biophysical measurements _____ amplifier is used.
    a) ac/dc universal   b) transducer
    c) Dc   d) all of these

13) The ultrasonic is _____ energy at frequency greater than 20 KHz.
    a) Thermal   b) inductive
    c) Imaging   d) sonic

14) The magnitude of noise signals is directly proportional to the signal source _____.
    a) Voltage   b) current
    c) Impedance   d) both a and b

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Draw neat labelled ECG waveforms.
2) Write the basic frequencies of the EEG signal.
3) Draw the neat labelled diagram of limb electrode.
4) Write the Nernst equation for bioelectric measurements.
5) Draw the neat labelled diagram of M-scan ultrasound display.

B) Answer the following questions. (Any Two)   **06**
1) Explain the continuous Doppler mode of transmission of ultrasound.
2) Explain the basic of diagnostics radiology.
3) What is floating electrode?

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Explain the waveform of action potential.
2) Explain the silver-silver chloride electrode.
3) Explain the instrumentation amplifier for bioelectric potentials.

B) Answer the following questions. (Any One)   **06**
1) Explain the preamplifier for bioelectric potentials.
2) Explain the metallic microelectrode.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain the measurement of biopotentials with two electrode.
2) Explain the polarization and depolarization in biopotential with neat labelled diagram.
3) Explain the basic architecture of the medical instrumentation system.

B) Answer the following questions. (Any One)   **04**
1) Explain X-ray machine with its block diagram.
2) Explain the differential amplifier for bioelectric potentials.

Q.5 Answer the following questions. (Any two)   **14**
1) Describe the EMG monitoring system with neat labelled diagrams.
2) Explain the Properties of ultrasound for ultrasonic measurements.
3) Explain the isolated amplifier for biomedical instrumentation.

Seat No.

Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper - XII)
ELECTRONICS COMMUNICATION

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw the figures wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculator is allowed.
5) Q.1 should be written on page No.3 of answer booklet within 30 minutes.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Human voice frequency range is _____.
   a) 20 Hz to 20 KHz   b) 300 Hz to 20 KHz
   c) 3 KHz to 4 Khz   d) above 20 KHz

2) _____ circuit is used in super heterodyne FM receiver.
   a) Clamper   b) Limiter
   c) Rectifier   d) Inverter

3) One way communication is called _____ system.
   a) Simplex   b) Duplex
   c) Triplex   d) Multiplex

4) Ionospheric propagation is also known as _____.
   a) Sky wave propagation   b) Space wave propagation
   c) ground wave propagation   d) Duct propagation

5) The ratio of peak modulating signal voltage to peak carrier voltage is called _____.
   a) Voltage ratio   b) Efficiency
   c) Ripple factor   d) Modulation Index

6) If 20 MHz electromagnetic signal in free space travels with velocity of light, the wave length of radiating signal is _____.
   a) 15 Km   b) 15 meter
   c) 10 meter   d) 10 cm

7) Communication is the process of _____.
   a) keeping touch   b) Broadcasting
   c) exchange of information   d) entertainment by electronics

8) _____ is the dialing system is used in modern telephone communication.
   a) Rotary   b) DTMF
   c) Multi tone alphanumeric   d) Audio pulse

9) For 100% modulated am wave if total power is 1800 watt, then power transmitted in each side band is _____.
   a) 200 W   b) 400 W
   c) 600 W   d) 300 W

10) A Yagi antenna is used for _____.
    a) a very large band width   b) high forward gain
    c) omni direction gain   d) All of these

11) If the total number of lines in TV frame is 625, the number of lines in a field is _____.
   a) 1250   b) 312.5
   c) 625   d) 2500

12) _____ is used in radio receiver.
   a) Modulation   b) Demodulation
   c) Retardation   d) all of these

13) For ideal amplitude modulation the modulation index is _____.
   a) 0   b) 1
   c) <1   d) >1

14) A radio wave that propagates near the surface of the earth is called _____ wave.
   a) Ground   b) Sky
   c) Space   d) Tropospheric

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) List the different ionospheric layer during day and night period.
   2) Define PAM and PPM.
   3) What is super heterodyne principle?
   4) Draw block diagram of AM receiver.
   5) State the principle of Telephone system.

B) Write short notes (Any Two)   **06**
   1) Simplex and duplex communication
   2) Envelope detector
   3) Subscriber local loop

Q.3 A) Answer the following questions. (Any two)   **08**
   1) Explain interlaced scanning in TV.
   2) Explain DTMF dialer used in Telephone hand set.
   3) Explain FDM and TDM techniques.

B) Answer the following questions. (Any One)   **06**
   1) Explain color TV receiver with necessary block diagram.
   2) A sinusoidal carrier voltage of frequency 1200 KHz is amplitude modulated by a sinusoidal voltage of frequency 20 KHz resulting maximum and minimum modulated carrier amplitude of 110 volt and 90 volt respectively.
   Calculate:
   i) the frequency of LSB and USB
   ii) Modulation index and amplitude of LSB

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain composite video signal with horizontal and vertical blanking standard.
   2) Explain principle of antenna. Give its types.
   3) What is need of telephone exchange and Explain electronic telephone exchange with necessary block diagram.

B) Answer the following questions. (Any One)   **04**
   1) What is noise in communication? What are its types? Define Signal to noise ratio and Noise figure.
   2) Explain space wave propagation.

Q.5 Answer the following questions. (Any Two)   **14**
   1) Explain antenna parameters.
   2) Explain AM radio receiver with neat block diagram.
   3) Explain frequency modulation with its necessary mathematical analysis.

Seat No.

B.Sc.(Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Computer Science(Special Paper – XII)
PYTHON

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) What is the answer to this expression, 22 % 3 is?
   a) 7   b) 1
   c) 0   d) 5

2) Which of the following symbols are used for comments in Python?
   a) //   b) "
   c) /**/   d) #

3) Which of the following refers to mathematical function?
   a) sqrt   b) Rhombus
   c) add   d) None of the above

4) Select the reserved keyword in python.
   a) Else   b) Import
   c) Raise   d) All of these

5) What is the output when following statement is executed?
   >>>"a"+"bc"
   a) a   b) bc
   c) bca   d) abc

6) Python allows string slicing. What is the output of below code?
   s="Hello World!!!"
   Print(s [2:5])
   a) he   b) Hello
   c) llo   d) None of these

7) To open a file c: sample.txt for writing, we use _____.
   a) outfile = open(file = "c:sample.txt", "o")
   b) outfile = open("c:sample.txt", "r")
   c) outfile = open("c:sample.txt", "w")
   d) None of these

8) Which of the following data type is used to store values in Key & Value format?
   a) Class   b) List
   c) Tuple   d) Dictionary

9) Tuples are immutable.
   a) True   b) False

10) What is the output of the following?
    x=123
    for i in x:
    print (i)

a) 1 2 3   b) 123
c) Error   d) None of these

11) _____ represents an entity in the real world with its identity and behaviour.
a) A method   b) An object
c) A class   d) An operator

12) What will be the output?
>>>sample=(2,4,6,8)
>>>sample.append((1,3,5))
>>>print len(sample)
a) 1   b) 7
c) 5   d) Error

13) What is the output of the code shown below?
lst=[1,2,3,4]
lst[4]
a) NameError   b) ValueError
c) IndexError   d) TypeError

14) Which one of these is floor division?
a) /   b) //
c) %   d) None of the mentioned

Q.2 A) Answer the following questions. (Any four)   **08**
1) Explain Super () method.
2) Explain range () function.
3) What is use of type ()?
4) What is tuple?
5) What is List?

B) Write notes on. (Any Two)   **06**
1) Explain time module.
2) Explain break statement.
3) Explain if else statement.

Q.3 A) Answer the following questions. (Any two)   **08**
1) Explain math module.
2) Explain local and global variable with example.
3) What is difference between tuple and list?

B) Answer the following questions. (Any one)   **06**
1) What is inheritance? Explain all types of inheritance.
2) What is loop? Explain different types of loops used in python.

Q.4 A) Answer the following questions. (Any two)   **10**
1) Explain regular expression with example.
2) Explain different operators used in python with example.
3) What is module? What are the advantages of module? Write a program for importing multiple modules.

B) Answer the following questions. (Any one)   **04**
1) Explain exception handling in detail.
2) Write a program to create file and print mode and name of the file.

Q.5 Answer the following questions. (Any two)   **14**
1) What is dictionary? Explain different methods of dictionary.
2) Write down the features of python.
3) Explain anonymous function with example.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Botany (Paper – II)
FUNGI AND ARCHEGONIATE

Day & Date: Monday, 18-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.

Q.1   Select the correct alternatives from the following and rewrite the sentence.   08
1) *Mucor* is a _____ fungi.
    a) Parasitic   b) Hiper parasitic
    c) Autotrophic   d) Saprophytic

2) The word Gymnosperm was coined by _____.
    a) Sporne   b) Darwin
    c) Theophrastus   d) Smith

3) Archegonium is _____ type of reproductive organ.
    a) Male   b) Female
    c) Oogamous   d) Isogamous

4) In the Basidiomycetes, the perfect spores are ____.
    a) Teliospores   b) Zoospores
    c) Basidiospores   d) Conidiospores

5) Fungus without any mycelium is _____.
    a) *Albugo*   b) *Mucor*
    c) *Puccinia*   d) *Saccharomyces*

6) The fungi_____ is reproduces by budding.
    a) Yeast   b) Aspergillus
    c) Penicillium   d) Puccinia

7) Yeast was discovered by ____.
    a) Aristotle   b) Linnaeus
    c) Robert Hook   d) Leeuwenhoek

8) All fungi are ____.
    a) Autotrophs   b) Phytoplasma
    c) Prokaryotic   d) Heterotrophic

Q.2   Answer the following questions. (Any Four)   08
1) Write the morphology of Selaginella stem.
2) Give outline of classification of Gymnosperm by sporne.
3) Enlist the names of Gymnosperms having ornamental value.
4) Write the classification of yeast up to general level.
5) What is alternation of generation?
6) Define fungi

Q.3   Answer the following questions. (Any Two)   08
1) Write economic importance of Bryophytes.
2) Write economic importance of Gymnosperm as gums & resins.
3) Write a short note on structure of mycelium in Mucor.

Q.4 **Answer the following questions. (Any Two)** 08
  1) Sketch & label L.S of ovule of Cycus.
  2) Give any four general characters of Bryophytes.
  3) Sketch and label the structure of Megasporangium of Selaginella.

Q.5 **Answer the following questions. (Any One)** 08
  1) Describe the sexual reproduction (Gamotophyte) of Selaginella.
  2) Write classification, Sketch, label & describe internal structure of thallus of Riccia.

Seat No.	

B.Sc. (Semester - V) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper - XII)
SOFTWARE TESTING

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) SDLC stands for _____.
   a) Software Design Line Cycle
   b) Software Defect Life Cycle
   c) Software Development Life Cycle
   d) System Development Life Cycle

2) Which is not a software life cycle model?
   a) Waterfall model   b) Spiral model
   c) Prototype Model   d) Capability Maturity Model

3) Project Risk Factor is considered in _____.
   a) Waterfall model   b) Spiral model
   c) Prototype Model   d) Iterative enhancement model

4) _____ is a black box testing method.
   a) Boundary value analysis   b) Boundary Volume analysis
   c) Code validation analysis   d) Basic path testing

5) Cyclometric complexity method comes under which testing method?
   a) Black box   b) Smoke Testing
   c) White box   d) Stress Testing

6) Which of the following is NOT a white box technique?
   a) Statement testing   b) Path testing
   c) State transition testing   d) Data flow testing

7) Which of the following would NOT normally form part of a test plan?
   a) Incident reports   b) Features to be tested
   c) Schedule   d) Risks

8) Test cases are created in which phase?
   a) Test Planning   b) Test Configuration
   c) Test Requirement   d) Test Specification

9) STLC stands for _____.
   a) System test life cycle   b) Software top life cycle
   c) Software test life cycle   d) System top life cycle

10) White Box Testing is not concern with _____.
    a) Statement Coverage   b) Decision Coverage
    c) Multiple Condition Coverage   d) Cause and Effect Coverage

11) Which is not true in case of Soak Testing?
   a) Subset of Regression Testing
   b) Also known as Endurance Testing
   c) Type of Performance Testing
   d) Running a system at high levels of load for prolonged periods of time.

12) Confidence Testing refers to_____.
   a) Smoke Testing   b) Retesting
   c) Regression Testing   d) All of these

13) Test plans are based on _____.
   a) Project Plan   b) Business Plan
   c) Support Plan   d) All of these

14) If requirements are frequently changing, which model is best suited?
   a) Prototype Model   b) Spiral Model
   c) RAD Model   d) Waterfall Model

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is software testing?
   2) What is regression testing?
   3) What is BVA?
   4) What is a defect?
   5) Define performance testing.

B) Write short notes (Any Two)   **06**
   1) Defect Life cycle
   2) Adhoc Testing
   3) Full regression testing

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What are the advantages and disadvantages of black box testing?
   2) Explain spiral model with its importance.
   3) What is the need of software testing?

B) Answer the following questions. (Any One)   **06**
   1) Explain top down and bottom up incremental integration testing.
   2) What are the characteristics of good test case?

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain the V-model in detail.
   2) How is white box testing differ from black box testing?
   3) What are the Challenges in White Box Testing?

B) Answer the following questions. (Any One)   **04**
   1) Explain soak testing with its importance.
   2) Explain boundary value analysis.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe the phases of SDLC in detail.
   b) What are the advantages and disadvantages of prototyping model?
   c) Explain in detail the different black box testing techniques.

Seat No.

Set **P**

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
English
LITERARY QUEST

Day & Date: Saturday, 05-10-2019　　　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) In the beginning of his speech, Kipling calls himself a _____ scholar.
   a) brilliant　　　　　　　　　　b) intelligent
   c) wondering　　　　　　　　　d) moral

2) Kipling advises _____ is the only thing we must not take seriously.
   a) money　　　　　　　　　　b) yourselves
   c) myself　　　　　　　　　　d) health

3) _____ are the simplest and commonest words are in any language, according to Shaw.
   a) "Yes" and "no"　　　　　　b) "Am" and "are"
   c) "Is" and "was"　　　　　　d) "Shall" and "should"

4) According to Shaw we all have _____ manners and _____ manners.
   a) speaking, listening　　　　b) reading, writing
   c) company, home　　　　　　d) good, bad

5) The speaker in 'My Grandmother's House' has lost his/her way and now begs love at _____ doors.
   a) friends'　　　　　　　　　b) grandmother's
   c) strangers'　　　　　　　　d) relatives'

6) My captain does not answer; his _____ are pale and still.
   a) hands　　　　　　　　　　b) legs
   c) eyes　　　　　　　　　　　d) lips

7) 'All that is best of _____ and _____ meet in the woman's aspects and her eyes,' according to Byron.
   a) day and night　　　　　　b) day and bright
   c) dark and bright　　　　　d) dark and night

8) The woman, in the poem 'Upagupta', is suffering from the contagious disease called _____.
   a) flu　　　　　　　　　　　b) cholera
   c) measles　　　　　　　　　d) small-pox

9) _____ is the synonym for 'faith'.
   a) fortunate　　　　　　　　b) lucky
   c) unfortunate　　　　　　　d) belief

10) 'Poetry' is the antonym for _____.
   a) prose　　　　　　　　　　b) poem
   c) lyric　　　　　　　　　　d) song

11) _____ is the antonym for 'untidy'.
   a) neat
   b) chaos
   c) tiny
   d) large

12) _____ is the synonym for 'filthy'.
   a) Good
   b) Cunning
   c) clever
   d) dirty

13) _____ is the synonym for 'rude'.
   a) polite
   b) impolite
   c) good
   d) intelligent

14) _____ is the antonym for 'despair'.
   a) hope
   b) hopeless
   c) repair
   d) pair

Q.2 Attempt any four of the following questions. **16**
   a) Comment on the theme of love in 'My Grandmother's House'.
   b) What does the speaker often think about the grandmother's house in the poem 'My Grandmother's House'?
   c) Why does the speaker ask captain to rise up in the poem 'O Captain! My Captain!'?
   d) Analyze any two metaphors used in the poem 'O Captain! My Captain!'
   e) How does Byron describe the beauty of the woman?
   f) What is the subject matter of the poem 'Upagupta'?

Q.3 Attempt any two of the following questions. **12**
   a) What will the students, whom Kipling is addressing, do when they go out into "the battle of life"?
   b) Who were the members of the committee formed by the British Broadcasting Corporation and for what purpose it was formed, according to Shaw?
   c) What are Prefixes? Explain any four prefixes with examples.
   d) What are Suffixes? Explain any four suffixes with examples.

Q.4 Attempt any one of the following question. **14**
   a) What are the characteristics of a good leader?
                          OR
   b) What are the essential qualities required to become an effective team member?

Q.5 What causes the stress? Write in detail about the ways of coping with the stress. **14**

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Physics (Special Paper – XIII)
ELECTRODYNAMICS

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.
                3) Draw neat and labeled diagrams wherever necessary.
                4) Use of log table and calculator is allowed.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Electric field intensity $\vec{E}$ in terms of scalar potential ϕ is _____.
   a) $\vec{E} = \nabla\phi$ b) $\vec{E} = \phi$
   c) $\vec{E} = \dfrac{1}{\nabla\phi}$ d) $\vec{E} = -\nabla\phi$

2) To find potential distribution due to spherical shell, the Laplacian should be expressed in _____ coordinates.
   a)   rectangular   b)   spherical
   c)   cylindrical   d)   cartesian

3) The line integral of electric force per unit charge over a closed path is _____.
   a)   emf   b)   magnetic flux
   c)   electric flux   d)   potential difference

4) Self inductance and mutual inductance are measured in _____.
   a)   Henry   b)   Farad
   c)   Ohm   d)   Ampere

5) Generation of motional emf is principle of _____.
   a)   battery   b)   photovoltaic cell
   c)   generator   d)   capacitor

6) Biot Savart's law gives _____.
   a)   magnetic field induction   b)   Gravitational field induction
   c)   electric field induction   d)   electric power

7) The equation of continuity is in accordance with law of conservation of _____.
   a)   momentum   b)   charge
   c)   mass   d)   energy

8) Mathematical formulation of empirical laws in electricity and magnetism are known as _____.
   a)   Amperes equations   b)   Maxwell's equations
   c)   Faraday's equations   d)   Lorentz's equations

9) The amplitude of electromagnetic waves in conductors _____ decreases with distance of propagation.
   a)   exponentially   b)   linearly
   c)   parabolic   d)   hyperbolically

10) The nature of electromagnetic waves is _____.
   a) stationary   b) plane
   c) longitudinal   d) transverse

11) If there are free charges on the interface of two dielectrics, then normal component of electric displacement vector at the interface is _____.
   a) continuous   b) discontinuous
   c) one   d) zero

12) When the waves get reflected from the surface of denser medium there occurs a phase change of _____.
   a) 0^0 b) 90^0
   c) 180^0 d) 270^0

13) Static charge can _____.
   a) radiate   b) not radiate
   c) vibrate   d) nothing can be said

14) Total power radiated by electric dipole is proportional to _____.
   a) frequency   b) square of frequency
   c) cube of frequency   d) fourth power of frequency

Q.2 A) Answer the following questions.(Any Four)   **08**
   1) Draw nature of trajectory of particle entering in crossed, uniform and constant electric and magnetic fields.
   2) State Faraday's and Lenz's law.
   3) State Ampere's law.
   4) Draw graphical representation of plane electromagnetic waves.
   5) Define Retarded time.

B) Answer the following questions. (Any Two)   **06**
   1) State Maxwell's equations for time dependent electric and magnetic fields in material medium.
   2) State boundary conditions for electromagnetic field vectors at the interface of two media.
   3) Prove orthogonality of E, H and k vectors of EM waves.

Q.3 A) Answer the following questions. (Any two)   **08**
   1) State Maxwell's equations for time dependent electric and magnetic fields in vacuum.
   2) A uniform electric field of 8×10^4 v/m along X- axis and uniform magnetic field of 0.06T along Y- axis are established. What must be speed of electron that can be projected along Z-axis and passed through crossed fields without getting deviated.
   3) Write note on plane electromagnetic waves in dielectrics.

B) Answer the following question. (Any One)   **06**
   1) What is Mutual inductance and explain application of mutual inductance to transformer?
   2) Establish conservation of momentum for EM field.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) State Coulomb's Law. Derive Poisson's and Laplace's equations.
   2) Obtain integral and differential forms of Faraday's law.
   3) Explain Maxwell's correction to Ampere's law. Why correction was needed?

    B)   **Answer the following question. (Any One)**   **04**
1)   Write note on total internal reflection.
2)   The amplitude of electric field in an monochromatic plane wave in free space, incident normally on the plane surface of medium of refractive index 2 is 10v/m. Calculate the amplitude of electric field inside the medium.

Q.5   **Answer the following questions. (Any two)**   **14**
  a)   Discuss the motion of charged particle in a constant, uniform magnetic field.
  b)   Explain physical significance (Integral form) of Maxwell's Equations.
  c)   Derive an expression for radiation reaction force acting on the radiating dipole.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Special Paper - XIII)
PHYSICAL CHEMISTRY

Day & Date: Monday, 07-10-2019　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Draw neat diagrams and give equations wherever necessary.
　　　　　　　　4) Use of logarithmic tables and scientific calculator is allowed

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) The rotational spectra, the unit of constant B is_____.
　　a) joules　　　　　　　　　　　b) joules^{-1}
　　c) cm^{-1}　　　　　　　　　　d) cm

2) Two solutions of different compositions co-existing with one another are called as _____ solutions.
　　a) miscible　　　　　　　　　　b) true
　　c) conjugate　　　　　　　　　　d) all of these

3) Reaction which proceeds in series of successive stages initiated by suitable primary processes are called _____.
　　a) opposing reactions　　　　　　b) chain reactions
　　c) consecutive reactions　　　　　d) parallel reactions

4) For spontaneous process change in free energy is _____.
　　a) positive　　　　　　　　　　　b) negative
　　c) both a & b　　　　　　　　　　d) all of these

5) The distance between two nearest troughs or crests is known as _____.
　　a) frequency　　　　　　　　　　b) wave number
　　c) wave length　　　　　　　　　d) all of these

6) $\Delta A = \Delta G$, when_____.
　　a) T is constant　　　　　　　　　b) P is constant
　　c) V is constant　　　　　　　　　d) both P & T are constant

7) The ratio $\frac{K_2}{K_1}$ known as _____.
　　a) rate of reaction　　　　　　　　b) order of reaction
　　c) Temperature coefficient　　　　d) velocity constant

8) A solution contains 180 gm of glucose in 180 gm of water. The total number of moles of both solute and solvent in the solution will be _____.
　　a) 1　　　　　　　　　　　　　　b) 10
　　c) 11　　　　　　　　　　　　　　d) 21

9) In the formation of an ideal solution _____ is evolved or absorbed.
　　a) heat　　　　　　　　　　　　　b) light
　　c) no heat　　　　　　　　　　　d) none of these

10) In a reaction, 2A + B ⟶ C + D. The molecularity of the reaction is _____.
　　a) 2　　　　　　　　　　　　　　b) 0
　　c) 3　　　　　　　　　　　　　　d) 1

11) Which of the following represents the relation between free energy change, enthalpy change and entropy change?
   a) $\Delta G = \Delta H + T\Delta S$
   b) $\Delta G - \Delta H = T\Delta S$
   c) $\Delta G = \Delta H - T\Delta S$
   d) $-\Delta H = \Delta G - T\Delta S$

12) The energy required for excitation is lowest for _____ transitions.
   a) rotational
   b) vibrational
   c) electronic
   d) all of these

13) For the reaction, $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ _____.
   a) $Wmax = 2.303RT \log Kp - 2RT$
   b) $Wmax = 2.303RT \log Kp$
   c) $Wmax = 2.303RT \log Kp - RT$
   d) $Wmax = 2.303RT \log Kp + RT$

14) The velocity constant of third order reaction is expressed in _____.
   a) Sec^{-1}
   b) $dm^3.mol^{-1}.sec^{-1}$
   c) $mol^{-2}(dm^3)^2.sec^{-1}$
   d) min^{-1}

Q.2 A) Attempt any four of the following questions. 08
   1) What do you mean by electromagnetic spectrum?
   2) State Raoult's law.
   3) Define the term activity.
   4) What is mean by consecutive or Successive reactions?
   5) Define the term CST.

B) Write the short notes on (Any Two) 06
   1) Hot bands
   2) Fugacity
   3) Characteristic of third order reaction for graphical method

Q.3 A) Attempt any two of the following questions. 08
   1) Explain the nicotine- water system. What is the effect of impurities on CST values?
   2) Derive Gibb's- Helmholtz equation.
   3) Explain consecutive reaction with an example.

B) Attempt any one of the following questions. 06
   1) HCI shows an absorption band at the frequency of 8.67×10^{13} Hz. Calculate the force constant for HCI bond. (μ for $HCI = 1.628 \times 10^{-24}$ gm.
   2) Derive Clapeyron-Clausius equation.

Q.4 A) Attempt any two of the following questions. 10
   1) The vapour pressure of a liquid is 7.4×10^4 Pascal at 238k and 1.06×10^5 Pascal at 293k. Calculate the molar heat of vaporization of liquid ($R = 8.314\ Jk^{-1}mol^{-1}$)
   2) Derive Arrhenius equation.
   3) Discuss the system with boiling point maximum.

B) Attempt any one of the following questions. 04
   1) Write the difference between ideal and non-ideal solutions.
   2) Explain the term temperature coefficient.

Q.5 Attempt any two of the following questions. 14
   a) Explain in detail vibrational energies of diatomic molecules.
   b) Derive van 't Hoff's equation.
   c) Explain transition state theory. If the rate of reaction gets tripled from 298k to 318k. Calculate Ea (R = 8.368 joules).

Seat No.	◣		**Set**	**P**

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper – XIII)
MOLECULAR BIOLOGY

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
           2) All questions carry equal marks.
           3) Draw neat and labelled diagrams wherever necessary.
           4) Figures to the right indicate full marks.

Q.1   **Fill in the blanks by choosing by correct alternatives given below.**   **14**

1)   Replication moves from _____.
    a)   5' ⟶ 3' direction   b)   3' ⟶ 5' direction
    c)   5' ⟶ 5' direction   d)   3' ⟶ 3' direction

2)   In prokaryotes, the lagging primers are removed by _____.
    a)   3' ⟶ 5' exonuclease   b)   DNA ligase
    c)   DNA polymerase I   d)   DNA polymerase III

3)   Synthesis of mRNA on DNA template is _____.
    a)   bidirectional
    b)   unidirectional
    c)   bidirectional with help of primer
    d)   unidirectional with the help of primer

4)   _____ does not have a mechanism that checks to make sure that the right monomer is incorporated in the polymer.
    a)   Protein synthesis
    b)   Double stranded rolling circle DNA synthesis
    c)   RNA synthesis
    d)   Excision repair DNA synthesis

5)   RNA polymerases join nucleotides through _____ bond.
    a)   Phosphodiester   b)   Hydrogen
    c)   Peptide   d)   Glycosidic

6)   The role of the promoter region of a gene is _____.
    a)   site where the ribosome binds to the mRNA
    b)   RNA polymerase binds to the DNA
    c)   site where DNA polymerase binds to the DNA
    d)   Site where Shine-Dalgarno sequence present

7)   Pribnow box is centered at _____.
    a)   +10 position   b)   +35 position
    c)   -35 position   d)   -10 position

8)   Which of the following amino acids has the greatest number of codons?
    a)   Proline   b)   Aspartic acid
    c)   Tryptophan   d)   Leucine

9)   The final location in the ribosome that the uncharged tRNA is thought to move to before exiting the ribosome is called the _____.
    a)   Termination codon   b)   A-site
    c)   P- site   d)   E-site

10) The charged initiator tRNA binds initially to the _____ in protein synthesis.
    a) 3'end of mRNA
    b) P-site
    c) A-site
    d) E-site

11) The Wobble hypothesis refers to the less stringent base pairing specificity of the _____.
    a) 5' end base of the codon
    b) 3' end base of the anticodon
    c) 5' end base of the anticodon
    d) Middle base of the anticodon

12) A genetic unit that codes amino acid sequence of a complete functional polypeptide could be termed as _____.
    a) recon
    b) cistron
    c) intron
    d) exon

13) Ribosomes are located _____.
    a) in the cytoplasm
    b) on the endoplasmic reticulum
    c) in the nucleus
    d) in the cytoplasm and on the endoplasmic reticulum

14) Synthesis of peptide bond is catalyzed by _____.
    a) A-site ribosome
    b) P-site ribosome
    c) 23 S rRNA
    d) tRNA

Q.2 A) Answer the following questions (Any Four)   08
1) Name the forms of DNA.
2) Define replication of DNA.
3) Enlist nitrogen bases present in DNA.
4) Define gene.
5) Enlist types of RNA.

B) Write Notes on (Any Two)   06
1) DNA polymerase
2) Functions of RNA polymerase subunits
3) Pribnow box

Q.3 A) Answer the following questions (Any two)   08
1) Describe heat shock proteins.
2) Write a note on aminoacyl tRNA synthetase.
3) Explain Griffith's experiment for DNA as carrier of genetic information.

B) Answer the following (Any One)   06
1) Give detail account on rolling circle replication.
2) Explain steps involved in eukaryotic translation.

Q.4 A) Answer the following questions (Any Two)   10
1) Give detail account on transcription process in eukaryotes.
2) Describe Watson and Crick model of DNA.
3) Explain the denaturation of DNA.

B) Answer the following questions (Any One)   04
1) Describe structure of promoter.
2) Explain types of transcription termination.

Q.5 Answer the following questions (Any two)   14
a) Describe post translational modifications of protein.
b) Explain lactose operon model for gene regulation in prokaryotes.
c) Give detail account on enzymes involved in DNA replication.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper- XIII)
PHYSIOLOGY

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Draw neat labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) In human being _____ respiratory pigment is present in blood.
    a) Hemoglobin   b) Globulin
    c) Globin   d) Haemin

2) Emulsification of fats is brought by _____.
    a) Bile Enzyme   b) Bile Salt
    c) Bile Pigment   d) Pile Juice

3) Axon of all sensory neurons are classified as _____.
    a) Motor Nerves   b) Sensory Nerves
    c) Mixed Nerves   d) Rotator Nerves

4) Pace maker of heart is _____.
    a) S-A Node   b) A-V Node
    c) A-V Bundle   d) A-V Septum

5) The basic functional unit of kidney is _____.
    a) Nephron   b) Neuron
    c) Nephridium   d) Loop of Henley

6) The breakdown of complex food material into simple form is called _____.
    a) Digestion   b) Nutrition
    c) Respiration   d) Excretion

7) Exchange of O_2 & CO_2 of respiratory surface across through _____.
    a) Active Transport   b) Passive Transport
    c) Diffusion   d) Osmosis

8) _____ is the waste product produced in ornithine cycle.
    a) Urea   b) Ammonia
    c) Creatinine   d) Uric Acid

9) Chloride shift is also called _____.
    a) Hamburger's Phenomenon   b) Henley's Phenomenon
    c) H. E Huxley's Phenomenon   d) None of the above

10) Completion of cardiac Cycle required _____ time
     a) 0.4 Sec   b) 0.8 Sec
     c) 0.08 Sec   d) 4.0 Sec

11) Insulin is produced by the _____.
     a) B Cell   b) X Cell
     c) S Cell   d) X-Cells

12) The record of electric impulse generated by the heart is called _____.
   a) ECG
   b) EVS
   c) EVG
   d) CGE

13) Hormones are chemical messengers produced & secreted into the blood stream by _____ Cell.
   a) Endocrine Cells
   b) Exocrine Cells
   c) Pituitary Gland
   d) Both exo and endocrine cells

14) _____ is the structural & functional unit of the nervous system.
   a) Neuron
   b) Nephron
   c) Neurofibril
   d) Nucleus

Q.2 A) Attempt any four of the following questions. 08
   1) Nephron
   2) Balanced diet
   3) Bohr's effect
   4) Deamination
   5) Stroke Volume

B) Attempt any two of the following questions. 06
   1) Dialysis - Explain
   2) ECG - explain
   3) Lipid metabolism

Q.3 A) Attempt any two of the following questions. 08
   1) Ultra structure of Neuron - Describe.
   2) Describe physiological role of Vit - D - Explain.
   3) Explain - Cardiac Cycle.

B) Attempt any one of the following questions. 06
   1) Explain in details Kreb's Cycle.
   2) Origin and conduction of heartbeat.

Q.4 A) Attempt any two of the following questions. 10
   1) Chloride shift - explain.
   2) Structure of skeletal muscle - explain.
   3) Synapse & Synaptic transmission - explain.

B) Attempt any one of the following questions. 04
   1) Ultra structure of Nephron - explain.
   2) Ornithin cycle - explain

Q.5 Attempt any two of the following questions. 14
   a) Transport of CO_2 - Explain.
   b) Describe the physiology of urine formation.
   c) Describe the process of gastric digestion.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov 2019
Mathematics (Special Paper – XIII)
METRIC SPACE

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
          2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Norm is a function with domain l^2 and Range _____.
   a) $[0, \infty)$ b) $(-\infty, \infty)$
   c) $(-\infty, 0)$ d) None of these

2) The metric space $\langle R, d \rangle$ or R_d is called _____ Metric space.
   a) Normal   b) Discrete
   c) Absolute   d) None of these

3) Any polynomial function is _____ at each point in R.
   a) oscillate   b) not continuous
   c) continuous   d) None of these

4) In any metric space $\langle M, \rho \rangle$ both M and ρ are _____sets.
   a) closed   b) empty
   c) Null   d) open and closed

5) Let E is subset of Metric space M, then E is closed subset of M if _____.
   a) $E = \overline{E}$ b) $E \neq \overline{E}$
   c) $E = \overline{\overline{E}}$ d) None of these

6) If A is not bounded then diam A = _____
   a) 1   b) ∞
   c) 0   d) $-\infty$

7) Every convergent sequence in metric space is _____.
   a) convergent   b) divergent
   c) Cauchy sequence   d) None of these

8) Every compact metric space is _____.
   a) complete and not bounded   b) bounded and not complete
   c) not complete and not bounded   d) compact and totally bounded

9) $\lim\limits_{x \to \infty} [1/x^2]$ = _____
   a) 0   b) 1
   c) ∞ d) $-\infty$

10) M has a Heine-Borel property if M is _____.
   a) complete   b) compact
   c) connected   d) None of these

11) If $f : R^1 \to R^1$ and $a \in R'$, If f is continuous at a then $|f(x) - f(a)| < \epsilon$, $(0 < |x - a| < \delta)$ such that _____
   a) $\epsilon > 0$ b) $\epsilon < 0$
   c) $\epsilon = 0$ d) None of these

12) If A and B are open subset of R^1 then $A \times B$ is _____ subset of R^2
   a) empty   b) closed
   c) open   d) None of these

13) The metric ρ is absolute metric if _____
   a) $\rho(x,y) = |x + y|$ b) $\rho(x,y) = |x - y|$
   c) $\rho(x,y) = |x.y|$ d) None of these

14) If $\langle M, \rho \rangle$ is a complete metric space and A is closed subset of M then $\langle A, \rho \rangle$ is also _____
   a) complete   b) compact
   c) connected   d) None of these

Q.2 A) Answer the following questions (Any Four)   **08**
1) Define metric space $\langle X, d \rangle$
2) Prove that $\lim_{x \to 3} [x^2 + 2x] = 15$
3) Define Open Ball $B[q, r]$
4) Define Clouse of E.
5) Explain Heine - Borel property.

B) Answer the following questions (Any Two)   **06**
1) Explain class l^2 with example for $s \in l^2$ and $t \in l^2$ then $s + t \in l^2$
2) Explain open set with example.
3) Explain Bounded set with diam A.

Q.3 A) Answer the following questions (Any two)   **08**
1) If f, g are real-valued continuous function at $a \in R^1$ then $f + g, f - g, f.g$ and f/g $[g(a) \neq 0]$ are also continuous at a.
2) If G_1 and G_2 are open subset of the metric space M then $G_1 \cap G_2$ is also open.
3) Let f be a continuous function from Compact Metric space M_1 into Metric space M_2 then $f(M_1)$ of f is also compact.

B) Answer the following questions (Any One)   **06**
1) State and prove Schwarz inequality.
2) Define closed subset of M and if E is any subset of Metric space M then $\overline{E}$ is closed.

Q.4 A) Answer the following questions (Any Two)   **10**
1) If f and g are real valued continuous function. If f is continuous at a and g is continuous at $f(a)$ then gof is continuous at a.
2) Let G be an open subset of metric space M then $G' = M - G$ is closed. Also converse if F is closed then $F' = M - F$ is open.
3) If Metric space M has Heine-Boral property then M is compact.

B) Answer the following questions (Any One)   **04**
1) State and prove Minkowski inequality.
2) If A is the subset of Metric space $\langle M, \rho \rangle$ is totally bounded then A is bounded.

Q.5 Answer the following questions (Any two)   **14**
a) Let $\langle M, \rho \rangle$ be a metric space and 'a' be a point in M. Let f, g be real valued function whose domain are subset of M
If $\lim_{x \to a}[f(x)] = L$ and $\lim_{x \to a}[g(x)] = M$ then $\lim_{x \to a}[f(x).g(x)] = L.M.$
b) Let $\langle M, \rho \rangle$ be a Complete Metric space. If T is a contraction on M then there is only one point x in M such that $T_x = x$
c) Let $\langle M_1, \rho_1 \rangle$ and $\langle M_2, \rho_2 \rangle$ be Metric spaces and let $f : M_1 \to M_2$ then f is continuous on M_1 if and only if $f|(G)$ is open in M_1 (whenever G is open in M_2)

Seat
No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper – XIII)
STATISTICAL INFERENCE – II

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory and figures to the right indicate full marks.
                        2) Use of scientific calculators and statistical tables is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) The most pragmatic approach for determining $(1 - \alpha)\%$ confidence interval
    is to find out _____.
    a) Zero width confidence interval (C.I.)
    b) equal tail C.I.
    c) A C.I. such that area of both the tails is α
    d) none of these

2) For finding the C.I. for the ratio of variance of two normal populations which
    distribution is used?
    a) χ^2 b) F
    c) t   d) normal

3) For a random sample of size n from $N(\mu, \sigma^2)$ with known μ, the degrees of
    freedom of $\chi^2 = \frac{\sum(X_i - \mu)^2}{\sigma^2}$ is _____.
    a) $(n - 1)$ b) n
    c) $(n + 1)$ d) 0

4) The hypothesis under test is _____ hypothesis.
    a) simple   b) null
    c) composite   d) alternative

5) Among all critical regions (C.R.) of size α the C.R. which minimizes β is
    called _____ C.R.
    a) best   b) powerful
    c) minimum   d) optimum

6) If there are 10 symbols of two types equal in numbers, the maximum
    possible number of runs is _____.
    a) 8   b) 10
    c) 9   d) 11

7) Ordinary sign test considers the difference of observed values from the
    hypothetical median value in terms of _____ only.
    a) signs   b) magnitude
    c) both (a) and (b)   d) neither (a) nor (b)

8) Most frequently used method of breaking the tie is _____.
    a) mid-rank method
    b) to omit tied values
    c) average statistic approach
    d) most favorable statistic approach

9) Neyman-Pearson Lemma provides _____ test.
   a) an unbiased
   b) an admissible
   c) most powerful
   d) minimax

10) The SPRT decision about the hypothesis is taken _____.
    a) after each successive observation
    b) after a fixed number of observations
    c) after at least five observations
    d) when the experiment is over

11) The test $H_0 : \mu = 70$ against $H_1 : \mu > 70$ leads to _____ tailed test.
    a) left
    b) right
    c) two
    d) none of these

12) Which of the following test is appropriate for paired data?
    a) the sign test
    b) signed rank test
    c) median test
    d) both (a) and (b)

13) In SPRT the decision criterion is a function of probability of _____ error.
    a) type one
    b) type two
    c) both (a) and (b)
    d) neither (a) nor (b)

14) The probability of rejecting Ho when it is false is _____.
    a) type I error
    b) type II error
    c) power of a test
    d) size of test

Q.2 A) Answer the following questions. (Any Four) 08
   1) Define simple and composite hypothesis.
   2) Define power function of a test.
   3) Define average sample number.
   4) State the assumptions of non-parametric tests.
   5) Define uniformly most powerful C.R. and uniformly most powerful test.

B) Answer the following questions. (Any Two) 06
   1) Define run used in run test with suitable illustration.
   2) Define pivotal quantity and illustrate with suitable example.
   3) State the advantages of non-parametric tests.

Q.3 A) Answer the following questions. (Any two) 08
   1) Obtain $100(1 - \alpha)\%$ C.I. for the mean μ of $N(\mu, \sigma^2)$ distribution when σ^2 is unknown.
   2) Explain Wilkoxan's signed rank test for two independent samples.
   3) Let X be a $B(1, \theta)$ r.v. Construct SPRT of strength (α, β) for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (\theta_1 > \theta_0)$.

B) Answer the following questions. (Any One) 06
   1) Obtain L.R. test for testing $Ho : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$ based on a random sample from $N(\mu, \sigma^2)$ distribution when both μ and σ^2 are unknown.
   2) Obtain $100(1 - \alpha)\%$ confidence interval for difference between means $(\mu_1 - \mu_2)$ in case of two normal populations $N(\mu_1, \sigma_1^2)$ and $N(\mu_1, \sigma_2^2)$, where $\sigma_1 and \sigma_2$ both are known.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Describe run test for two independent samples.
   2) Obtain SPRT for testing $H_0 : \lambda = \lambda_0$ against $H_1 : \lambda = \lambda_1 (\lambda_1 > \lambda_0)$ where λ is the mean of Poisson distribution.
   3) Obtain $100(1 - \alpha)\%$ confidence interval for population proportion.

B) Answer the following questions. (Any One) 04
1) Explain in brief median test.
2) An urn contains 6 marbles of which θ are white and remaining are black. Suppose two marbles are drawn at random without replacement, in order to test $H_0: \theta = 3$ against $H_1: \theta = 4$. H_0 is rejected if both marbles are white otherwise accepted. Compute size of a test.

Q.5 Answer the following questions. (Any two) 14
a) Write a note in detail on Mann-Whitney U test.
b) State and prove Neyman-Pearson Lemma.
c) Construct SPRT for testing $H_0: \theta = \theta_0$ against $H_1: \theta = \theta_1 (\theta_1 > \theta_0)$ in $N(0, \sigma^2)$ distribution.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper- XIII)
ECONOMIC GEOLOGY AND PROSPECTING

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Draw neat-labeled diagram whenever necessary.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Laterite is _____ concentration deposit rich in Fe.
   a) rudaceous   b) residual
   c) replacement   d) retrograde

2) _____ commonly formed by magmatic injection concentration.
   a) Galena   b) Gold
   c) Chalcopyrite   d) Diamonds

3) The efficient and rapid method in ground water exploration is _____ method.
   a) seismic   b) gravity
   c) magnetic   d) electric resistivity

4) Jaduguda is famous for _____ ore deposits.
   a) gold   b) coal
   c) iron   d) uranium

5) Tenor value for iron is _____.
   a) medium   b) high
   c) very high   d) low

6) In India, famous gold deposits are located in _____ region.
   a) Ranchi   b) Singbhum
   c) Hutti   d) Zawar

7) Which of the following is not a simple ore?
   a) Hematite   b) Magnetite
   c) Pyrite   d) Chalcopyrite

8) In Iron ore exploration, _____ method is used.
   a) seismic   b) magnetic
   c) geobotonical   d) None of these

9) Kerala coastal tract constitutes of _____ placer deposits.
   a) monazite   b) zircon
   c) ilmenite   d) garnet

10) Coal deposits in India occur in _____.
   a) Saucer belt   b) Hutti region
   c) Bombay high   d) Damodar basin

11) Groundwater exploration is done by _____ methods.
   a) geological   b) geo-physical
   c) geo-botonical   d) All

12) Carbonate rocks are susceptible for _____ deposits.
   a) magmatic
   b) residual
   c) hydrothermal replacement
   d) metasomatic

13) Ocean floor is characterized by presence of _____.
   a) monazite sand
   b) manganese nodules
   c) bauxite
   d) alluvial gold

14) Chromite deposits occur in _____ rocks.
   a) basic
   b) ultrabasic
   c) acidic
   d) intermediate

Q.2 A) Answer the following questions. (Any Four) 08
   1) Define simple ore.
   2) Give two names of iron ores with chemical composition.
   3) Define economic geology.
   4) What is contact metasomatism?
   5) What is prospecting?

B) Write Notes on (Any Two) 06
   1) Physical properties and chemical composition of bauxite
   2) Gold deposits of India
   3) Ladder vein deposits

Q.3 A) Answer the following questions. (Any Two) 08
   1) Explain process of supergene enrichment.
   2) Describe uranium deposits of India.
   3) Explain electric resistivity method.

B) Answer the following questions. (Any One) 06
   1) Explain geological occurrence of coal deposits in India.
   2) Describe in detail early magmatic deposits.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Write a note on - Residual deposits.
   2) Write a note on - Tenor of ore.
   3) Explain method of geochemical prospecting in mineral exploration.

B) Answer the following questions. (Any One) 04
   1) Describe magnetic prospecting method in iron exploration.
   2) Write a note on - Crustification

Q.5 Answer the following questions. (Any Two) 14
   a) Define mechanical concentration. Describe Fluvial placer deposits.
   b) Describe salient features of National Mineral Policy.
   c) Describe Manganese deposits with reference to physical properties, chemical composition, occurrence and distribution in India.

Seat No.

Set **P**

B.Sc.(Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper – XIII)
MICROBIAL GENETICS

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Draw neat and labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) The initial source for all genetic variation is _____.
   a) sexual reproduction   b) mutation
   c) conjugation   d) transformation

2) During replication the two strands of DNA are separated by enzymes termed as _____.
   a) Helicase   b) Nucleases
   c) DNA polymerases   d) DNA ligase

3) Ultraviolet radiation causes DNA damage by formation of _____.
   a) Adenine dimer   b) cytidine dimer
   c) guanine dimer   d) thymine dimer

4) Most common mode of DNA replication is _____.
   a) Circular   b) Conservative
   c) Semiconservative   d) Dispersive

5) Tautomerism is one of the causes of _____ mutation.
   a) Spontaneous   b) Induced
   c) Missence   d) Silent

6) _____ acts as an intercalating agent.
   a) Acridine orange   b) Ethidium Bromide
   c) Proflavin   d) Alkalyting agents

7) _____ enzyme is also called as kornberg enzyme.
   a) DNA polymerase III   b) DNA polymerase II
   c) DNA polymerase I   d) RNA polymerase

8) Initiation of DNA replication requires a _____.
   a) Plasmid   b) DNAase
   c) DNA primer   d) RNA primer

9) Different forms of the same gene are called as _____.
   a) alleles   b) gametes
   c) genotypes   d) recombined genes

10) Mutations arising from insertion or deletion of nucleotides are called ____.
   a) Suppressor mutations   b) frame shift mutations
   c) Base pair substitutions   d) spontaneous mutations

11) Okazaki fragments are synthesized in _____ direction.
   a) no relation of replication fork   b) same
   c) opposite   d) any

12) Operon concept was put forward by _____.
   a) Zinder & Lederberg
   b) William Hays
   c) Pasteur
   d) J Jacob & Monod

13) The conversion of a gene's nucleotide sequence into a m RNA is called as _____.
   a) The genome
   b) Gene expression
   c) Transcription
   d) Translation

14) Semi conservative mode of DNA replication in E. coli was experimentally proved by _____.
   a) Watson & Crick
   b) William Hays
   c) Hershey & Chase
   d) Meselson & Stahl

Q.2 A) Answer the following questions. (Any Four) 08
   1) Define replication.
   2) Fate of exogenote
   3) Genotype
   4) Define recon
   5) Spontaneous mutation

B) Write Short Notes on (Any Two) 06
   1) Briefly discuss the Cis Trans test.
   2) Describe briefly Frame shift mutations.
   3) Give the detailed account of time course of phenotypic expression in mutation.

Q.3 A) Answer the following questions. (Any two) 08
   1) Give the detailed account of DNA replication.
   2) Describe briefly DNA finger printing.
   3) Explain in detail effect of mutation on phenotypes.

B) Answer the following questions. (Any One) 06
   1) Explain the techniques and applications of genetic engineering.
   2) Give the detailed account of applications of Bioinformatics.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Write in brief - Agarose gel electrophoresis.
   2) Give the detailed account of protein engineering.
   3) Explain in detail base pair substitution mutation.

B) Answer the following questions. (Any One) 04
   1) Give the detailed account selection, detection of mutants.
   2) Write in a brief about mutation in bacteriophages.

Q.5 Answer the following questions. (Any two) 14
   a) Give the detail account of operon concept with Lac operon as an example.
   b) Describe process of Transcription.
   c) Explain in detail structural organization of *Escherichia coli* chromosome.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Paper – I)
PHYSICAL CHEMISTRY

Day & Date: Friday, 08-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Use of Scientific calculator is allowed.

Q.1 **Select the correct alternatives from the following and rewrite the sentence.** **08**

1) Molecularity never be _____.
   a) negative   b) zero
   c) infinity   d) all of these

2) If the rate expression for the reaction is $\frac{dx}{dt} = kA^{1/2}.B^{3/2}$, the overall order of reaction is _____.
   a) $3/2$ b) $1/2$
   c) 2   d) 3

3) The units of first order rate constant are___.
   a) Mole dm^{-3} s^{-1} b) dm^3 $mole^{-1}$ s^{-1}
   c) s^{-1} d) s

4) In a certain first order reaction, the time for half change was 60 minutes. Find the rate constant.
   a) 0.01155 min^{-1} b) 0.00539 min^{-1}
   c) 0.03795 min^{-1} d) 0.06394 min^{-1}

5) The equation, $y = mx + c$, represent _____.
   a) parabola   b) hyperbola
   c) straight line   d) circle

6) $\int \frac{1}{x} dx = $ _____.
   a) x b) $\ln x$
   c) $\ln x + c$ d) c

7) Process occurring at constant temperature is known as ___process.
   a) isobaric   b) isothermal
   c) isotonic   d) isochoric

8) According to _____ law, PV = constant at constant temperature.
   a) Charles's   b) Boyle's
   c) Avogadro's   d) Graham's

Q.2 **Answer the following questions. (Any Four)** **08**

1) Plot the graph of $\frac{x}{a-x}$ against t, and give its slope.
2) Write the Postulates of kinetic theory of gases.
3) What is inversion temperature?
4) Define the term 'Derivative'.
5) Explain the term order of reaction with suitable example.
6) What is a cyclic process?

Q.3 **Answer the following questions. (Any Two)** 08
    1) Explain liquefaction of gases.
    2) Explain in brief graphical representation of second order reactions.
    3) What is intercept? Give its characteristics.

Q.4 **Answer the following questions. (Any Two)** 08
    1) Write note on Carnot's theorem.
    2) What is Joule-Thomson effect? Give its applications.
    3) The study of the decomposition of a gas gave the following data: Find the order of reaction.

Initial Pressure (x10^5 Pa)	0.8	0.5	0.2
Half life (second)	84	84	83.5

Q.5 **Answer the following questions. (Any One)** 08
    1) Derive an expression for velocity constant of a second order reaction with equal concentration of reaction.
    2) T_c and P_c for oxygen are $154.4 K$ and $5.131 \times 10^6 Nm^{-2}$. Find van der Waal's constants 'a' and 'b' $(R = 8.314 \, Jk^{-1}mol^{-1})$

Seat No.

Set **P**

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Psychology (Paper - I)
GENERAL PSYCHOLOGY I

Day & Date: Tuesday, 19-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.

Q.1 **Select the correct alternatives from the following and rewrite the sentence.**   **08**
1) In the third stage of Sleep _____ waves are found.
    a) alpha   b) beta
    c) theta   d) delta

2) Nerves are one of the messengers of the _____.
    a) Cell body   b) Cell
    c) Brain   d) Body

3) _____ is a state of heightened susceptibility to suggestions of others.
    a) Day dreaming   b) Hypnosis
    c) Sleep   d) Awareness

4) _____ proposed adaptive theory of Sleep.
    a) Webb   b) Freud
    c) Adler   d) Cattell

5) _____ Psychology is the study of groups, social roles, rules and social action.
    a) Cultural   b) Community
    c) Social   d) Health

6) Axon is tube-like structure that carries the neural messages from other _____.
    a) Cell   b) Body
    c) Brain   d) Neuron

7) ___ is very small but powerful part of the Brain.
    a) thalamus   b) cerebrum
    c) forebrain   d) hypothalamus

8) The Learning can be defined as permanent changes in _____ as a result of practice.
    a) Personality   b) Behavior
    c) Experience   d) Animal

Q.2 **Answer the following questions. (Any Four)**   **08**
1) What is operant conditioning?
2) What is consciousness?
3) State four principles of classical condition?
4) What is latent content of dream?
5) Define Sleep.
6) State the long of EMG.

Q.3 **Answer the following questions. (Any Two)** 08
  1) Differentiate positive and Negative Reinforcement.
  2) Types of Sleep.
  3) Explain the Broca area in short.

Q.4 **Answer the following questions. (Any Two)** 08
  1) Observation Biases.
  2) State four types of Reinforcement Schedule.
  3) State Application of operant conditioning to Human Behavior.

Q.5 **Answer the following questions. (Any One)** 08
  1) Describe areas of specialization in Psychology.
  2) Explain the structure of the Neurons with figure.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper – XIII)
POWER ELECTRONICS

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Draw neat and labeled diagrams wherever necessary.
           4) Use of log table and calculator is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) _____ layer is an additional layer fabricated in power BJT.
    a) Buffer   b) Buried
    c) Drift   d) Insulated

2) In SCR the magnitude of latching current is always _____ the holding current.
    a) less than   b) greater than
    c) less than and equal to   d) equal to

3) A freewheeling diode is used in controlled rectifier in case of _____.
    a) inductive load   b) resistive load
    c) capacitive load   d) all of these

4) _____ commutation is used in SCR series inverter.
    a) Class B   b) Class F
    c) Class C   d) Class A

5) SMPS means _____ Power Supply.
    a) Single Mode   b) Switched Mode
    c) Series Mode   d) Shunt Mode

6) The buried gate is fabricated in _____ device.
    a) GTO   b) SCR
    c) SIT   d) PUT

7) If gate current is increased, then forward break over voltage is _____.
    a) decreased   b) increased
    c) remains the same   d) all of these

8) In controlled rectifier _____ commutation is used.
    a) forced   b) load
    c) line   d) none of these

9) Choppers is a _____ converter.
    a) AC – DC   b) AC – AC
    c) DC – AC   d) DC – DC

10) _____ is programmable in PUT.
    a) Gate voltage   b) Load current
    c) Anode voltage   d) Cathode voltage

11) IGBT works as a _____ switch.
    a) mechanical   b) bidirectional
    c) unidirectional   d) electromechanical

12) In normal operation of SCR _____ triggering is the most commonly used technique.
   a) forward voltage   b) Gate
   c) dV/dt   d) Thermal

13) If the firing angle of SCR is α then conduction angle is _____.
   a) 0^0 b) 90^0
   c) 180^0 d) $(180-\alpha)^0$

14) In dc choppers, if t_{ON} is the on-period and f is the chopping frequency, then output voltage in terms of the input voltage Vin is _____.
   a) $V \, in \times \dfrac{t_{on}}{f}$ b) $f \times V \, in \times t_{on}$
   c) $\dfrac{V \, in}{\dfrac{t_{on}}{f}}$ d) $V \, in \times \dfrac{f}{t_{on}}$

Q.2 A) Answer the following questions. (Any Four)   08
   1) State applications of power diode.
   2) Give advantages of SCR.
   3) State the necessity of controlled rectifiers.
   4) Sketch the circuit diagram of basic transistorized Inverter.
   5) Draw the block diagram of offline UPS.

B) Write Note on (Any Two)   06
   1) Classification of Inverters
   2) SMPS
   3) Drift layer

Q.3 A) Answer the following questions. (Any two)   08
   1) Explain working of series inverter using SCR.
   2) Describe the working of flasher circuit using SCR.
   3) Explain SCR triggering circuit by using UJT.

B) Answer the following questions. (Any One)   06
   1) With suitable diagram explain working of IGBT.
   2) What is mean by Phase control? Describe single phase full wave controlled rectifier with resistive load.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Describe construction of power MOSFET.
   2) Explain working of SCR by using two transistor model. State anode current equation.
   3) Explain working of parallel inverter using SCR with necessary wave forms.

B) Answer the following questions. (Any One)   04
   1) Explain step-up chopper circuit.
   2) With suitable diagram describe the turn off process of GTO.

Q.5 Answer the following questions. (Any two)   14
   a) Explain speed control of DC motor by using SCR.
   b) Explain Class C commutation method for SCR with wave forms.
   c) Describe single phase half wave controlled rectifier with inductive load. State the effect of free wheel diode.

Seat
No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper-XIII)
WEB TECHNOLOGY

Day & Date: Monday, 07-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) Which of the following directive is used to link an assembly to a page or user control.?
   a) @Page b) @Import
   c) @Assembly d) @Reference

2) ASP.NET pages are by default Self page posted.
   a) True b) False

3) Which control is required for every page that have AJAX extensions for ASP.NET.?
   a) UpdatePanel b) ScriptManager
   c) ConentPanel d) None of the above

4) What are the Command Object methods.?
   a) ExecuteNonQuery b) ExecuteReader
   c) ExecuteScalar d) All of the above

5) Authentication is the process of verifying the identity of a user.
   a) True b) False

6) _____ property of BulletedList Control is set to display items in hyperlink form.
   a) DisplayMode b) Display Style
   c) DisplayHyperlink d) Hyperlink

7) _____ attribute must be set on a validator control for the validation to work.
   a) ControlToValidate b) ControlToBind
   c) Validate control d) Validate

8) Common style information files are stored in _____ location.
   a) Browser b) Master pages
   c) Themes d) All of these

9) In ASP.NET What are the different types of session mode available.?
   a) InProc b) StateServer
   c) SQLServer d) All of the above

10) Leaf node that has no child nodes.
    a) True b) False

11) _____ number of directives are available in ASP.NET.
    a) 10 b) 11
    c) 12 d) 13

12) _____ property of RadioButtonList is used to display list in multiple column.
    a) MultiColumn b) Columns
    c) RepeatColumns d) DisplayColumns

13) _____ property to post data from one page to another.
   a) PostBack
   b) Nevigate
   c) PostBackURL
   d) PostBackresource

14) Page-Load is first event of page life cycle.
   a) True
   b) False

Q.2 A) Answer the following questions. (Any Four) 08
1) What is IsPostBack and AutoPostBack.?
2) What is need of master page.
3) What is Authorization.?
4) What is QueryString.?
5) Write down Import directive with its attributes.

B) Write Notes on (Any Two) 06
1) MultiView and View control.
2) RadioButton control.
3) RangeValidator Control with example.

Q.3 A) Answer the following questions. (Any two) 08
1) Explain Website Life Cycle.
2) What is Theme.? Explain with example.
3) Explain Cookies with example.

B) Answer the following questions. (Any One) 06
1) Explain CustomValidator Control with example.
2) Explain Button class.

Q.4 A) Answer the following questions. (Any Two) 10
1) What is Site Navigation.? Explain TreeView Control in detail.
2) Explain ViewState in detail.
3) Explain UpdatePanel AJAX control.

B) Answer the following questions. (Any One) 04
1) Explain advantages and disadvantages of Client side and Server side state management.
2) Explain SiteMapPath Control.

Q.5 Answer the following questions. (Any Two) 14
a) Design web page for student information. Write code for insert and delete record.
b) Explain different Application Folders used in ASP.NET.
c) Explain List Class with example.

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Physics (Special Paper – XIV)
MATERIALS SCIENCE

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.
         3) Neat diagrams must be drawn wherever necessary.
         4) Use of log table or calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Strength of Composite is _____.
    a) Low   b) High
    c) Zero   d) Infinite

2) Applied Force per Unit Cross Sectional area is called _____.
    a) Stress   b) Strain
    c) Creep   d) Ductility

3) Time dependent permanent deformation is called _____.
    a) Elasticity   b) Creep
    c) Plasticity   d) Fatigue

4) The dielectric strength is function of _____.
    a) Thickness   b) Length
    c) Charge   d) None of these

5) Bakelite is obtained by reaction of formaldehyde with _____.
    a) Phenol   b) Styrene
    c) Ethane   d) Urea

6) _____ polymers occurs naturally.
    a) Nylon   b) Starch
    c) PVC   d) Teflon

7) The degree of polymerization is the ratio of molecular weight of polymer to _____.
    a) Molecular weight of monomer   b) Atomic weight of monomer
    c) Atomic weight of polymer   d) None of these

8) _____ materials are combination of two or more materials which have different properties from constituent materials.
    a) Polymer   b) Crystalline
    c) Composite   d) Amorphous

9) Cermets are examples of _____.
    a) Micro composites   b) Continuous fibre composites
    c) Shortfibre composites   d) Large particle composites

10) _____ Structure can be studied by naked eye.
    a) Atomic   b) Grain
    c) Micro   d) Macro

11) Oxide ceramics are _____ materials.
   a) Semiconductor
   b) Conductor
   c) Good conductor
   d) Insulator

12) When grain size reduces to nanoscale, then the material becomes _____.
   a) soft
   b) elastic
   c) plastic
   d) stronger and harder

13) Sol-Gel is _____ method of synthesis of nanomaterials.
   a) Physical
   b) Hybrid
   c) Chemical
   d) Electrical

14) _____ materials have occupied an important role in bone repairing materials in the medical field.
   a) Bioactive glasses and glass ceramics
   b) Polymers
   c) Composites
   d) Nanomaterials

Q.2 A) Answer the following: (Any Four) 08
   1) Give any four examples of ceramics.
   2) What are composites important in nature?
   3) Define polymerization mechanism.
   4) Define
      i) Fatigue
      ii) Hardness
   5) What is biomechanism?

B) Write Notes on: (Any Two) 06
   1) Write applications of nanomaterials.
   2) Write note on addition polymerization.
   3) Explain Rock Salt structure of ceramics with diagram.

Q.3 A) Answer the following: (Any two) 08
   1) What are biomaterials? Explain biocomposite materials.
   2) Explain the properties of composites.
   3) Write note on ceramic processing.

B) Answer the following: (Any One) 06
   1) Explain in detail classification of nanomaterials.
   2) Explain particle & fibre reinforced composites.

Q.4 A) Answer the following: (Any Two) 10
   1) Explain electrical & magnetic & mechanical properties of materials.
   2) Write note on thermosetting & thermoplastic polymers.
   3) Explain high energy ball milling method of synthesis of nanomaterials.

B) Answer the following: (Any One) 04
   1) Explain properties & applications of biomaterials.
   2) Explain co-precipitation method of synthesis of nanomaterials.

Q.5 Answer the following: (Any two) 14
   a) Discuss various techniques of characteristic of nanostructured materials.
   b) Discuss various methods of fabrication of polymers in detail.
   c) Explain classification of materials.

Seat No.

Set **P**

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Special Paper- XIV)
INORGANIC CHEMISTRY

Day & Date: Wednesday, 09-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagram wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) In lanthanide series, the differentiating electrons are added in _____.
   a) 3d - subshell b) 4d - subshell
   c) 4f - subshell d) 5f - subshell

2) The name of element with atomic number 112 is _____.
   a) Un-un-unium b) Un-un-bium
   c) Un-un-nilium d) Un-un-quadium

3) In diborane, the B - B bond distance is _____ ppm.
   a) 122 b) 133
   c) 266 d) 177

4) In XeF_2 molecule, Xe undergoes _____ hybridization.
   a) sp^3d b) sp^3
   c) sp^3d^2 d) sp^3d^3

5) Metallic solids are _____.
   a) Insulators b) semiconductors
   c) good conductors d) super conductors

6) $YBa_2Cu_3O_{7-x}$ superconductor is also known as _____ superconductors.
   a) 123 b) 312
   c) 321 d) 213

7) Atmospheric corrosion involves _____ heterogeneous system.
   a) solid-solid b) solid-gas
   c) solid-liquid d) liquid-gas

8) Self stifling _____ corrosion.
   a) promotes b) prevents
   c) increases d) all of these

9) Actinides along with actinium ($Z = 89$) are placed together in the group
   _____ and period _____ of periodic table.
   a) 3, 6 b) 3, 5
   c) 3, 7 d) 4, 5

10) Mercury acts as superconductor at critical temperature _____ K.
    a) 4.15 b) 7.19
    c) 35 d) 93

11) Due to passivity metal becomes _____.
    a) active b) inactive
    c) corroded d) none of these

12) Borazine is close analogue of _____.
   a) tolnene
   b) naphthalene
   c) hexane
   d) benzene

13) The metals in metal carboxyls are usually in _____ oxidation states.
   a) zero
   b) low or zero
   c) high
   d) none of these

14) Lithium alkyls are obtained by reaction of alkyl chloride and lithium metal in _____ solvent.
   a) polar
   b) aqueous
   c) non-aqueous
   d) inert

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Mention the various methods used for separation of lanthanides.
   2) Define the terms
      i) metals
      ii) non-metals
   3) Distinguish between diborane and ethane.
   4) What is 18-Valence electron rule?
   5) Explain hot dipping.

B) Write the Notes on: (Any Two)   **06**
   1) Occurrence of lanthanides
   2) Structure of P_4O_6
   3) Bonding in alkyl aluminum

Q.3 A) Answer the following questions. (Any two)   **08**
   1) Give applications of superconductors.
   2) Structure of diborane, explain in brief.
   3) What is corrosion? Explain electro-chemical theory of corrosion.

B) Answer the following question. (Any One)   **06**
   1) Define metallic bond. Explain free electron theory of metallic bonding.
   2) What are transuranic elements? Describe heavy ion bombardment method for synthesis of FU elements.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Give detailed electronic configuration of actinides.
   2) Describe structure and bonding in XeO_4.
   3) What is passivity? Explain it with the help of oxide film theory.

B) Answer the following question. (Any One)   **04**
   1) Explain chemical vapor deposition method used for preparation of mixed oxide superconductor $YBa_2Cu_3O_{7-x}$.
   2) Describe bonding in metal carbonyls.

Q.5 Answer the following questions. (Any two)   **14**
   a) What are semi conductors? Explain n-type and p-type semiconductors.
   b) Describe in detail ion - exchange method for separation of lanthanides.
   c) Describe structure of XeF_2 and XeF_6 on the basis of valence bond approach.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper- XIV)
PLANT BIOTECHNOLOGY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
             2) All questions carry equal marks.
             3) Draw neat and labeled diagrams wherever necessary.
             4) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) DNA finger printing technique was developed by _____.
    a) Watson and Crick   b) Alec Jeffrey
    c) Sharp and Roberts   d) Hogness et al.

2) Surfece sterilization of plant material is carried out by using _____.
    a) $AgCl_2$ b) $BaCl_2$
    c) $CaCl_2$ d) $HgCl_2$

3) Blotting technique is used to separate _____.
    a) DNA   b) RNA
    c) Proteins   d) All of these

4) Which of the following bacterium is considered as natural genetic engineer?
    a) *Agrobacterium tumefaciens*   b) *Agrobactrium radiobactor*
    c) *Pseudomonas putida*   d) *Thermus aquaticus*

5) Golden rice is a transgenic crop of the future with the following _____.
    a) insect resistance   b) carbohydrates
    c) high vitamin A content   d) high Lysine content

6) Restriction enzymes are also called as _____.
    a) biological scissors   b) biological glue
    c) both a and b   d) none of these

7) PCR technique was first devised by _____.
    a) E.M. Southern   b) Alwine
    c) Alec Jeffreys   d) Kary Mullis

8) _____ are known as molecular glue.
    a) DNA polymerase   b) DNA ligases
    c) RNA polymerase   d) Restriction endonuclease

9) In which stage of genetic engineering a probe is used _____.
    a) claving DNA   b) recombining DNA
    c) cloning   d) screening

10) To express eukaryotic genes in prokaryotic library used is _____.
    a) cDNA library   b) bDNA library
    c) aDNA library   d) zDNA library

11) Enzymes used in formation of cDNA from mRNA is _____.
    a) helicase   b) polymerase
    c) everse transcriptase   d) gyrase

12) _____ is an excised piece of leaf or stem tissue used in micropropagation.
   a) Microshoot
   b) Explant
   c) Medium
   d) Scion

13) _____ is not a product of recombinant DNA technology.
   a) Golden rice
   b) Blue rose
   c) Bt cotton
   d) Onion

14) Which type of restriction enzymes are commonly used in rDNA technology?
   a) Type-I
   b) Type-II
   c) Type-III
   d) Type-IV

Q.2 A) Answer the following: (Any Four)   **08**
   1) Define transgenic plants.
   2) Which enzymes are involved in DNA recombinant technology?
   3) Give the uses of DNA libraries.
   4) Define somatic hybridization.
   5) Enlist the steps in DNA finger printing.

B) Write Notes on: (Any Two)   **06**
   1) Vectors used in recombinant DNA technology.
   2) Uses of Southern blotting technique.
   3) Basic requirements for PCR technique.

Q.3 A) Answer the following: (Any two)   **08**
   1) Explain how Agrobacterium tumefaciens is useful in biotechnology.
   2) What is DNA library? Describe how cDNA library is constructed.
   3) Describe method of protoplast culture with suitable plant.

B) Answer the following: (Any One)   **06**
   1) What is recombinant DNA technology? Explain Northern blotting technique.
   2) Give the advantages of Golden rice.

Q.4 A) Answer the following: (Any Two)   **10**
   1) Explain in brief Vector-Plasmid.
   2) Describe biological methods of gene delivery.
   3) What is GM plant and explain golden rice.

B) Answer the following: (Any One)   **04**
   1) Describe chemical methods of gene delivery.
   2) Explain somatic hybridization.

Q.5 Answer the following: (Any two)   **14**
   a) Describe the method of anther culture and give its applications.
   b) What is PCR? Describe the different steps of PCR technique.
   c) Describe in brief achievements in plant biotechnology.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper- XIV)
ECONOMIC ZOOLOGY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagram wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) Tuna is an example of _____ fishery.
   a) Coastal   b) Off shore
   c) Crustacean   d) Inland

2) _____ is an Indian major carp.
   a) Labeo   b) Mackerel
   c) Bombay duck   d) Pomphret

3) _____ is a rich source of vitamin A, D and E.
   a) Isinglass   b) Fish liver oil
   c) Fish manure   d) Fish glue

4) Migration of fishes from sea to river for spawning is _____.
   a) Potamodromous   b) Anadromous
   c) Oceanodromous   d) Catadromous

5) Parental care in the form of placement of eggs in brood pouches found in _____ fish.
   a) Hippocampus   b) Tilapia
   c) Skipper   d) Arius

6) Fyke net is modified form of _____.
   a) Cast   b) Gill
   c) Trap   d) Trawl

7) _____ is a pest of stored grain.
   a) Pyrilla   b) Tribolium
   c) Grasshopper   d) Cotton boll worm

8) _____ are used in biological control of pest.
   a) Predator   b) Parasites
   c) Pathogen   d) All of these

9) _____ is used to cut mulberry leaves in desired size.
   a) Chopping board   b) Ant well
   c) Chandrika   d) Leaf basket

10) _____ are the important factors in rearing room of silkworm.
    a) Temperature   b) Humidity
    c) Both a and b   d) Turbidity

11) Pebrine is a _____ disease of silkworm.
    a) Protozoan   b) Bacterial
    c) Viral   d) Fungal

12) Flacherie in silkworm is characterized by _____ symptoms.
    a) Diarrhoea
    b) Vomiting
    c) Black pepper like spot
    d) Both a and b

13) The object produced within the soft tissue of oyster is called _____.
    a) Pearl
    b) Coral
    c) Gold
    d) Silver

14) Wood borer are mainly belongs to _____.
    a) Lepidoptera
    b) Coleoptera
    c) Hemiptera
    d) Hymenoptera

Q.2 A) Answer the following questions. (Any Four) 08
1) Isinglass
2) Cotton boll worm
3) Fish liver oil
4) Chandrika
5) Catamaron

B) Write Notes on: (Any Two) 06
1) Pearl culture
2) Pyrilla
3) Tribolium

Q.3 A) Answer the following questions. (Any two) 08
1) Describe the different types of migration in fishes.
2) Give an account of Integrated Pest Management.
3) Describe the forest insect pest.

B) Answer the following question. (Any One) 06
1) Give an account of fishing gears.
2) Write an account of rearing house of silkworm.

Q.4 A) Answer the following questions. (Any Two) 10
1) Describe the rearing methods of silkworm.
2) Describe the Coastal fishery.
3) Describe the biological control of crop pest.

B) Answer the following question. (Any One) 04
1) Give an account of parental care in fishes.
2) Describe the silkworm Bacterial diseases.

Q.5 Answer the following questions. (Any two) 14
a) Describe the Off shore fishery.
b) Give an account of rearing appliances of sericulture.
c) Describe the inland fishery.

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov 2019
Mathematics (Special Paper – XIV)
NUMERICAL ANALYSIS

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.
                3) Use of scientific calculators are allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) If $f(x) = x^3 - 5x^2 + 10$, then $\Delta^3 f(x) = $ _____
   a)   6   b) -6
   c)   10   d) -10

2) The nth forward difference of $f(x)$ is given by _____
   a) $\Delta^n f(x+h) - \Delta^{n-1} f(x)$ b) $\Delta^{n-1} f(x+h) - \Delta^{n-1} f(x)$
   c) $\Delta^{n+1} f(x+h) - f(x)$ d)   None of these

3) The value of $\Delta^n(e^x) = $ _____ the interval of differencing being 1.
   a) $(e+1)^n e^x$ b) $(e-1)^n e^x$
   c) e^x d) $n\, e^x$

4) $\left(E^{\frac{1}{2}} + E^{-\frac{1}{2}}\right)(1+\Delta)^{\frac{1}{2}} = $ _____
   a) $\Delta + 1$ b) $\Delta - 1$
   c) $\Delta + 2$ d) $\Delta - 2$

5) $\Delta \tan^{-1} x = $ _____
   a) $\tan^{-1}\left\{\dfrac{h}{1 + hx + x^2}\right\}$ b) $\tan^{-1}\left\{\dfrac{h}{1 - hx + x^2}\right\}$
   c) $\tan^{-1}\left\{\dfrac{h}{1 + hx - x^2}\right\}$ d)   None of these

6) If $\lambda_1, \lambda_1, \lambda_1$ are real and equal roots then C.F. = _____
   a) $c_1(\lambda_1)^n + c_2(\lambda_1)^n + c_3(\lambda_1)^n$ b) $(c_1 + c_2 n + c_3 n^2)(\lambda_1)^n$
   c) $(c_1 - c_2 n - c_3 n^2)(\lambda_1{}^n)$ d)   None of these

7) The order of equation $y_{n+2} - 2y_n + y_{n-1} = 1$ is _____
   a)   3   b)   2
   c)   1   d) -1

8) The particular integral of the equation $y_{n+2} - 4y_{n-1} + 3y_n = 5^n$ is _____
   a) $\dfrac{5^n}{18}$ b) $\dfrac{8}{5^n}$
   c) $\dfrac{5^n}{8}$ d) $\dfrac{-5^n}{8}$

9) Simpson's $(\frac{1}{3})^{rd}$ rule is obtained by putting $n = $ _____ in general quadrature formula.
   a)   1   b)   2
   c)   3   d)   0

10) The Lagrange's interpolation formula for unequal intervals for n points is a polynomial of degree _____.
   a) $n+1$ b) n
   c) $n-1$ d) $n-3$

11) The number of strips required in Simpson's $\left(\frac{3}{8}\right)^{th}$ rule is multiple of _____.
   a) 1
   b) 2
   c) 3
   d) 4

12) The value of $\int\limits_{0}^{1} \dfrac{dx}{1+x} =$ _____
   a) 0.69315
   b) 0.69915
   c) 0.96315
   d) 0.69351

13) Interpolation is the technique of estimate the value of a function for any _____
   a) Intermediate value of the constant
   b) Intermediate value of the variable
   c) Both a) and b)
   d) None of these

14) If $f(0) = 1,\ f(2) = 5,\ f(3) = 10$ and $f(x) = 4$ then $x =$ _____
   a) $\dfrac{5}{13}$
   b) $\dfrac{-5}{13}$
   c) $\dfrac{15}{13}$
   d) $\dfrac{13}{5}$

Q.2 A) Attempt any four of the following questions.   **08**
   1) Evaluate $\Delta^2(ab^x)$
   2) With usual notation, prove that $hD = \log(1 + \Delta) = -\log(1 - \nabla)$
   3) State Newton's backward interpolation formula.
   4) Solve $y_{n+2} - 4y_n = 0$
   5) Solve $y_{n+2} - 5y_{n+1} + 6y_n = 4^n$

B) Attempt any two of the following questions.   **06**
   1) Find the by, $f(10)$ by using Lagrange's formula for

x	5	6	9	11
$f(x)$	12	13	14	16

   2) Evaluate $\int\limits_{0}^{1} \dfrac{x^2}{1+x^3}\, dx$ by using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule.

   3) Solve $y_{n+2} - 2y_{n+1} + y_n = n^2 2^n$

Q.3 A) Attempt any two of the following questions.   **08**
   1) Prove that $1 + \delta^2\mu^2 = \left(1 + \frac{1}{2}\,\delta^2\right)^2$
   2) The following data gives the velocity of a particle for 20 seconds at interval of 5 seconds. Find the initial acceleration using the entire data:

Time t (sec) :	0	5	10	15	20
Velocity v (m/sec) :	0	3	14	69	228

   3) Solve $y_{x+1}^2 - 3y_{x+1}\cdot y_x + 2y_x^2 = 0$

B) Attempt any one of the following question.   **06**
   1) State the prove Newton's forward interpolation formula.
   2) Given that :

x	1	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.451	9.451	9.750	10.031

   Find $\dfrac{dy}{dx}$ at $x = 1.1$

Q.4 A) Attempt any two of the following questions. 10

    1) Solve :

        i) $y_{n+2} - 2\cos\alpha . y_{n+1} + y_n = \cos\alpha\, n$

        ii) $u_{n+3} - 2u_{n+2} - 5u_{n+1} + 6u_n = 0$

    2) State and prove Simpson's $\left(\frac{3}{8}\right)^{th}$ rule.

    3) With usual notation, prove that

        i) $\Delta = E\nabla = \nabla E$

        ii) $E = e^{hD}$

B) Attempt any one of the following question. 04

    1) Solve $y_{x+1} - y_x + xy_{x+1}\, y_x = 0$ given $y_1 = 2$

    2) The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface

x = height :	100	150	200	250	300	350	400
y = distance :	10.63	13.03	15.04	16.81	18.42	19.90	21.27

        Find the value of y when $x = 410$ ft

Q.5 Attempt any two of the following questions. 14

a) State the prove Trapezoidal rule hence evaluate $\int\limits_{0}^{6} \dfrac{dx}{1+x^2}$

b) State and prove Lagrange's interpolation formula for unequal intervals.

c) Evaluate:

    i) $\Delta^2 \cos 2x$

    ii) $\Delta^2 \left(\dfrac{5x+12}{x^2+5x+6}\right)$

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper – XIV)
PROBABILITY THEORY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Use scientific calculators and statistical table is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Convergence in probability of a sample mean to population mean is known as _____.
   a) CLT   b) WLLN
   c) both (a) and (b)   d) Neither(a) nor (b)

2) A state 2 of a Markov chain is called recurrent if _____.
   a) it leads to every state of a MC
   b) it communicates with every state it leads to
   c) it does not communicate with at least one state it leads to
   d) none of these

3) In $M/M/1 : \infty/ FIFO$ model, expected waiting time of customers in queue is _____.
   a) $\frac{1}{(\mu-\lambda)} - \frac{1}{\mu}$ b) $1 - \frac{\lambda}{\mu}$
   c) $(1 - \rho)\rho^{(n-1)}$ d) $(1 - \rho)\rho^n$

4) For a random sample of size 2 from U(0,1) distribution, CDF of first order statistic is _____.
   a) y^2 b) $2y(1 - y)$
   c) $(1 - y)^2$ d) none of these

5) Events occur according to Poisson process with rate $\lambda = 2$ per hour. Then the expected number of events between 10 AM and 1 PM will be _____.
   a) 2   b) 6
   c) 9   d) None of these

6) If Y_5 is the fifth order statistic of a random sample $X_1, X_2, \dots X_{10}$; $0 < Xi < 5$ then range of Y_5 is _____.
   a) $0 < y_5 < 1$ b) $0 < y_5 < 10$
   c) $-10 < y_5 < 10$ d) $0 < y_5 < 5$

7) The most famous example of convergence in distribution to standard normal distribution is _____.
   a) WLLN   b) CLT
   c) convergence in probability   d) none of these

8) If state 3 is transient state then _____.
   a) $P_{33} = 1$ b) $P_{33}^{(n)} < 1$
   c) $P_{33}^{(n)} = 0$ d) $P_{33}^{(n)} = 1$

9) If the customer leaves the queue when he finds that the queue is too long then it is called _____.
   a) balking   b) reneging
   c) jockeying   d) none of these

10) In queuing system steady state condition will be achieved if traffic intensity is _____.
    a) less than 1   b) greater than 1
    c) 0   d) 1

11) In $M/M/1 : \infty/$ FIFO model, distribution of inter arrival time is _____.
    a) Poisson   b) exponential
    c) Laplace   d) geometric

12) If {X(t)} is a Poisson process with parameter λ, then V[X(t)]= _____.
    a) λ b) λt
    c) $\lambda + t$ d) λ^2

13) In usual notations CDF of first order statistic is given by _____.
    a) $[1 - F(y)]^n$ b) $n[1 - F(y)]^{n-1} f(y)$
    c) $n[F(y)]^{n-1} f(y)$ d) none of these

14) If $p = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ then three step TPM would be _____.
    a) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$
    c) $\begin{bmatrix} 0.5 & 0.5 \\ 0.25 & 0.75 \end{bmatrix}$ d) $\begin{bmatrix} 0 & 1 \\ 0.25 & 0.75 \end{bmatrix}$

Q.2 A) Attempt any four of the following questions.   **08**
1) Define r^{th} order statistic.
2) Define convergence in probability.
3) Define convergence in distribution.
4) What do you mean by queue discipline?
5) In usual notations write the pdf of first order statistic.

B) Attempt any two of the following questions.   **06**
1) State any three assumptions of $M/M/1 : \infty/$ FIFO model of queuing theory.
2) State the assumptions of birth-death process.
3) If $\{Xn\}$ is a sequence of iid $N\left(0, \frac{1}{n}\right)$ r.vs. show that $Xn \xrightarrow{P} 0$ as $n \to \infty$.

Q.3 A) Attempt any two of the following questions.   **08**
1) State and prove WLLN for a sequence of iid r.vs.
2) Let $\{Xn\}$ be a sequence of r.vs. $F_{Xn} = \begin{cases} 1 - \left(1 - \frac{1}{n}\right)^{n\,x} & x > 0 \\ 0 & 0.W. \end{cases}$
   Show that $Xn \xrightarrow{Law} X$ an $n \to \infty$, where X is exp(1) r.v.
3) State the assumptions made in queuing system on number of arrivals and departures.

B) Attempt any one of the following questions.   **06**
1) Find the distribution of Yr when a random sample of size n is taken from exp(θ) distribution. Further show that $U = Yr$ and $V = Ys - Yr$ $(r < s)$ are independently distributed.
2) Let $\{Xn\}$ be a sequence of iid $x^2_{(10)}$ r.vs.
   i) Test whether WLLN holds good for this sequence.

ii)   Discuss the convergence of $\bar{X} = \frac{1}{n}\sum X_i$ in quadratic mean.

Q.4 A) Attempt any two of the following questions.   **10**
1)   State CLT for a sequence of iid r.vs. Let $\{Xn\}$ be a sequence of iid
     Poisson(1) r.vs. Using CLT prove that $\sum e^{-n}\frac{n^k}{k!} \rightarrow \frac{1}{2}$
2)   Let $\{Xn\}$ be a markov chain having three states $\{0, 1, 2\}$ with initial
     distribution given by $P[Xo = i] = \frac{1}{3}$ for $i = 0,1,2$. Suppose the one step
     TPM of this markov chain is
     $P = \begin{bmatrix} 0.75 & 0.25 & 0 \\ 0.25 & 0.5 & 0.25 \\ 0 & 0.75 & 0.25 \end{bmatrix}$. Find the joint distribution of (X_0, X_1).
3)   Cars arrive at toll plaza window according to poisson distribution with
     mean 10 per hour. Service time per customer is exponentially
     distributed with mean 5 minutes. The space in the shade of toll plaza
     including serviced car can accommodate a maximum of 3 cars. Other
     cars have to wait outside the shade.
     i)   What is the probability that an arriving car can drive directly into
          the shade?
     ii) What is the probability that an arriving car will have to wait outside
          the shade?

B) Attempt any one of the following questions.   **04**
1)   In usual notations derive the pdf of rth order statistic, when a random
     sample of size n is drawn from a population with pdf $f_x(x)$ and
     CDF $Fx(x)$
2)   Define
     i)   Markov chain
     ii)   Absorbing state
     iii) Transient state
     iv)   Recurrent state

Q.5 Attempt any two of the following questions.   **14**
a)   If $\{Xn$ is a sequence of $B\left(n,\frac{\lambda}{n}\right)$ r.vs. ; $n > \lambda > 0$. Show that Xn converges
     in distribution to $p(\lambda)$ as $n \rightarrow \infty$.
b)   Describe in brief Poisson process. In usual notations obtain distribution of
     $P_n(t)$
c)   If $Xn \xrightarrow{P} X$ and $Yn \xrightarrow{P} Y$ as $n \rightarrow \infty$ then show that $Xn + Yn \xrightarrow{P} X + Y$ as $n \rightarrow \infty$.
     Also show that $Xn - Yn \xrightarrow{P} X - Y$ as $n \rightarrow \infty$

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper - XIV)
ENVIRONMENTAL GEOLOGY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Draw neat diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Silt accumulation in the river is mainly due to _____ and causes flood.
   a) removal of vegetation cover on the slope
   b) gentle slope
   c) animals
   d) rain

2) Disposal of _____ is main problem in open cast miming.
   a) ore   b) dump
   c) mineral   d) heavy machinery

3) In rainy seasons, hilly roads are blocked usually due to _____.
   a) human activities   b) cyclone
   c) sea level change   d) landslides

4) Major earthquakes cause _____.
   a) siltation   b) Tsunami
   c) cyclones   d) pollution

5) Slides are more likely possible in _____.
   a) deserts   b) tropical hilly terrains
   c) slopes   d) ground

6) Channel spreading controls _____.
   a) Flood   b) Tsunami
   c) Landslide   d) Volcano

7) Global Positioning Systems is of great help in mitigation of _____ hazard.
   a) flood
   b) volcano
   c) Landslide
   d) all hazards mentioned in a, b, & c

8) In urban areas, _____ is solution for flood problems.
   a) restoration of flood plains
   b) channel cleaning and deepening
   c) non-disposal of garbage in stream
   d) all solutions as mentioned in a, b & c.

9) The solid material falls down under influence of gravity in _____ hazard.
   a) cyclone   b) Tsunami
   c) Landslide   d) flood

10) Faulty design & poor construction of dam may cause _____.
    a) cyclone   b) Tsunami
    c) Landslide   d) flood

11) Early warning system is possible in _____ hazard.
    a) Flood   b) cyclone
    c) Tsunami   d) all in a, b, c.

12) Related phenomena with landslide is _____.
    a) flood   b) avalanche
    c) faulting   d) soil erosion.

13) Increased carrying capacity of river decreases possibility of _____.
    a) landslide   b) flow
    c) food   d) siltation

14) Impact of disaster can be reduced by _____.
    a) preparedness
    b) early warning & effective communication
    c) effective mitigation
    d) by all in options a, b, c

Q.2 A) Attempt any four of the following questions.   **08**
    1) What is importance of early warning system in Disaster?
    2) Define mitigation.
    3) Define Environmental Geology.
    4) Define avalanche.
    5) Define flood.

B) Attempt any two of the following questions.   **06**
    1) Describe geological impact of cyclone on coast.
    2) Describe environmental effects of natural causes of sea level changes.
    3) Role of time in flood.

Q.3 A) Attempt any two of the following questions.   **08**
    1) What is artificial levee? Describe its role in hazard prevention.
    2) Explain role & relation of vegetation & human in causing flood hazard.
    3) Explain solutions for geological structures like fault and joints that causes landslides.

B) Attempt any one of the following questions.   **06**
    1) Explain hazardous effects of Flood.
    2) What is disaster management? Explain the structure of disaster management.

Q.4 A) Attempt any two of the following questions.   **10**
    1) Explain the hazards related to fluorine, silica & asbestos.
    2) Man made causes of landslides.
    3) Prediction of landslide hazard.

B) Attempt any one of the following questions.   **04**
    1) Explain retention wall solution.
    2) Explain role of vegetation in landslide.

Q.5 Attempt any two of the following questions.   **14**
    a) Explain problems & solutions related to underground mining activity.
    b) Explain preparedness for flood and volcanic hazards.
    c) Explain interdisciplinary nature of disaster management.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Sep/Oct-2019
Microbiology (Special Paper – XIV)
MICROBIAL BIOCHEMISTRY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The root nodules of legumes contain a pink pigment which has high affinity for oxygen _____.
   a) nod hemoglobin   b) Leg hemoglobin
   c) bacterial hemoglobin   d) hemoglobin

2) _____ is the source of carbon that is assimilated in Photosynthesis.
   a) Solar radiation   b) Soil water
   c) Soil nutrient   d) Atmospheric CO_2

3) _____ is allosteric enzyme.
   a) Acetyl choline esterase   b) Acetyl transferase
   c) Aspartate transcarbamoylase   d) Acylase

4) _____ is allosteric protein.
   a) Albumin   b) Globulin
   c) Gelatin   d) Hemoglobin

5) _____ is precursor for biosynthesis of peptidoglycan.
   a) Sucrose   b) Glucose
   c) Fructose   d) Galactose

6) Catabolite repression was discovered by _____.
   a) Emil Fischer   b) J. Monod
   c) Kuhne   d) Koshland

7) _____ enzyme is involved in fixation of CO_2 or assimilation of CO_2.
   a) Ribose – 5 Ⓟ carboxylase
   b) Ribulose – 5 Ⓟ carboxylase
   c) Ribose – 1.5 diphosphate carboxylase
   d) Ribulose – 1.5 diphosphate carboxylase

8) _____ is initiation codon.
   a) UAG   b) UGA
   c) UAA   d) AUG

9) Induced fit hypothesis is related with _____.
   a) rigidity   b) heredity
   c) flexibility   d) activity

10) _____ is key intermediate in carbohydrate metabolism.
   a) Malate   b) Citrate
   c) Isocitrate   d) Pyruvate

11) Lock and key hypothesis was proposed by _____.
   a) J. Monod   b) Singer
   c) Emil Fischer   d) Hooke

12) _____ amino acid is not used in protein synthesis.
  a) Methionine
  b) Aspartic acid
  c) Citrulline
  d) Glutamic acid

13) Movement of ribosome on mRNA one codon at a time is called _____.
  a) Transformation
  b) Transduction
  c) Transfection
  d) Translocation

14) _____ group is added in methionine during formylation.
  a) C=O
  b) CHO
  c) CH_3
  d) COOH

Q.2 A) Answer the following questions. (Any Four)   **08**
  1) List termination codons.
  2) Nucleotide.
  3) Group specificity.
  4) Luciferin.
  5) Role of Ninhydrin.

B) Answer the following questions (Any Two)   **06**
  1) Extraction of intracellular enzymes.
  2) Properties of immobilized enzymes.
  3) Strain and distortion.

Q.3 A) Answer the following questions (Any Two)   **08**
  1) Fate of pyruvate.
  2) Precipitation of enzyme by change in pH.
  3) Termination of polypeptide chain.

B) Answer the following questions (Any One)   **06**
  1) Assimilation of sulfur.
  2) Adsorption chromatography.

Q.4 A) Answer the following questions (Any Two)   **10**
  1) Regulation of allosteric enzymes.
  2) Bioluminesce
  3) Precipitation of enzymes by organic solvent.

B) Answer the following questions (Any One)   **04**
  1) Isoenzymes
  2) Activation of amino acids.

Q.5 Answer the following questions (Any Two)   **14**
  a) Phosph ketolase pathway.
  b) Proximity and orientation model.
  c) Assimilation of carbon.

Seat No.	

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Geology (Paper – I)
PHYSICAL GEOLOGY

Day & Date: Tuesday, 19-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Select the correct alternatives from the following rewrite the sentence.**   **08**

1) The difference in the equatorial diameter and polar diameter of the earth is _____ km.
   a) 43   b) 44
   c) 45   d) 46

2) Which one of the following sequences correctly lists the different arrivals from first to last?
   a) P waves → S waves → Surface waves
   b) Surface waves → p waves → S waves
   c) P waves → Surface waves → S waves
   d) S waves → P waves → Surface waves

3) Molten rock which does not reach the surface is called:
   a) Basalt   b) Magma
   c) Lava   d) Slag

4) Breaking up of exposed rock by physical or chemical agencies is known as_____.
   a) Erosion   b) Weathering
   c) Wearing   d) Deposition

5) _____ are the lines connecting the points of equal intensities of earthquakes.
   a) Seismic vertical   b) Seismic contours
   c) Isoseismal lines   d) Seismic lines

6) Particulate matter present in the atmosphere is always in the _____ form.
   a) Gaseous   b) Liquid
   c) Semisolid   d) Suspended

7) The boundary where seismic waves change their path and velocity is known as _____.
   a) Seismic boundary   b) Seismic gap
   c) Discontinuity   d) Disconformity

8) Vesicular basaltic fragments of Lapilli are commonly called _____.
   a) Pumice   b) Breccia
   c) Cinder   d) Tuff

Q.2 **Answer the following questions. (Any Four)** 08
1) Define isoseismal lines.
2) What is regolith?
3) Define seismic discontinuity.
4) What are the Tuffs and Tephra?
5) Which gas in the atmosphere absorbs harmful ultraviolet rays radiating from sun?
6) At what depth Mohorovicic and Gutenberg discontinuities occur?

Q.3 **Answer the following questions. (Any Two)** 08
1) Describe any four branches of geology.
2) Describe in brief mesosphere.
3) Explain seismogram.

Q.4 **Answer the following questions. (Any Two)** 08
1) What are the causes of earthquakes?
2) Describe all discontinuities present in the interior of the earth.
3) Describe in brief fissure type of eruption.

Q.5 **Answer the following questions. (Any One)** 08
1) Give a table showing Richter Magnitude Scale.
2) Describe in detail products of volcano.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper - XIV)
EMBEDDED SYSTEM DESIGN

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
       2) Figures to the right indicate full marks.
       3) Draw neat labeled diagram wherever necessary.
       4) Use of Log-table and calculator is allowed.
       5) Time allotted for question 1 is first 30 minutes only.
       6) Answer of question 1 should be written on page 3 of answer book.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Microcontroller based an electronic system designed for _____ application is called an embedded system.
   a) General   b) Dedicated
   c) Any   d) Computer

2) For an embedded system which of the following statement is correct?
   a) An embedded system consist of both hardware and firmware, co-designed
   b) An embedded system consist of only hardware
   c) An embedded system consist of only firmware
   d) An embedded system consist of microcontroller

3) For microcontroller based embedded system _____ is essential.
   a) Clock circuit
   b) Reset circuit
   c) Both clock as well as reset circuit
   d) only microcontroller

4) C Language consist of _____ keywords.
   a) 256   b) 128
   c) 64   d) 32

5) Which of following function is used for assignment of the values to the variable?
   a) printf()   b) assign()
   c) scanf()   d) Puts()

6) In case of while () loop, the condition is tested _____.
   a) At the beginning of loop
   b) At the end of loop
   c) any place in between the loop
   c) At both beginning and end of the loop

7) Which of the following file should be included in embedded c program?
   a) delay.h   b) time.h
   c) reg51.h   d) math.h

8) In embedded C program, _____ is essential.
   a) Superloop   b) while(100)
   c) while(10)   d) math.h

9) In serial communication _____ timer is used to configure baud rate.
   a) Timer 0   b) Timer 1
   c) Timer 2   d) Timer 3

10) Which of the following device is used to achieve isolation in the interfacing of devices with the microcontroller?.
   a) LED   b) Transistor
   c) Opto-coupler   d) Switch

11) While sending Data/command to the 16 x 2 LCD, the EN pin should _____.
   a) Be always high   b) Be always low
   c) Be connected to Vcc   d) Give a high to low through

12) If ADC 0804 is interfaced to port 1 of the microcontroller, then which of following statement should be used in embedded C program before reading the digital data.
   a) P1 = 0xff;   b) P1 = 0x00;
   c) P1 =0x08   d) P1= 0xf0;

13) Which of following sensor can be used to develop an embedded system for temperature measurement?
   a) BF34   b) LM 35;
   c) SYHS220   d) AD 595;

14) For designing of an embedded system for measurement of physical parameters _____.
   a) Calibration of the system is essential
   b) The DAS is not required
   c) Output device is not required
   d) Use of sensor is not mandatory

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Mention any four applications of an embedded system.
   2) Define the terms variables and constants in C Language.
   3) Give the structure of an embedded C program.
   4) Draw circuit diagram to interface LED to microcontroller.
   5) Give character set of C language.

B) Write Notes on (Any Two)   **06**
   1) Write short note on Basic architecture of an embedded system.
   2) Write a note on superloop.
   3) Write a program in embedded C to blink the LED connected at Pin P2.0

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What do you mean by loops in C Language? Give comparison between three loops.
   2) Discuss interfacing of relay to the microcontroller 89s51.
   3) With the help of suitable diagram explain minimum hardware for microcontroller based an embedded system.

B) Answer the following questions. (Any One)   **06**
   1) What do you mean by User's defined function? Give suitable example.
   2) Draw suitable diagram and give software for interfacing of seven segment display to the microcontroller.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Write a note on control statements in C Language.
   2) Draw diagram for interfacing of ADC 0804 to microcontroller and write embedded C program to read digital data.

    3)   Write a program to generate square wave of frequency 4 KHz at Pin P0.1.

B) **Answer the following questions.(Any One)**   **04**
    1)   Discuss interfacing of optocouplers to the microcontroller 89s51.
    2)   Write an embedded C Program for configuration of port 1 in input mode.

Q.5 **Answer the following questions. (Any Two)**   **14**
    a)   Discuss with suitable diagram the interfacing of 16 x 2 LCD to microcontroller.
    b)   Describe in detail the designing of an embedded system for measurement of temperature.
    c)   Write embedded C program for serial transmission of character to computer.

Seat No.

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper- XIV)
ADVANCED JAVA

Day & Date: Wednesday, 09-10-2019　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**　**14**

　1) Which class can handle any type of request so it is protocol-independent?
　　　a) HttpServlet　　　　　　　　b) GenericServlet
　　　c) Servlet　　　　　　　　　　d) All of these

　2) <%= %> element in JSP is used to display data on browser, called as
　　　_____.
　　　a) Comment　　　　　　　　　b) Expression
　　　c) Declaration　　　　　　　　d) Scriplate

　3) In JSP implicit object out is a _____ class.
　　　a) PrintWriter　　　　　　　　b) JSPWriter
　　　c) System　　　　　　　　　　d) Servle

　4) _____ page directive attribute is used for handling the exception in JSP.
　　　a) errorPage　　　　　　　　　b) isErrorPage
　　　c) both a) and b)　　　　　　　d) exception

　5) In HTTP Request _____ method is not secured because data is append in
　　　URL.
　　　a) GET　　　　　　　　　　　b) POST
　　　c) Both a) and b)　　　　　　　d) PUT

　6) Which driver is called as thin driver in JDBC?
　　　a) Type-4 driver　　　　　　　b) Type-1 driver
　　　c) Type-3 driver　　　　　　　d) Type-2 driver

　7) JSP _____ directive is used in the JSP pages using the JSP standard tag
　　　libraries.
　　　a) page　　　　　　　　　　　b) include
　　　c) taglib　　　　　　　　　　d) All of these

　8) What are the correct statement about server?
　　　a) physical machine　　　　　b) software
　　　c) hardware　　　　　　　　　d) none of these

　9) In which file do we define a servlet mapping?
　　　a) servlet.mappings　　　　　b) servlet.xml
　　　c) web.xml　　　　　　　　　d) Simple.java

　10) Struts framework is light-weight solution.
　　　a) True　　　　　　　　　　　b) False

　11) Which servlet does the struts framework use?
　　　a) EntryServlet　　　　　　　b) StrutsServlet
　　　c) ActionServlet　　　　　　　d) BasicServlet

12) Which technology can be used at View Layer in Struts?
   a) J2EE
   b) DHTML
   c) XML/XSLT
   d) JavaScript

13) _____ is the root level element in a hibernate mapping file.
   a) <hibernate-mapping>
   b) <hibernate-configuration>
   c) both a and b
   d) None of these

14) If you don't use @Table annotation, hibernate will use the _____as the table name by default.
   a) class name
   b) HibernateTable
   c) Object Name
   d) annotationTable

Q.2 A) Answer the following: (Any Four)   **08**
   1) What is struts?
   2) What is framework?
   3) List out advantages of web server.
   4) Define type-I driver.
   5) What is ORM?

B) Write Notes on: (Any Two)   **06**
   1) JSP Action Elements
   2) JDBC architecture
   3) JavaBean

Q.3 A) Answer the following: (Any two)   **08**
   1) Explain all attribute of page directive tags.
   2) Differentiate between Servlet and JSP.
   3) Write a program to check given string is palindrome or not. (Use swing Components)

B) Answer the following: (Any One)   **06**
   1) Explain HttpRequest and HttpResponse interfaces with example.
   2) Explain different types of JDBC components.

Q.4 A) Answer the following: (Any Two)   **10**
   1) Explain JSTL XML tags with example.
   2) Explain characteristics of Struts.
   3) Write a program to insert employee information in Hibernate.

B) Answer the following: (Any One)   **04**
   1) What is cookies? Explain advantages and disadvantages of cookies.
   2) Explain Hibernate generator classes.

Q.5 Answer the following: (Any two)   **14**
   a) What is session? Explain advantages and disadvantages of URL rewritten.
   b) Explain JSP implicit objects with example.
   c) Write a program to navigate (next, last first, previous) student records. (use type-IV driver).

Seat No.

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov- 2019
Physics (Special Paper - XV)
ATOMIC, MOLECULAR PHYSICS AND QUANTUM MECHANICS

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Neat diagrams must be drawn wherever necessary.
              4) Use of log tables and calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) If P is the momentum of the particle and k is the propagation constant of the wave, then the De—Broglie's relation is _____.
   a) $P = \hbar k$ b) $P = \hbar/k$
   c) $P = \hbar w$ d) $P = k/\hbar$

2) The quantity $\Psi\Psi^*$ is called _____.
   a) Probability current density   b) reflection coefficient
   c) transmission coefficient   d) probability density

3) The separation between two successive energy levels in harmonic oscillator is _____.
   a) $\hbar w$ b) $\hbar w/_2$
   c) $3/2\hbar w$ d) $2/3\hbar w$

4) The energy spectrum of particle in one - dimensional rigid box has the nature of _____.
   a) infinite sequence of discrete energy levels
   b) infinite sequence of equidistant energy levels
   c) exponential increasing
   d) exponential decreasing

5) The Z component of angular momentum operator is given by $L_z = $ _____.
   a) $i\hbar\, \partial/\partial\phi$ b) $m\hbar$
   c) $i\hbar\, \partial/\partial\theta$ d) $-i\hbar\, \partial/\partial\phi$

6) The energy operator is given by $E = $ _____.
   a) $i\hbar\, \partial/\partial t$ b) $-i\hbar\, \partial/\partial t$
   c) $i\hbar\, \partial/\partial x$ d) $-i\hbar\, \partial/\partial x$

7) In quantum mechanics raising operator is given by _____.
   a) $L_+ = L_x + iL_y$ b) $L_+ = L_x - iL_y$
   c) $L_+ = L_z + iL_y$ d) $L_+ = L_z - iL_y$

8) The transition from nS levels to the lowest P level give rise to the series of spectral lines is called _____.
   a) sharp   b) principal
   c) diffuse   d) fundamental

9) Most intense line in doublet corresponds to _____.
   a) Maximum j value   b) j and ℓ change in same way
   c) Both a and b together   d) zero j value

10) If the coupling between ℓ^* and s^* is not broken in an external magnetic field, then we observe _____.
   a) normal Zeeman effect
   b) anomalous Zeeman effect
   c) Paschen-back effect
   d) Stark effect

11) The ratio of magnetic moment to the mechanical moment of orbital motion of electron is _____.
   a) $e/2m$
   b) $2e/2m$
   c) e/m
   d) $2e/m$

12) Good quantum numbers in Paschen-Back effect are _____.
   a) n, ℓ, m_ℓ, m_s
   b) n, ℓ, j, m_j
   c) n, ℓ, j, s
   d) n, ℓ, m_ℓ, m_j

13) Frank-Condon principle helps in estimating the _____.
   a) width of bands
   b) intensity of bands
   c) intermolecular distance
   d) band region

14) Pure rotational spectra occurs in_____.
   a) Ultraviolet region
   b) Infra-red region
   c) microwave region
   d) visible region

Q.2 A) Answer the following questions. (Any Four)   **08**
1) State Heisenberg's uncertainty principle.
2) Give any two properties of Raman lines.
3) What is an operator?
4) What is Stark effect?
5) Find Eigen value of $(\sin nx)$ for operator d^2/d^2x.

B) Write Notes (Any Two)   **06**
1) Spectral notations
2) Raman effect., Stoke's line and antistoke's line
3) Calculate the reduced mass of CO diatomic molecule.
[Mass of $C = 1.99 \times 10^{-26}$kg & Mass of $O = 2.66 \times 10^{-26}$kg]

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Obtain Zero point energy in case of linear harmonic oscillator from Heisenberg's uncertainty principle.
2) Derive the expression for vibrational energy levels of diatomic molecule.
3) The Raman exciting line in an experiment is 4358 A°. A sample gives Stoke's line at 4458 A°. Deduce the wavelength of anti-Stoke's line.

B) Answer the following questions. (Any One)   **06**
1) Discuss quantitative intensity rules used to calculate relative intensity of spectral lines in a doublet.
2) Derive Schrodinger's time dependent wave equation in one dimension of a free particle.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Show that $dp/dt + \nabla j = 0$, where ρ is the probability density and j is probability current density.
2) What is the Paschen Back effect? Obtain an expression for term value.
3) Using the steady state Schrodinger's wave equation, derive the energy eigen values for the motion of particle in one dimensional rigid box.

B) Answer the following (Any One)   **04**

   1) Derive the commutation relations for L_x, L_y, L_z of orbital angular momentum.

   2) Show that $[\hat{H}, \hat{P}] = 0$.

Q.5 Answer the following questions (Any Two)   **14**

   a) Explain anomalous Zeeman effect and obtain an expression for term shift.

   b) Solve Schrodinger's equation for hydrogen atom and discuss the radial wave equation.

   c) Calculate the ground state energy of an electron confined to move freely between two ends separated by $2A^o$. (Given: mass of electron $m = 9.1 \times 10^{-31}$ kg & Plank's constant $h = 6.626 \times 10^{-34}$ J-s)

Seat No.
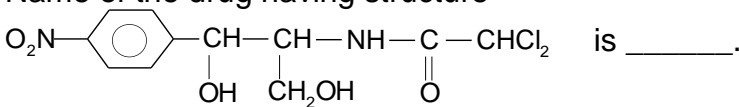
B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov 2019
Chemistry (Special Paper - XV)
ORGANIC CHEMISTRY

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.
                3) Draw neat diagrams and give equations wherever necessary.
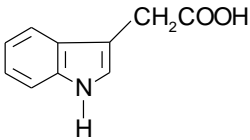
Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Pyrrole on nitration with HNO_3 + $(CH_3CO)_2O$ at room temperature gives _____.
   a) 3 - nitropyrrole   b) 4 - nitropyrrole
   c) 2 - nitropyrrole   d) none of these

2) For chain shortening of carbohydrates _____ reaction is used.
   a) Diazotisation   b) Weermann
   c) Chichibabin   d) Kiliani

3) β - ionone ring is present in _____ molecule.
   a) Vitamin - A   b) thyroxine
   c) adrenaline   d) all these

4) Name of the drug having structure

O_2N—⟨○⟩—CH—CH—NH—$\overset{\displaystyle O}{\underset{\displaystyle ||}{C}}$—$CHCl_2$ is _____.
           OH CH_2OH

   a) chlorambucil   b) chloromycetin
   c) isoniazide   d) ibuprofen

5) _____ is an example of azo dye.
   a) Rosaniline   b) Phenolphthalein
   c) Congored   d) Picric acid

6) The agrochemical _____ stimulates latex production in rubber trees.
   a) ethophan   b) carbaryl
   c) IAA   d) monocrotophos

7) The product in the following reaction is _____
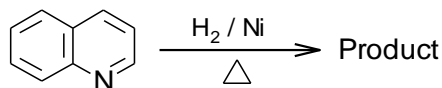
   a)   b)

   c)   d) none of these

8) α - D(+) glucose and β - D(+) glucose differ only in the configuration at _____ carbon atom.
   a) C - 1   b) C - 2
   c) C - 3   d) C - 4

9) Thyroxine contains _____ iodine atoms in its molecule.
   a) 1
   b) 2
   c) 3
   d) 4

10) Condensation of diethyl derivative of malonic ester with urea gives _____.
   a) chloromycetin
   b) tolbutamide
   c) phenobarbitone
   d) paludrine

11) A dye which is fixed to fabric by using binding material is known as _____ dye.
   a) mordant
   b) azo
   c) reactive
   d) disperse

12) The compound [indole with CH$_2$COOH at 3-position] is _____.
   a) IAA
   b) DDT
   c) BHC
   d) MIC

13) The carbohydrate amylopectin is a _____.
   a) monosaccharide
   b) disaccharide
   c) trisaccharide
   d) polysaccharide

14) In Sulpha drugs _____ is crucial pharmacophore.
   a) $-SH$
   b) $-SH-R$ (with $=O$)
   c) $-SO_2NH_2$
   d) none of these

Q.2 A) Answer the following (Any Four)   **08**
   1) Draw the structure of maltose.
   2) Pyridine is more basic than pyrrole. Why?
   3) How will you prove the presence of five conjugated double bond system in Vitamin - A?
   4) Explain the terms :
      i) antidiabetics
      ii) anti-inflammatory drugs
   5) Mention the chromophores present in
      i) nitroso dyes
      ii) anthraquinone dyes

B) Write Notes (Any Two)   **06**
   1) Oligosaccharides
   2) Synthesis of ibuprofen
   3) General idea of agrochemicals

Q.3 A) Answer the following questions (Any Two)   **08**
   1) How will you convert glucose into fructose?
   2) Give the synthesis of Paludrine.
   3) What are pyrethroids? Explain general structure of pyrethrum.

B) Answer the following question (Any One)   **06**
   1) How will you establish the structure of adrenaline analytically?
   2) How is pyrrole synthesized from -
      i) acetylene
      ii) furan and
      iii) succinamide
      Predict the products of the following reactions -

a) $\xrightarrow[\text{100}^0\text{ C}]{\text{SO}_3\text{ / Pyridine}}$?

b) $\xrightarrow{\text{(CH}_3\text{CO)}_2\text{ O / SnCl}_4}$?

c) $\xrightarrow{\text{CrO}_3\text{ / H}_2\text{SO}_4}$?
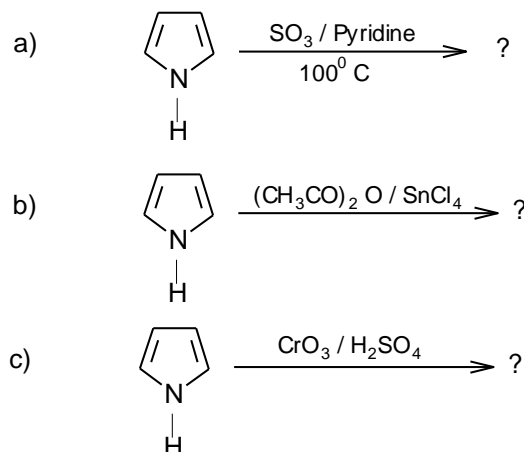
Q.4 A) Answer the following questions (Any Two)   **10**
1) How is an aldohexose converted into aldoheptose?
2) Give synthesis of thyroxine.
3) An aromatic primary amine A [C_6H_7N] on heating with fuming conc. H_2SO_4 gives its Para Sulphonated derivative B [$C_6H_7NSO_3$]. The comp. B on diazotization using $NaNO_2$ + HCl gives diazonium salt C [$C_6H_5N_2SO_3Cl$]. The comp. C on coupling with diphenylamine (C_6H_5)$_2$NH gives an acidic azo-dye D [$C_{18}H_{15}N_3SO_3$]. What are A, B, C & D? Give equations. Name the compound D.

B) Answer the following question (Any One)   **04**
1) Why does nucleophilic substitution in pyridine occur at position - 2? Explain with general mechanism.
2) Give the synthesis of isoniazide.

Q.5 Answer the following questions (Any Two)   **14**
a) Explain Skraup's synthesis of quinoline. What is the action of the following reagents on quinoline.
   i) SO_3/ H_2SO_4 , 220°C
   ii) C_6H_5Li?
b) How is configuration of D - glucose determined from D - arabinose?
c) How are dyes classified on the basis of methods of application? How is phenolphthalein synthesized?

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper - XV)
PLANT METABOLISM

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   _____ is not called as sugar.
   a) Starch   b) Ribose
   c) Glucose   d) Sucrose

2)   Corresponding D and L sugars are mirror image of each other that form
   _____.
   a) Enantiomeric pair   b) Anomeric pair
   c) Optically active pair   d) Stereoisomeric pair

3)   The enzymes invertase hydrolyses sucrose into _____.
   a) *glucose phosphate & fructose* b) glucose & fructose
   c) fructose phosphate & glucose   d) glucose & maltose

4) $\beta(1 \rightarrow 4)$ glycosidic linkages are found in _____.
   a) Maltose   b) Sucrose
   c) Cellulose   d) Starch

5) β-oxidation of fatty acids takes place in _____.
   a) Mitochondria   b) Glyoxysomes
   c) Cytosol   d) Both (a) and (b)

6)   _____ is not a phospholipid.
   a) Lecithin   b) Cephalin
   c) Cardiolipin   d) None of them

7)   Lipids may play important role as precursors of signaling compounds in the
   cells are _____.
   a) Triglycerides   b) Phospholipids
   c) Waxes   d) Glycolipids

8)   _____ is not a component of triglycerides.
   a) Glycerols
   b) long chain saturated fatty acids
   c) long chain monohydric alcohol
   d) long chain unsaturated fatty acids

9)   The process of glycolysis occurs in _____.
   a) Mitochondrion   b) Cytosol
   c) Peroxisomes   d) Chloroplast

10) TCA cycle is also known as _____.
   a) Kreb's cycle   b) Citric acid cycle
   c) Both (a) and (b)   d) Glycolysis cycle

11) Cyanide resistant respiration is found in _____.
   a) Plants
   b) Animals
   c) Bacteria
   d) Viruses

12) Oxidative phosphorylation take place _____.
   a) in mitochondrial matrix
   b) on cristae in mitochondria
   c) in thylakoids of grana in chloroplast
   d) All of above

13) Mitochondrial electron transport system (ETS) consist of _____.
   a) Two complexes
   b) Three complexes
   c) Four complexes
   d) Five complexes

14) Pentose phosphate pathway is _____.
   a) Direct oxidation pathway
   b) Warburg-direction pathway
   c) Hexose monophosphate shunt
   d) All of above

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Draw the structure of ATP molecule.
   2) What are carbohydrates?
   3) Give the significance of lipids.
   4) What are epimers?
   5) Define gluconeogenesis.

B) Write the Notes on (Any Two)   **06**
   1) Write a note on electron transport.
   2) Give the properties of monosaccharides with examples.
   3) Write a note on ATP synthesis.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Classify carbohydrates giving suitable example.
   2) Write a note on oxidative phosphorylation.
   3) Describe the Jagendorf's experiment.

B) Answer the following questions. (Any One)   **06**
   1) Write a note on regulation of PDH.
   2) Give the properties of unsaturated fatty acids with examples.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe the Boyer's conformational model.
   2) What are the types of polysaccharides? Explain storage polysaccharides in detail.
   3) Explain pentose phosphate pathway.

B) Answer the following questions. (Any One)   **04**
   1) Describe the classification of lipids.
   2) Explain cyanide - resistant respiration.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe the β - oxidation pathway of fatty acids.
   b) Describe the biosynthesis of starch and sucrose.
   c) Describe the TCA cycle.

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper- XV)
MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Draw neat labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

  1) Histone proteins are present in _____.
      a) Ribsome   b) Replisome
      c) Nucleosome   d) Spliceosome

  2) Griffith's experiment to prove that DNA serves as genetic material is known as _____.
      a) Conjugation   b) Transformation
      c) Transduction   d) Recombination

  3) Small RNA strands called ad primers are required during _____.
      a) Transcription   b) Conjugation
      c) Translation   d) Replication

  4) Enzyme involved in transcription is known as _____.
      a) Reverse Transcriptase   b) DNA Polymerase
      c) *Taq* Polymerase   d) RNA Polymerase

  5) _____ amino acid binds to initiator t-RNA in prokaryotes.
      a) Proline   b) Methionine
      c) Guanine   d) f-methionine

  6) _____ codon serves as a termination codon.
      a) AUG   b) GUG
      c) UAA   d) AUA

  7) Poly-A-tail is added towards _____ end of eukaryotic m-RNA.
      a) 5'   b) 3'
      c) 1'   d) 2'

  8) Many ribosomes translating a single m-RNA to form a structure called as _____
      a) Ribosome   b) Multiribosome
      c) Polymer   d) Polyribosome

  9) The nucleotide sequence is read as _____, called codons.
      a) Doublets   b) Singlets
      c) Triplets   d) Quadrates

  10) The initiator amino acid methionine is coded by codon.
      a) GUU   b) UAA
      c) UGA   d) AUG

  11) _____ enzyme catalyzes the process of transcription.
      a) RNA Polymerase   b) DNA Polymerase
      c) Reverse Transcriptase   d) DNA Ligase

12) _____ enzyme is also known as molecular glue.
   a) DNA Endonuclease
   b) DNA Exonuclease
   c) DNA Ligase
   d) DNase Enzyme

13) _____ is not a cloning vector.
   a) Plasmids
   b) Cosmids
   c) BAC
   d) Introns

14) The biotechnological products, Factors-VIII & IX, are used to cure _____.
   a) Cancer
   b) Diabetes
   c) Dwarfism
   d) Hemophilia

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Bt-Cotton
   2) Exon
   3) Okazaki Fragments
   4) Anticodon
   5) Dolly

B) Write Notes on (Any Two)   **06**
   1) Differentiate between leading and lagging strand of DNA replication.
   2) Discuss the role of palindromic sites with examples.
   3) Explain theta model of DNA replication.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Discuss SOS repair and its significance.
   2) Briefly discuss Griffith's transformation experiment.
   3) Explain briefly synthesis of C-DNA using reverse transcriptase.

B) Answer the following question. (Any One)   **06**
   1) Give brief idea of biotechnological products and their applications.
   2) Explain briefly post-transcription modifications in eukaryotic m-RNA.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain nucleosome concept with solenoid model.
   2) Discuss initiation, elongation and termination of transcription in prokaryotes.
   3) Elaborate excision-repair method of DNA repair.

B) Answer the following question. (Any One)   **04**
   1) Discuss types and mechanism of action of restriction endonucleases.
   2) Compare and contrast RNA polymerase in prokaryotes and eukaryotes.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Discuss properties of genetic code with notes on degeneracy and wobble hypothesis.
   b) Describe initiation, elongation & termination steps in translation.
   c) Define and discuss plasmid, cosmid and BAC as cloning vectors.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Mathematics (Special Paper – XV)
INTEGRAL TRANSFORM

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                          2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) $L\left\{\frac{e^{at}+e^{-at}}{2}\right\} = $ _____.
   a) $p/{p^2 + a^2}$
   b) $p/{p^2 - a^2}$
   c) $2p/{p^2 - a^2}$
   d) None of these

2) If $L\{f(t)\} = f(p)$ then $L\{e^{-at}f(t)\} = $ _____.
   a) $af(p)$
   b) $f(p + a)$
   c) $\frac{1}{a}f(p)$
   d) None of these

3) If $L\{f(t)\} = f(p)$ then $L\{t^2 f(t)\} = $ _____.
   a) $(-1)^2 \frac{d}{dp}f(p)$
   b) $(-1)^2 \frac{d^2}{dp^2}f(p)$
   c) $\frac{d^2}{dp^2}f(p)$
   d) None of these

4) If $L\{f(t)\} = f(p)$ then $L\{f'''(t)\} = $ _____.
   a) $p^3 f(p) - p^2 f(0) - pf'(0) - f''(0)$ b) $p^2 f(p) - pf(0) - f'(0)$
   c) $p^2 f(p) + pf(0) - f'(0)$ d) None of these

5) The initial value theorem is _____.
   a) $\lim_{t\to\infty} f(t) = \lim_{p\to 0} pf(p)$
   b) $\lim_{t\to 0} f(t) = \lim_{p\to\infty} pf(p)$
   c) $\lim_{t\to\infty} f(p) = \lim_{p\to\infty} pf(p)$
   d) None of these

6) If $L^{-1}\{f(p)\} = f(t)$ then $L^{-1}\{f(Kp)\} = $ _____.
   a) $Kf(t)$
   b) $\frac{1}{K}f(t)$
   c) $\frac{1}{K}f(t/K)$
   d) None of these

7) $L^{-1}\left\{p/{p^2 + a^2}\right\} = $ _____.
   a) $\frac{\cos at}{a}$
   b) $\cos at$
   c) $\frac{\cos at}{p}$
   d) None of these

8) The value of $|\star|\star|\star|$ ----- n times = _____.
   a) t^{n-1}
   b) $\frac{t^{n-1}}{(n-1)!}$
   c) $\frac{t^{n-1}}{n!}$
   d) None of these

9) If $L^{-1}\left\{\frac{1}{p-a}\right\} = e^{at}$ then $L^{-1}\left\{\frac{1}{(p-a)^3}\right\} = $ _____ .

    a) $t^2 e^{at}$ b) $\frac{1}{2} t^2 e^{at}$

    c) $t^3 e^{at}$ d)   None of these

10) $L^{-1}\left\{\frac{3}{p^2-3}\right\} = $ _____ .

    a) $\sqrt{3} \sin h\sqrt{3}t$ b) $\sin h\sqrt{3}t$

    c) $\sqrt{3} \sin \sqrt{3}t$ d)   None of these

11) The solution of $\frac{d^2y}{dt^2} + y = 0$ under condition that $y = 1, \frac{dy}{dt} = 0$ when $t = 0$ is _____ .

    a) $\sin t$ b) $\cos t$

    c) $\cos ht$ d)   None of these

12) If $y(x,t)$ is function of x and t the $L\left\{\frac{\partial^2 y}{\partial t^2}\right\} = $ _____ .

    a) $p^2\bar{y}(x,p) - py(x,0) - y_t(x,0)$ b) $p^2\bar{y}(xp) + py(x,0)$

    c) $p^2\bar{y}(x,p) - py_t(x,0) - y(x,0)$ d)   None of these

13) If $y(x,t)$ is function of x and t then $L\left\{\frac{\partial y}{\partial t}\right\} = $ _____ .

    a) $x\bar{y}(x,p) + y(x,0)$ b) $p\bar{y}(x,p) - y(x,0)$

    c) $p\bar{y}(x,0) - y(x,p)$ d)   None of these

14) A rational algebraic function is called proper fraction if _____ .

    a)   degree of numerator = degree of denominator

    b)   degree of numerator > degree of denominator

    c)   degree of numerator < degree of denominator

    d)   None of these

Q.2 A) Answer the following questions. (Any Four)   **08**

    1)   Solve $L\{\sin t . \cos t\}$

    2)   Solve $L\left\{\frac{e^{at}-1}{a}\right\}$

    3)   Solve $L^{-1}\left\{1/p^{7/2}\right\}$

    4)   State Learch's theorem.

    5)   State Linearity property of Laplace transform.

B) Answer the following questions. (Any Two)   **06**

    1)   Solve $L\{3 \sin h2t - 5 \cos h2t\}$

    2)   Solve $L^{-1}\left\{\frac{p}{p^2+2} + \frac{6p}{p^2-16} + \frac{3}{p+3}\right\}$

    3)   Solve $(D^2 - 2D + 2)y = 0$ $y = Dy = 1$ when $t = 0$

Q.3 A) Answer the following questions. (Any Two)   **08**

    1)   Evaluate $L\{\sin \sqrt{t}\}$

    2)   Show that $L^{-1}\{f(p-a)\} = e^{at} L^{-1}\{f(p)\}$

    3)   Solve $ty'' + y' + 4ty = 0$ when $y(0) = 3, y'(0) = 0$

B) Answer the following questions. (Any One)   **06**

    1)   If $L\{f(t)\} = f(p)$ then $L\{f(at)\} = \frac{1}{a} f(p/a)$

    2)   Solve $L^{-1}\left\{\log\frac{(p+3)}{(p+2)}\right\}$

Q.4 **A)** **Answer the following questions. (Any Two)** 10

1) If $f(t)$ is function of calls A and if $L\{f(t)\} = f(p)$ then show that
$$L\{t^n f(t)\} = (-1)^n \frac{d^n f(p)}{dp^n}$$

2) Evaluate $L^{-1}\left\{\frac{3p-7}{p^2-2p-3}\right\}$

3) Solve $\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial x^2}$, $y(x,0) = 3 \sin 2\pi x$, $y(0,t) = 0 = y(1,t)$, $0 < x < 1$, $t > 0$

B) **Answer the following questions. (Any One)** 04

1) Prove that
$$L^{-1}\left\{\frac{f(p)}{p^2}\right\} = \int_0^t \int_0^t f(x) dx \, dy$$

2) Prove that $L = \left\{\frac{\sin t}{t}\right\} = \tan^{-1} 1/p$ and hence find $L\left\{\frac{\sin at}{t}\right\}$.
Does the $L\left\{\frac{\cos at}{t}\right\}$ exist?

Q.5 **Answer the following questions. (Any Two)** 14

a) If $F(t)$ is periodic function with period $T > 0$ i.e. $F(u+T) = F(u), F(u + 2T=F(u)$ etc. then show that
$$L\{f(t)\} = \int_0^T \frac{e^{-Pt}}{1 - e^{-Pt}} f(t) dt$$

b) State and prove convolution theorem for inverse Laplace transformation.

c) Solve $(D - 2)x - (D + 1)y = 6e^{3t}$
$(2D - 3)x + (D - 3)y = 6e^{3t}$
with condition that $x(0) = 3, y(0) = 0$

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - XV)
INTEGRAL TRANSFORM

Day & Date: Tuesday, 19-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                         2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) $L\{t^n\} = $ _____.
   a) $\frac{n!}{P^n}$
   b) $\frac{n!}{P^{n+1}}$
   c) $\frac{(n+1)!}{P^n}$
   d) $\frac{(n+1)!}{P^{n+1}}$

2) $L\{\sin 4t\} = $ _____.
   a) $\frac{4}{P^2+16}$
   b) $\frac{4}{P^2+4}$
   c) $\frac{P}{P^2+16}$
   d) $\frac{P}{P^2+4}$

3) $L\{f(t)\} = f(P)$ then $L\{e^{at} f(t)\} = $ _____.
   a) $af(p)$
   b) $\frac{1}{a} f(p)$
   c) $f(P + a)$
   d) $f(P - a)$

4) $L\{\sin h3t\} = $ _____.
   a) $\frac{3}{P^2-3}$
   b) $\frac{P}{P^2-9}$
   c) $\frac{3}{P^2-9}$
   d) $\frac{P}{P^2-3}$

5) $\int_0^\infty t\, e^{-3t}\ \sin t\, dt = $ _____.
   a) $\frac{3}{25}$
   b) $\frac{3}{50}$
   c) $\frac{2}{50}$
   d) $\frac{124}{125}$

6) $L^{-1}\left\{\frac{1}{P^2-a^2}\right\} = $ _____.
   a) $\frac{\sin hat}{a}$
   b) $\frac{\cos hat}{a}$
   c) $\sin hat$
   d) $\cos hat$

7) $L^{-1}\{f(P)\} = f(t)\}$ then $L^{-1}\{f(KP)\} = $ _____.
   a) $kf(kt)$
   b) $\frac{1}{k} f(kt)$
   c) $\frac{t}{k} f\left(t/k\right)$
   d) $\frac{1}{k} f\left(t/k\right)$

8) $L^{-1}\{f(p)\} = f(t)$ then $L^{-1}\{f^n(p)\} = $ _____.
   a) $t^n f(t)$
   b) $(-1)^n t^n f(t)$
   c) $(-1)^n f(t)$
   d) $(-1)^n \frac{d^n f(p)}{dp^n}$

9)   Convolution of two function is always _____.
   a) Commutative
   b) Associative
   c) Both a and b
   d) None of these

10) $L^{-1}\left\{\frac{P}{(p^2+a^2)^2}\right\} = $ _____.

   a) $\frac{t \sin at}{2a}$

   b) $\frac{t \cos at}{2}$

   c) $t \sin at$

   d) $t \cos at$

11) If $L\{f(t)\} = f(p)$ then $L\{f''(t)\} = $ _____.

   a) $Pf(p) - f(o) - f'(o)$

   b) $P^2 f(p) - pf(o) - f'(o)$

   c) $P^2 f(p) - pf'(o) - f(o)$

   d) $P^2 f(p) - f(o) - pf'(o)$

12) $|\star|\star|\star|$ ----- (n times) = _____.

   a) $\frac{t^n}{n!}$

   b) $\frac{t^{n-1}}{(n-1)!}$

   c) $\frac{t^{n-1}}{(n-1)}$

   d) $t^n / (n-1)!$

13) $L\{f(t)\} = f(p)$ then initial value theorem states that _____.

   a) $\lim_{t\to\infty} f(t) = \lim_{p\to 0} pf(p)$

   b) $\lim_{t\to 0} f(t) = \lim_{p\to\infty} pf(p)$

   c) $\lim_{t\to 0} f(t) = \lim_{p\to 0} pf(p)$

   d) $\lim_{t\to\infty} f(t) = \lim_{p\to\infty} pf(p)$

14) If $y(x,t)$ is function of X and t then $L\left\{\frac{\partial^2 y}{\partial t^2}\right\} = $ _____.

   a) $P^2 \bar{y}(x,p) - py(x,o) - y_t(x,o)$

   b) $P^2 \bar{y}(x,p) + py(x,o)$

   c) $P^2 \bar{y}(x,o) - py_t(x,o) - y(x,o)$

   d) $P^2 \bar{y}(x,p) - py_t(x,o) + y(x,o)$

Q.2 A) Answer the following questions. (Any Four)   **16**

   1) Find $L\{\sin t \cos t\}$

   2) State Linearity property of laplace transform.

   3) Find $L^{-1}\left\{\frac{4}{p-2}\right\}$

   4) Solve $L^{-1}\left\{\frac{6}{2p-3} - \frac{(3+4p)}{9p^2-16}\right\}$

   5) Find $L\{3 \sin 2t - 2 \cos 2t\}$

B) Answer the following questions. (Any Two)   **12**

   1) Find $L\{t \cos at\}$

   2) If $L^{-1}\{f(p)\} = f(t)$ then show that $L^{-1}\{f(p-a\} = e^{at} f(t)$

   3) Solve $\frac{d^2 y}{dt^2} + y = 0$ under the condition that $y = 1, \frac{dy}{dt} = 0$ when $t = 0$.

Q.3 A) Answer the following questions. (Any Two)   **14**

   1) Find $L\{\sin \sqrt{t}\}$

   2) Find $L^{-1}\left\{\frac{3p-2}{p^2-4p+20}\right\}$

   3) Solve the differential equation using laplace transformation
   $y'' + 4y' + 4y = 4e^{-2t}, y(o) = -1, y'(o) = 4$

B) Answer the following questions. (Any One)

   1) Solve $L\{7e^{2t} + 9e^{-2t} + 5 \cos t + 7t^3 + 5 \sin 3t + 2\}$

   2) Find $L^{-1}\left\{Log\left(\frac{P+3}{P+2}\right)\right\}$

Q.4 A) Answer the following questions. (Any Two)

   1) If $f(t) = t^2, 0 < t < 2$ and $f(t+2) = f(t)$ find $L\{f(t)\}$

   2) Using convoluation theorem solve $L^{-1}\left\{\frac{1}{(p+1)(P+2)}\right\}$

   3) Solve $(D^2 + g)y = \cos 2t, y(0) = 1, y\left(\pi/2\right) = -1$

B) **Answer the following questions. (Any One)**

1) If $L\{f(t)\} = f(p)$ and $G(t) = \begin{cases} f(t-a) & t > a \\ 0 & t < a \end{cases}$ then show that

$L\{G(t)\} = e^{-ap} f(p)$

2) Prove that

$$L^{-1}\left\{\frac{f(p)}{p^2}\right\} = \int_0^t \int_0^t f(x)\, dxdy.$$

Q.5 **Answer the following questions. (Any Two)** **14**

a) State and prove convolution theorem for inverse laplace transform.

b) Prove that $L\left\{\frac{\sin t}{t}\right\} = \tan^{-1}\frac{1}{p}$ and hence find $L\left\{\frac{\sin at}{t}\right\}$. Does $L\left\{\frac{\cos at}{t}\right\}$ exist?

c) Solve

$$Dx + Dy = t$$
$$D^2x - y = e^{-t}$$

If $X(0) = 3, X'(0) = -2, y(0) = 0$.

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper XV)
DESIGNS OF EXPERIMENTS

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) The total number of interaction effects in a 2^3 factorial experiment is: _____.
   a) 3   b) 4
   c) 5   d) 8

2) The error degrees of freedom in LSD is 12. Hence degrees of freedom for treatment is: _____.
   a) 2   b) 4
   c) 3   d) 5

3) Randomization is a process in which the treatments are allocated to the experimental units: _____.
   a) In a sequence   b) With equal probability
   c) At the will of the investigator   d) None of these

4) In RBD with 4 blocks and 5 treatments having one missing value, the error degrees of freedom in ANOVA table will be: _____.
   a) 12   b) 11
   c) 10   d) 9

5) An experimental design is: _____.
   a) A map of experiment   b) A plan of experiment
   c) An architect of experiment   d) None of these

6) In a RBD, which of the following is an unbiased estimator of error variance?
   a) Treatment sum of squares   b) Treatment mean sum of squares
   c) Error sum of squares   d) Error mean sum of squares

7) In CRD, the following principles of design of experiment are applied: _____.
   a) Randomization and local control
   b) Replication and local control
   c) Randomization and replication
   d) Randomization, replication and local control

8) A factorial experiment with three factors each at two levels is called: ____.
   a) 2 x 3 factorial experiment   b) 3 x 2 factorial experiment
   c) 3^2 factorial experiment   d) 2^3 factorial experiment

9) The analysis of split-plot design consists of: _____.
   a) Main-plot analysis   b) Sub-plot analysis
   c) Both a) and b)   d) Neither a) and b)

10) In RBD with 5 treatments and 4 replicates a treatment is added, the increase in error degrees of freedom will be: _____.
   a) 1
   b) 2
   c) 3
   d) 4

11) The factors like date of sowing and breeds are often used as: _____.
   a) experimental unit
   b) treatments
   c) replicates
   d) None of these

12) In the replicate given below: _____.

| Block 1 | (1) | ab | ac | bc |
| Block 2 | a | b | c | abc |

Confounded effect is: _____.
   a) AB
   b) AC
   c) BC
   d) ABC

13) Local control helps to: _____.
   a) reduce the no. of treatments
   b) increase the no. of plots
   c) reduce the error variance
   d) increase the error d.f

14) A LSD controls: _____.
   a) two way variation
   b) three way variation
   c) multi-way variation
   d) None of these

Q.2 A) Answer the following (Any Four)   **08**
   1) Define efficiency of design.
   2) Define treatment.
   3) Define experimental unit.
   4) Explain split-plot design.
   5) State the formula to estimate two missing values in RBD.

B) Write Notes (Any Two)   **06**
   1) Explain partial confounding with an illustration.
   2) What is CRD? Give its ANOVA table.
   3) Give merits of CRD.

Q.3 A) Answer the following (Any Two)   **08**
   1) Complete the following ANOVA table in LSD.

Source of variation	d.f.	S.S.	M.S.S.	F
Rows	-	72	-	2
Columns	-	-	36	-
Treatments	-	180	-	-
Error	6	-	12	
Total	-	-		

   2) Describe the ANOVA technique for one-way classification.
   3) Explain total confounding with an illustration.

B) Answer the following (Any One)   **06**
   1) Obtain the formula for estimating one missing observation in RBD.
   2) Estimate the parameters in CRD model.

Q.4 A) Answer the following (Any Two)   **10**
   1) Explain Yate's procedure to obtain factorial effect totals in a 2^2 factorial experiment with two factors A and B.
   2) Explain two principles of design of experiments; randomisation and replication.

3) Obtain the formula for estimating efficiency of RBD over CRD.

B) Answer the following (Any One) 04

1) State the mathematical model in ANOCOVA in CRD. State the expressions for estimators of different parameters.

2) Obtain the efficiency of LSD over RBD when columns are taken as blocks, if the following information is available.
Rows s.s. $= 259.5375$, Columns s.s. $= 155.2725$,
Treatment s.s. $= 1372.1225$, Error s.s. $= 156.37$, Treatment d.f. $= 3$.

Q.5 Answer the following (Any Two) 14

a) Give the mathematical model, assumptions and analysis of variance table in case of RBD.

b) Obtain the formula for estimating two missing observations in LSD.

c) What is factorial experiment? State the expression for the main effect and interaction effect in a 2^2 factorial experiment with two factors A and B.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper - XV)
STRATIGRAPHY OF INDIA PART – II

Day & Date: Thursday, 10-10-2019 | Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) The Kashmir, Bhadarwah-Chamba, Zanskar- Spiti-Kinnaur and Garhwal-Kumaun sub-basins are parts of _____ basin.
   a) Gondwana
   b) Laurasia
   c) Panthalassa
   d) Tethyan basin

2) Productus shales are found in _____.
   a) Ordovician
   b) Silurian
   c) Devonian
   d) Permian

3) Nagaur Formation of Jodhpur Supergroup belongs to _____.
   a) Cambrian
   b) Ordovician
   c) Silurian
   d) Devonian

4) The Po Formation forms a stepped topography due to alternation of light coloured _____ and _____.
   a) ferrugenous sandstone – quartzite
   b) quartzite - dark shale
   c) pegmatite - dark shale
   d) phyllite - dark shale

5) Age of Deccan Traps is _____.
   a) Upper Cretaceous to Eocene
   b) Upper Cretaceous to Oligocene
   c) Upper Cretaceous to Miocene
   d) Upper Cretaceous to Pliocene

6) 'Chikkim limestone', belongs to _____.
   a) Eocene rocks of Kashmir
   b) Cretaceous of Spiti
   c) Pre Cambrians of Sikkim
   d) Jurassics of Spiti

7) Deccan Traps are older than _____.
   a) Lametas
   b) Bagh beds
   c) Laterites
   d) Intertrappeans

8) The age of Bagh beds found under Deccan Traps is _____.
   a) Triassic
   b) Jurassic
   c) Cretaceous
   d) Tertiary

9) The lower Gondwana System includes _____ series.
   a) Talchir
   b) Umia
   c) Jabalpur
   d) Rajmahal

10) The main boundary fault separates _____.
    a) Vindhyans and Arawallies
    b) Siwaliks and Tertiaries
    c) Siwaliks and Aravallis
    d) Siwaliks and Archaeans

11) The Gondwana System was formed during _____.
   a) Upper Carboniferrous-Jurassic
   b) Upper Carboni ferrous – Cretaceous
   c) Permian-Jurassic
   d) Permian – Eocene

12) Jurassic rocks of Cutch are overlaid by _____.
   a) Deccan Traps   b) Gondwana
   c) Salt range   d) None of these

13) Pick out the formation which is devoid of coal.
   a) Barakar stage   b) Raniganj stage
   c) Barren measures   d) None of these

14) Dolomitic layers, containing the fossil brachiopod Neobolus, known as the Neobolus beds, are found in _____.
   a) Salt range   b) Spiti
   c) Jurassic of Cutch   d) none of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) The fossils of reptiles like Dinosaur are found in which stage of Cretaceous of South India?
   2) Write any two characteristic features of Chari Series of Jurassic System.
   3) What is the age of Haimanta group?
   4) Write the sequence of periods of Paleozoic era?
   5) What is the age of Fenestella shales?

B) Write Notes on (Any Two)   **06**
   1) Describe Lipak series.
   2) What is Mandla Lobe?
   3) List out the formation of lower and upper Gondwana.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What is Muth Quartzites?
   2) Write a note on Saurashtra Plateau.
   3) Write a short note on Surma formation.

B) Answer the following questions. (Any One)   **06**
   1) Write a note on depositional environment of Gondwana super group.
   2) Write a brief note on Satpura basin.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Write down the characteristics of stratigraphic divisions of Gondwana.
   2) Marine transgression during Jurassic period.
   3) Write a note on Kartol formation.

B) Answer the following questions. (Any One)   **04**
   1) Write a note on Satpura hills.
   2) Write a note on lithology, structure and coalfields of Wardha Valley.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe structure, lithology, flora and fauna of Pranhita-Godavary valley of Gondwana formation.
   b) Describe origin, types and distribution of laterite in Maharashtra.
   c) Describe litho - stratigraphy of tertiary of Assam.

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper – XV)
ENVIRONMENTAL MICROBIOLOGY

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) _____ protects us from harmful effects of U.V rays.
    a) Thick layer of Co_2 b) Ozone umbrella
    c) Smog   d) Clouds

2) The efficiency of sewage treatment or wastewater treatment process is expressed in terms of the percentage decrease in _____.
    a) Oxygen supply demand   b) Carbon oxygen demand
    c) Biochemical oxygen demand   d) Biological demand

3) _____ is a colourless and odourless pollutant and reduces O_2 carrying capacity of hemoglobin.
    a) SO_2 b) CO
    c) H_2S d) CO_2

4) _____ is used as strong oxidising agent in COD determination test.
    a) $Feso_4$ b) $KMnO_4$
    c) $K_2Cr_2O_7$ d) Ferroin

5) _____ elements acts as key elements in eutrophication process.
    a) N and S   b) N and K
    c) P and S   d) N and P

6) Xanthan gum produced by *Xanthomonas* is used in recovery of _____.
    a) oil   b) metal
    c) sewage treatment sediments   d) marine sediments

7) Zoogloeal film formation is the characteristic of _____.
    a) septic tank   b) oxidation ponds
    c) trickling filter   d) aerated lagoons

8) Ageing and extinction of lakes is due to _____.
    a) Radioactive pollution   b) Eutrophication
    c) Air pollution   d) Metal pollution

9) _____ play important role in leaching of uranium.
    a) *E.coli*   b) *Bacillus megaterium*
    c) *Xanthomonas*   d) *Thiobacillus ferrooxidans*

10) *Sulfolobus acidocaldarius* is an example of extreme _____.
    a) acidophile   b) alkalifile
    c) halophile   d) thermophile

11) Oil and grease are common in _____ waste
    a) textile   b) dairy
    c) sugar industry   d) paper industry

12) The Taj Mahal is threatened due to the effect of _____.
   a) SO_2
   b) Hydrogen
   c) Ozone
   d) Chlorine

13) Marine bacteria grow best at _____ % of salt concentration.
   a) 2.5 to 4
   b) 1 to 2
   c) 0.5 to 1
   d) Less than 0.5

14) Study of animals in germ free environment is known as _____.
   a) Geomicrobiology
   b) Geology
   c) Gnotobiology
   d) Biology

Q.2 A) Answer the following questions. (Any Four) 08
   1) Define extremophiles.
   2) What is bioremediation?
   3) Give composition of sewage.
   4) Define bioaerosols.
   5) Define C.O.D.

B) Answer the following questions. (Any Two) 06
   1) Explain B.O.D test.
   2) Give sources of entrophication.
   3) Significance of sewage treatment.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Effects of air pollution
   2) Acidophiles and alkaliphiles.
   3) Describe activated sludge process.

B) Answer the following questions. (Any One) 06
   1) Discuss characteristics & treatment of dairy waste.
   2) Consequences of Entrophication.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Give an account of sources of air pollution.
   2) Ozone layer depletion.
   3) Applications of germ free environment.

B) Answer the following questions. (Any One) 04
   1) Treatment of distillery waste
   2) Anderson sampler

Q.5 Answer the following questions. (Any Two) 14
   a) What is bioleaching? Explain copper leaching.
   b) MEOR
   c) Give an account of characteristics of marine bacteria.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper - I)
FUNDAMENTALS OF MICROBIOLOGY

Day & Date: Monday, 11-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.

Q.1 **Select the correct alternatives from the following and rewrite the sentence.**   **08**
1) Anaerobic life was discovered by _____.
    a) Alexander Fleming   b) Louis Pasteur
    c) Joseph lister   d) Robert Koch

2) The protein component of bacterial locomotory organelle is _____
    a) Albumin   b) Pilin
    c) Flagellin   d) Globulin

3) The basic taxanomic group in microbial taxanomy is _____.
    a) Kingdom   b) Order
    c) Species   d) Family

4) Arrangement of flagella all over the suface of cell is called as _____.
    a) Monotrichous   b) Amphitrichous
    c) Lophotrichous   d) Peritrichous

5) The cocci which divide in one plane and remain attached to each other to form a chain are _____.
    a) Staphylococcus   b) Diplococci
    c) Streptococei   d) Sarcina

6) _____ is present in the cell wall of Gram positive as well as Gram negative bacteria.
    a) Teichoic acid   b) Peptidoglycan
    c) Lipopolysaccharides   d) Phospholipid

7) _____ is the vitally important organelle of bacterial cell.
    a) Cell wall   b) Cell membrane
    c) Flagella   d) Capsule

8) Special character of Gram negative bacterial cell wall is presence of _____
    a) Teichoic acid   b) Mycolic acid
    c) Lipolysaccharide   d) Cellulose

Q.2 **Answer the following questions. (Any Four)**   **08**
   1) Give two examples of Gram positive bacteria.
   2) Give two examples of rod shaped bacteria.
   3) What is opacity of the colony?
   4) Explain different arrangements of cocei shaped bacteria.
   5) What is peptidoglycan?
   6) Give any two functions of capsule.

Q.3   **Answer the following questions. (Any Two)**   **08**
   1)   Give contributions of Joseph Lister.
   2)   Describe in brief cultivation techniques of Actinomycetes.
   3)   Structure of cell wall of Gram positive bacteria.

Q.4   **Answer the following questions. (Any Two)**   **08**
   1)   Enlist colony characters studied for identification of bacteria.
   2)   Give brief account on general characteristics of Actinomycetes.
   3)   Give eight important characters of prokaryotic cell.

Q.5   **Answer the following questions. (Any One)**   **08**
   1)   Describe in detail contributions of Louis Pasteur.
   2)   What are acellular organisms? Explain in brief general characteristics of viruses.

Seat No.

Set **P**

B.Sc. (Semester - VI) (New)(CBCS) Examination Oct/Nov-2019
Electronics (Special Paper - XV)
ELECTRONICS INSTRUMENTATION

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) Answer five questions.
               2) All questions are compulsory.
               3) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The 4-20 mA current transmission is an example of _____ technique.
   a) ratiometric conversion   b) offset compensation
   c) logarithmic conversion   d) grounding

2) In case of multichannel DAS, the _____ device is playing important role.
   a) multiplexer   b) signal conditioner
   c) input   d) output

3) The AD494/595 is precalibrated precision amplifier to produce output voltage _____ from thermocouple signal.
   a) $1 \text{ m V}/^0\text{C}$ b) $10 \text{ micro V}/^0\text{C}$
   c) $10 \text{ m V}/^0\text{C}$ d) $1 \text{ micro V}/^0\text{C}$

4) In _____ system the output change is related to the ratio of the input change.
   a) ratiometric conversion   b) offset compensation
   c) logarithmic conversion   d) grounding

5) The _____ techniques are used to eliminate noise or interference in the signal.
   a) grounding   b) electrostatic shielding
   c) electromagnetic shielding   d) all of these

6) The signal conditioning systems are required to perform _____ process in all the measurement devices.
   a) linear   b) non-linear
   c) both a and b   d) all of these

7) In case of DMM, to measure the value of unknown resistance the _____ source is utilized.
   a) constant voltage   b) constant current
   c) variable voltage   d) variable current

8) The _____ method is employed in magnetic tape recording.
   a) direct recording   b) frequency modulation
   c) pulse code modulation   d) all of these

9) The _____ amplifier is utilized to eliminate low-frequency noise from the circuit.
   a) chopper   b) filter
   c) amplifier   d) preamplifier

10) The frequency generator utilizes _____ to produce the frequency.
    a) Integrator   b) differentiator
    c) both a and b   d) amplifier

11) The programmable instrumentation amplifier has _____.
    a) low offset voltage   b) low offset voltage drift
    c) low noise   d) all of these

12) The _____ is essential component of the digital storage oscilloscope.
    a) amplifier   b) oscillator
    c) sample and hold   d) filter

13) The X-Y recorder is _____ type recorder.
    a) magnetic   b) graphic
    c) digital   d) strip chart

14) The standard glass pH electrode is of _____ electrode
    a) ampeometric   b) potentiometric
    c) variable capacitance   d) variable resistance

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) State the features of IC AD594.
    2) What are the advantages of digital multimeter?
    3) State the features of the programmable instrumentation amplifier.
    4) Give the features of the data loggers.
    5) What is the role of preamplifier in signal conditioning?

B) Answer the following questions. (Any Two)   **06**
    1) Draw the pin configuration of IC AD594.
    2) Explain in brief computer based DAS.
    3) Draw the diagram of recording head and reproduce head of the magnetic recorder.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Explain the 4-20 mA current transmission.
    2) Write a note on LCR-Q meter.
    3) Describe the pH meter.

B) Answer the following questions. (Any One)   **06**
    1) Write a note on function generator.
    2) Explain the bridge amplifier for signal conditioning.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Explain the block schematic of the IC AD620.
    2) What are the types of conversion technique? Explain logarithmic conversion technique.
    3) Explain digital data recorder.

B) Answer the following questions. (Any One)   **04**
    1) Explain the chopper amplifier for signal conditioning.
    2) Explain the working of data logger with its block diagram.

Q.5 Answer the following questions. (Any Two)   **14**
    a) Describe general DAS with block diagram. And explain the multichannel DAS.
    b) What are the advantages of Digital Storage Oscilloscope over CRO? And explain in detail CRO with neat labelled diagram.
    c) What is recorder? Explain the X-Y recorder with neat labelled diagram.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper – XV)
DATA COMMUNICATION AND NETWORKING – II

Day & Date: Thursday, 10-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) Which layers of the OSI model are host-to-host layers?
   a) Transport, Session, Presentation, Application
   b) Network, Transport, Session, Presentation
   c) Datalink, Network, Transport, Session
   d) Physical, Datalink, Network, Transport

2) Bridge works in which layer of the OSI model?
   a) Application layer   b) Transport layer
   c) Network layer   d) Datalink layer

3) Which of the following IP address class is Multicast?
   a) Class A   b) Class B
   c) Class C   d) Class D

4) Which of following provides reliable communication?
   a) TCP   b) IP
   c) UDP   d) All of the above

5) OSI stands for _____.
   a) Open System Interconnection   b) Operating System Interface
   c) Optical Service Implementation d) none of the mentioned

6) A single channel is shared by multiple signals by _____.
   a) analog modulation   b) digital modulation
   c) multiplexing   d) none of the mentioned

7) Data flow between two devices can occur in a _____ way.
   a) simplex   b) half-duplex
   c) full-duplex   d) all of the above

8) What does protocol defines?
   a) Protocol defines what data is communicated
   b) Protocol defines how data is communicated
   c) Protocol defines when data is communicated
   d) All of above

9) Repeater operates in which layer of the OSI model?
   a) Physical layer   b) Data link layer
   c) Network layer   d) Transport layer

10) The _____ address uniquely defines a host on the Internet.
   a) IP   b) port
   c) specific   d) physical

11) As frequency increases, the period _____.
   a) increases   b) decreases
   c) doubles   d) remains the same

12) Mode in which each station can send and receive data but not at same time is called _____.
   a) Half Duplex   b) Simplex
   c) Full Duplex   d) Duplex

13) Agreement between communicating devices are called _____.
   a) Data   b) Message
   c) Protocol   d) Transmission Medium

14) Which one of the following is the multiple access protocol for channel access control?
   a) CSMA/CD   b) CSMA/CA
   c) Both (a) and (b)   d) None of the mentioned

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What is framing?
2) What is multiplexing? Mention its types.
3) Define Standards.
4) Explain types of error.
5) Define the terms frequency and bandwidth.

B) Write Notes on (Any Two)   **06**
1) Data Flow
2) POP
3) Hubs

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Explain Stop and Wait protocol.
2) Explain Coaxial Cable.
3) Explain ARP, RARP.

B) Answer the following questions. (Any One)   **06**
1) Explain Cyclic Redundancy Check.
2) Explain TCP/IP reference model in detail.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain Data Compression.
2) Explain CSMA/CA in detail.
3) Explain Congestion Control in Virtual-Circuit Subnets.

B) Answer the following questions. (Any One)   **04**
1) Explain Connection oriented and connection less services.
2) Explain Flow & Error Control.

Q.5 Answer the following questions. (Any Two)   **14**
  a) Differentiate between TCP & UDP.
  b) Explain ISO-OSI Reference model.
  c) Explain Transmission Mode.

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Physics (Special Paper - XVI)
ELECTRONICS

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Neat diagrams must be drawn wherever necessary.
               4) Use of calculator or log table is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) The ideal op-amp has _____ band width.
   a) Infinite   b) Finite
   c) Zero   d) One

2) Virtual ground is a point of an op-amp circuit which draws _____ current.
   a) no   b) Infinite
   c) high   d) Low

3) The frequency of a symmetrical rectangular wave form of an astable multivibrator using 555 timer IC is given by _____.
   a) $\frac{0.72}{CR_A}$ b) $\frac{1.44}{CR_A}$
   c) $\frac{1.44}{C(R_A+R_B)}$ d) $\frac{1.44}{C(R_A+2R_B)}$

4) Output of timer is _____ of supply voltage.
   a) dependent   b) Corresponds
   c) constant   d) Independent

5) An SCR is turned off when _____.
   a) anode current is reduce to zero
   b) gate voltage is reduced to zero
   c) gate is reverse biased
   d) none of these

6) An SCR is sometimes called _____.
   a) Triac   b) Diac
   c) UJT   d) Thyristor

7) A triac is equivalent of two SCRs _____.
   a) in parallel   b) in series
   c) in inverse parallel   d) none of these

8) The device that does not have the gate terminal is _____.
   a) Triac   b) Diac
   c) SCR   d) FET

9) The liquid used in LCDs are _____.
   a) Nematic   b) Tantalum
   c) Oil   d) Electrolytic

10) _____ is active display.
   a) LED
   b) LCD
   c) EPID
   d) Light controller

11) The input impedance of a MOSFET is of the order of _____.
   a) Ω
   b) kΩ
   c) a few hundred Ω
   d) Several M Ω

12) An n-channel D-MOSFET with a positive VGS is operating in _____.
   a) The depletion mode
   b) the enhancement mode
   c) cut off
   d) Saturation

13) A MOSFET can be operated with _____.
   a) negative gate voltage only
   b) positive gate voltage only
   c) positive as well as negative gate voltage only
   d) none of these

14) A Triac is a _____ switch.
   a) bidirectional
   b) Unidirectional
   c) mechanical
   d) none of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) State different characteristics of ideal Op-Amp.
   2) An op-amp is used in inverting mode with $R_1 = 2k\Omega$ and $R_2 = 20\ k\Omega$, calculate gain of inverting amplifier.
   3) Define duty cycle in astable multivibrator.
   4) What was the need to develop MOSFET?
   5) Give the important features of liquid crystal displays.

B) Answer the following questions. (Any Two)   **06**
   1) Draw the pin connection diagram of IC 555 timer.
   2) Give comparison between JFETs and D-MOSFETs.
   3) With neat diagram, explain OP-AMP as a differentiator.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Draw the structure of LED display and explain its operation.
   2) Calculate the frequency and duty cycle of output waveform generated by astable multivibrator, when charging capacitance of 0.1 μF and $Ra = 7.2\ K\Omega\ and\ Rb = 3.6\ K\Omega$.
   3) Explain circuit operation of E-MOSFET.

B) Answer the following questions. (Any One)   **06**
   1) Discuss application of an SCR for speed control of d.c. motor.
   2) Explain the construction, working and characteristics of Diac.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain the construction and working of Triac.
   2) Explain circuit operation of D-MOSFET.
   3) Explain with a diagram the operation of a seven segment display using gaseous discharge.

B) Answer the following questions. (Any One)   **04**
   1) Explain Turn- ON method of SCR.
   2) An OP-AMP is used in non-inverting mode $R_1 = 1\ k\Omega, R_2 = 12\ k\Omega$, Calculate the output voltage for the inputs of (a) Vi = 150mV and (b) Vi = 2V .

Q.5 **Answer the following questions. (Any Two)** **14**
- **a)** Explain astable operation of IC 555 timer.
- **b)** Derive an expression for voltage gain of a closed loop non-inverting amplifier using OP-AMP.
- **c)** Explain construction, working and characteristics of SCR.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Physics (Special Paper – XVI)
INSTRUMENTATION

Day & Date: Friday, 11-10-2019　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Neat diagrams must be drawn wherever necessary.
　　　　　　　4) Use of calculator or log table is allowed.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) Function of transducer is to convert _____.
   a) Electrical signal into nonelectrical quantity
   b) Non electrical quantity into electrical signal.
   c) Electrical signal into mechanical quantity.
   d) All of the above.

2) _____ is not an example of transducer.
   a) Analog voltmeter　　　　　　b) Thermocouple
   c) Thermistor　　　　　　　　　d) Photoelectric cell

3) _____ sense only rotational speed.
   a) Multimeter　　　　　　　　　b) Voltmeter
   c) Tachometer　　　　　　　　　d) Diffractometer

4) Electrons of SEM are reflected through _____.
   a) Glass funnel　　　　　　　　b) Metal coated surface
   c) Specimen　　　　　　　　　　d) Vacuum chamber

5) _____ is used in electron microscope.
   a) Electron beams
   b) Light waves
   c) Electron beams and magnetic fields
   d) Magnetic field

6) The reflection of visible light takes place from atoms of _____ layers.
   a) Surface　　　　　　　　　　b) Few
   c) Deep　　　　　　　　　　　　d) All

7) _____ have longer wavelength than X-ray.
   a) Gamma ray　　　　　　　　　b) Visible light
   c) Microwaves　　　　　　　　　d) Beta rays

8) _____ radiations are used for X-ray florescence to determine chemical composition.
   a) $k\alpha$　　　　　　　　　　b) $k\beta$
   c) $L\alpha$　　　　　　　　　　d) $L\beta$

9) _____ is the wavelength for UV spectrum of light.
   a) 10 nm to 400 nm　　　　　　b) 0.01 nm to 10nm
   c) 700 nm to 1 nm　　　　　　　d) 400 nm to 700 nm

10) Raman effect supports _____.
    a) Quantum theory
    b) Corpuscular theory
    c) Wave theory
    d) Electromagnetic theory

11) X-rays are _____.
    a) Electromagnetic radiations
    b) Magnetic radiations
    c) Electric radiations
    d) Chemical radiations

12) The intensity of the X-ray depends on _____ of materials.
    a) Atomic weight
    b) Atomic number
    c) Volume of electrons
    d) None of these

13) In Mossbauer spectroscopy, a solid sample is exposed to a beam of _____ radiations.
    a) Gamma
    b) Beta
    c) Visible
    d) UV

14) The term 'recoil energy' is used in _____ effect.
    a) Raman
    b) Compton
    c) Mossbauer
    d) Photoelectric

Q.2 A) Answer the following questions. (Any Four) 08
    1) Define active and passive transducer with an example.
    2) What are backscattered electrons?
    3) What is Raman effect?
    4) What is Bragg's law?
    5) What is the full form of EEG and MRI?

B) Answer the following questions. (Any Two) 06
    1) Write the advantages and disadvantages of RTD.
    2) Define magnification and resolution of electron microscope.
    3) Mention biomedical instruments.

Q.3 A) Answer the following questions. (Any two) 08
    1) Explain in detail electrical characteristics of sensor-dry reed relay.
    2) List the important features of UV-V is spectrometer.
    3) A beam of X-ray of wavelength 0.071 nm is diffracted by (110) plane of rock salt with lattice constant of 0.25 nm. Find the glancing angle for second order diffraction.

B) Answer the following questions. (Any One) 06
    1) Explain ECG.
    2) List an applications of SEM and TEM.

Q.4 A) Answer the following questions. (Any Two) 10
    1) Discuss applications of Mossbauer spectroscopy.
    2) State and explain different elements used as a sensor in RTD.
    3) Convert following transmission data into absorbance

a	0.085
b	0.255
C	0.036
d	0.567
e	0.328

B) Answer the following questions. (Any One) 04
    1) Write a note on Thermistor.
    2) Distinguish between optical and electron microscopy.

Q.5 **Answer the following questions. (Any two)** **14**
1) Explain construction and working of X-ray diffractometer.
2) Explain construction and working of TEM.
3) Describe in brief servomotor sensor.

Seat No.

Set **P**

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Special Paper – XVI)
ANALYTICAL AND INDUSTRIAL ORGANIC CHEMISTRY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Draw neat diagram and give equations wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Alkaline hydrolysis of _____ is called saponification.
    a) nitriles   b) Carbohydrates
    c) fats and oils   d) Proteins

2) Thermosetting polymers on reheating will not soften due to _____ change.
    a) physical   b) Chemical
    c) electrical   d) Mechanical

3) The growth of yeast and fermentation process is maximum at pH
    _____.
    a) 2.6 to 3.00   b) 3.6 to 4.00
    c) 4.6 to 5.00   d) 5.6 to 6.00

4) The reactions catalysed by enzymes in living organisms are called _____
    reactions.
    a) Polymerisation   b) Biocatalytic
    c) Friedel crafts   d) Saponification

5) In soap manufacture by not process _____ is added to salt out the soap.
    a) Acid solution   b) Alkali solution
    c) Brine solution   d) Water

6) RF value is a _____.
    a) Addition   b) Subtraction
    c) Ratio   d) Multiplication

7) Clarified juice on concentration gives heavy syrup which will contain _____
    water.
    a) 25-30%   b) 35-40%
    c) 45-50%   d) 9-11%

8) In ascending paper chromatography base line of paper is kept _____.
    a) Below solvent   b) Above solvent
    c) Outside chamber   d) In the solvent

9) Microwave assisted reactions are _____.
    a) Clean   b) Fast
    c) Fuel efficient   d) All of these

10) Ethyl alcohol having small amount of poisonous substances is called as
     _____.
     a) Rectified spirit   b) Absolute alcohol
     c) Power alcohol   d) Denatured spirit

11) Sodium borohydride is soluble in _____.
    a) Phenol   b) Acetone
    c) Methanol   d) Chloroform

12) In paper chromatography, paper acts as a _____ phase.
    a) Mobile liquid   b) Mobile solid
    c) Stationary liquid   d) Stationary solid

13) Bio- catalysts are _____ in action.
    a) Highly specific   b) Non-specific
    c) Stereo specific   d) Both a and c

14) Osmium tetroxide often used for _____ of alkenes.
    a) Anti hydroxylation   b) Syn hydroxylation
    c) Anti hydration   d) Syn hydration.

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Define isotactic and syndiotactic.
2) Write two principle of green chemistry.
3) How 1,3-dithiane is prepared?
4) Define with formulae RF value.
5) Write one synthetic application of sodium borohydride.

B) Write short notes (Any Two)   **06**
1) Draw labeled diagram of gas chromatography.
2) How hydroxylation of alkene occur using osmium tetroxide?
3) How allylic oxidation happens using selenium dioxide?

Q.3 A) Answer the following questions. (AnyTwo)   **08**
1) Write preparation of Teepol and Deriphat.
2) Explain 1,2- polymerisation and 1,4-polymerisation processes in diene polymerisation.
3) Explain byproducts of alcohol industry.

B) Answer the following questions. (Any One)   **06**
1) Explain preparation and uses of phenol- formaldehyde resin.
2) With diagram explain multiple effect evaporation process.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain hot process of manufacturing of soaps.
2) What is principle of chromatography? What are advantages, disadvantages and applications of paper chromatography?
3) Explain classification of polymers based on general physical properties.

B) Answer the following questions. (Any One)   **04**
1) Write note on ionic liquids.
2) How esters reduced with Lithium Aluminum Hydride.

Q.5 Answer the following questions. (Any Two)   **14**
  a) Explain in detail refining of raw sugar.
  b) Explain types of detergents.
  c) Explain column chromatography in detail. Write applications of column chromatography.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Botany (Special Paper – XVI)
BIOSTATISTICS

Day & Date: Friday, 11-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) All questions carry equal marks.
3) Figures to the right indicate full marks.
4) Scientific calculators are allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) Interpretation of _____ problem is called as biostatistics.
   a) biological   b) Mathematical
   c) geological   d) Algological

2) Formulating and testing of hypothesis is an important function of _____.
   a) mathematics   b) Statistics
   c) both a and b   d) all of these

3) *Me* or Mdn sign is used for _____.
   a) Arithmetic mean   b) Median
   c) Mode   d) Deviation

4) Primary data are collected by method of _____.
   a) Direct personal investigation
   b) Indirect oral investigation
   c) Investigation through questionnaire
   d) all the above

5) Classification is the process of dividing things into _____ classes.
   a) Different   b) Similar
   c) Individual   d) Single

6) To collect the data according to quality is called as _____ classification.
   a) Quantitative   b) Qualitative
   c) Both a and b   d) None of these

7) Standard deviation was first worked out by _____.
   a) Karl Pearson   b) Milton Friedman
   c) Harvey Goldstein   d) Herman Hollerith

8) Tabulation is divided into _____ type.
   a) One   b) Two
   c) Three   d) Four

9) Sampling process can be grouped under the _____ categories.
   a) Two   b) Five
   c) Six   d) Four

10) The process of judgement sampling belongs to _____ sampling.
    a) Random   b) non-random
    c) both a and b   d) all of these

11) _____ is better utilized more often in biological studies.
   a) Mean   b) Median
   c) Mode   d) Range

12) _____ is the number obtained by dividing the total value of different items by their number.
   a) Mode   b) Median
   c) Arithmetic mean   d) all of these

13) In a throw of coin what is the probability of getting tail?
   a) 1   b) 2
   c) ½   d) 0

14) T-test was worked out by _____.
   a) W. S. Gosset   b) Milton Friedman
   c) Harvey Goldstein   d) Herman Hollerith

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What is biostatistics?
2) Define primary data.
3) What is hypothesis?
4) Define probability.
5) What is statistical inference?

B) Write short notes on. (Any Two)   **06**
1) Sources of secondary data
2) Merits of arithmetic mean
3) Uses of statistics

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Calculate the median by using the proper formula.
     6   4   16   7   8   2
2) Explain the merits and demerits of primary data.
3) Describe the co-efficient of variance.

B) Answer the following questions. (Any One)   **06**
1) Describe the basic principles of biostatistics.
2) Find out the mode from following data and give merits and demerits of mode.
     60   62   76   70   74   84   82   72   84   78   84   86

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Write on the statistical methods of biostatistics.
2) Explain the sampling methods.
3) Describe the kinds of probabilities.

B) Answer the following questions. (Any One)   **04**
1) Write short note on t-test.
2) Write on basic concepts of probability.

Q.5 Answer the following questions. (Any Two)   **14**
1) Discuss the methods of primary data collection.
2) Mention merits and demerits secondary data collections.
3) Explain the function and limitation of biostatistics.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper – XVI)
ENDOCRINOLOGY, ENVIRONMENT BIOLOGY AND TOXICOLOGY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**
1) Parathyroid hormone acts to ensure that _____.
   a) Calcium levels in the blood never drop too low
   b) sodium levels in urine are constant
   c) potassium levels in the blood don't escalate
   d) the concentration of water in the blood is sufficient

2) Hyposecretion of thyroxin in adults causes _____.
   a) Diabetes insipid   b) Exopthalmia
   c) Myxoedema   d) Diabetes millitis

3) Hormones produced by adrenal cortex _____.
   a) Adrenaline, noradrenaline
   b) Minaralocorticoids , glucocorticoids
   c) Nor epinephrine, Calcitonine
   d) Epinephrine, Angiotensinogen

4) _____ disease is caused by deficiency of parathormone.
   a) Cretinism   b) Titany
   c) Hypercalcimia   d) Myxoedema

5) _____ hormone produce by Alfa cells of Islets of Langerhans.
   a) Insulin   b) Glucagon
   c) Somatostatin   d) Secretin

6) Conn's disease is caused by hyper secretion of _____ glands.
   a) Adrenal   b) Parathyroid
   c) Thyroid   d) Pituitary

7) _____ regulate metabolism, body heat production, blood pressure, and normal development of skeletal and nervous system.
   a) Insulin   b) Thyroxin
   c) MSH   d) Prolactin

8) Hyperglycemia or high blood sugar is due to imbalance in _____.
   a) Prolactin   b) Thyroxin
   c) LH   d) Insulin

9) The pineal gland is a tiny endocrine gland found in the brain produces and secretes the hormone _____ which helps to regulate biological rhythms such as sleep and wake cycles.
   a) Dopamine   b) Melatonin
   c) L TH   d) Glucagon

10) _____ is the neurotransmitter used at the neuromuscular junction and it is the chemical that motor neurons of the nervous system release in order to activate muscles.
   a) Prostaglandin   b) Thiamine
   c) Acetylcholine   d) Gamabutarine

11) The _____ zone is the well-lit, open surface waters in a lake away from the shore.
   a) Limnetic   b) littoral
   c) Profundal   d) Hyporadiation

12) _____ ecosystems are flowing waters that drain the landscape, and include the biotic as well as abiotic.
   a) Lotic   b) Lentic
   c) Lake   d) Pond

13) Plankton, nekton and benthos are not the components of one of the ecosystems which is _____.
   a) Oceans   b) Fresh water rivers
   c) Grassland   d) Pond

14) _____ toxicity is the development of adverse effects as the result of long term exposure to a toxicant or other stressor.
   a) Chronic   b) Sub vital
   c) Acute   d) Sub acute

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define lentic ecosystem.
   2) TRH.
   3) Define Hormone.
   4) Animal ethics.
   5) Beta cells of pancreas.

B) Answer the following questions. (Any Two)   **06**
   1) Hormones secreted by Parathyroid.
   2) Faunal adaptation in sandy shore ecosystem.
   3) Bio-magnification.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Thyroid gland disorders.
   2) Role of melatonin in biological rhythms.
   3) Characteristics of desert ecosystem.

B) Answer the following question. (Any One)   **06**
   1) Solid waste management.
   2) Action of the pesticides.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Disorders of Adrenal gland.
   2) Faunal adaptation rocky sea shore.
   3) Applications toxicology.

B) Answer the following question. (Any One)   **04**
   1) Bioaccumulation.
   2) Histological structure Pancreas.

Q.5 Answer the following questions. (Any Two)   **14**
   1) Hormones of adrenal gland.
   2) Faunal adaptations of Lotic ecosystem.
   3) Rain water harvesting.

Seat No.	

B.Sc.(Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Zoology (Special Paper – XVI)
TECHNIQUES IN BIOLOGY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Neat diagrams must be drawn wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) A spectrophotometer is an instrument that measures the _____.
   a) pH   b) Density of water
   c) Intensity of light   d) Temperature

2) The basicity of given sample is measured from the device _____.
   a) Calorimeter   b) pH meter
   c) Balance   d) Spectrometer

3) _____ technique used for the separation of mixture from tissue extract.
   a) Chromatography   b) Angiography
   c) Mixography   d) Electrophoresis

4) In western blotting _____.
   a) Agarose gel is commonly used
   b) Ployacrylamides is commonly used
   c) Both A and B
   d) High resolution gel

5) The process of DNA finger printing was invented by _____.
   a) Taffreys   b) Roseland
   c) Crick   d) Hooke

6) DNA finger printing was first invented for the purpose of _____.
   a) Paternity Testing   b) Diagnosis and Treating diseases
   c) Identify victims of war   d) None of the above

7) The preservation of biological material in the frozen state is called as ____.
   a) Fixation   b) Block preparation
   c) Preservation   d) Cryopreservation

8) The Southern blot is used for transferring _____.
   a) RNA   b) DNA
   c) Both a and b   d) Proteins

9) At what speed do you centrifuge blood?
   a) 2200 - 2500 Rpm   b) 3000 - 3200 Rpm
   c) 1000 - 1500 Rpm   d) 40000 Rpm

10) Radioactivity discovered by _____.
   a) Henri Becquerel   b) Jaffrey
   c) Roseland   d) Crick

11) Microtome machine is used for _____.
    a) Staining   b) Section cutting
    c) Fixation   d) Preservation

12) Staining method was first discovered by _____.
    a) Camillo Golgi   b) Robertson
    c) Benda   d) De Duve

13) _____ technology is used in forensic science.
    a) DNA foot printing   b) DNA finger printing
    c) DNA microtomy   d) All above

14) DNA chip is also known as _____.
    a) Biochip   b) DNA microarray
    c) DNA microtomy   d) All above

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) What is spectrophotometer?
    2) Aim of the separation technique.
    3) Principle of electrophoresis.
    4) Define animal cell culture.
    5) Uses of Microtomy.

B) Write notes on (Any Two)   **06**
    1) Applications of calorimeter.
    2) Define Autoradiography? Give an account of it.
    3) DNA probe.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Write in brief about blotting types.
    2) Describe methodology of microtomy upto sectioning.
    3) Give an account of Fulgen technique.

B) Answer the following question. (Any One)   **06**
    1) Describe column chromatography.
    2) Describe microarray technique and its application.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Define separation technique. Describe the thin layer chromatography.
    2) Describe the cryopreservation of gametes and its applications.
    3) Write about the uses of electrophoresis.

B) Answer the following questions. (Any One)   **04**
    1) Describe calorimeter technique.
    2) Describe the steps of PCR technique.

Q.5 Answer the following questions. (Any two)   **14**
    1) What is electrophoresis? Describe types of electrophoresis.
    2) What is microtomy? and Explain the method of microtomy.
    3) What is DNA barcoding? and Discuss their applications.

Seat
No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
PSYCHOLOGY (Paper - II)
DEVELOPMENTAL PSYCHOLOGY
(Adolescence to Adulthood Early)

Day & Date: Wednesday, 20-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
                           2) Figures to the right indicate full marks.

Q.1   Select the correct alternatives from the following and rewrite the sentence.   08

1)   According to Schaie _____ the first stage of cognitive development.
   a)   Achieving stage   b)   Responsible stage
   c)   Exeutive stage   d)   Acquisitive stage

2)   Sternberg's theory of love includes _____ component.
   a)   One   b)   Two
   c)   Three   d)   Four

3)   One reason issues of identity become so important in adolescents _____
capacities.
   a)   Intellectual   b)   Ability
   c)   Interest   d)   Attitude

4)   _____ is cognitive development in adolescence.
   a)   Think Abstractly   b)   Ego centrism
   c)   Drug tolerance   d)   Social interaction

5)   _____ Drugs produce a biological or psychological dependence.
   a)   Addictive   b)   Deductive
   c)   Super power   d)   None of these

6)   In identity formation of adolescents theory _____ stages given by Erikson.
   a)   One   b)   Six
   c)   Eight   d)   Nine

7)   Elkind (1994) adolescent stress has increased the rate in suicide are _____.
   a)   Increased   b)   Decreased
   c)   Neglect   d)   Accepted

8)   _____ is spread mostly thought sexual contact.
   a)   HIV   b)   Chlamydia
   c)   Hepatitis B   d)   All of above

Q.2   Answer the following questions. (Any Four)   08
1)   Write on labeling theory of passionate love?
2)   What is the opinion of Perry about students who entered college?
3)   What distance can the average young adult can hear the ticking of a
watch?
4)   What is obesity?
5)   Write primary and secondary sexuallal characterstic in boy's.
6)   What is the perspective of Schaie's theory?

Q.3 Answer the following questions. (Any Two) 08
1) Senses in early adulthood.
2) Dangers of smoking – Tobacco.
3) Explain the Erikson identity versus identity confusion stage.

Q.4 Answer the following questions. (Any Two) 08
1) Explain the filtering model of marriage in Early Adulthood.
2) How Intellectual growth occur early adulthood?
3) How development imaginary Abolesceuts?

Q.5 Answer the following questions. (Any One) 08
1) Explain the generation gap between parent and adolescent in Adolescence.
2) Discuss about work in early adulthood.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Mathematics (Special Paper – XVI)
PROGRAMMING IN C

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Who is father of C language?
    a) Bjarne Stroustrup   b) James A Gosling
    c) Dennis Ritchie   d) None of these

2) Every programme statement in C ends with _____.
    a) Colon   b) Semi colon
    c) Comma   d) None of these

3) The character '\t' means _____.
    a) new line   b) vertical line
    c) Horizontal tab   d) None of these

4) Integer data type requires _____ bytes of memory.
    a) 01   b) 02
    c) 04   d) None of these

5) Arithmetic expression is evaluated form _____.
    a) right to left   b) left to right
    c) top to bottom   d) None of these

6) C supports as many as _____ relational operators.
    a) 5   b) 6
    c) 7   d) None of these

7) _____ is standard input function in C-language.
    a) printf()   b) scanf()
    c) getch ()   d) None of these

8) In C, -14% 3 = _____.
    a) 2   b) -2
    c) 4   d) None of these

9) Multiway selection can be accomplished using an else if statement or the _____ statement.
    a) Go to   b) While
    c) Switch   d) None of these

10) _____ is a jump statement.
    a) Go to   b) While
    c) Switch   d) None of these

11) Which is correct for loop statement?
    a) For (increment : test-condition: initialization)
    b) For (initialization : test-condition: increment)
    c) For (initialization: increment : test condition)
    d) None of these

12) _____ is exit controlled loop in C language.
    a) while   b) do-while
    c) for   d) None of these

13) One dimensional array is also called as _____.
    a) vector   b) matrix
    c) both a) and b)   d) None of these

14) By default function return _____.
    a) Character value   b) Float value
    c) Integer value   d) None of these

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Write any two mathematical function used in C.
    2) Write any two reserved keyword.
    3) Write logical operator in C.
    4) What is size of operator?
    5) Write note on reading a character.

B) Answer the following questions. (Any Two)   **06**
    1) Explain switch statement.
    2) Write a programme to accept the radius of circle and calculate the area of circle.
    3) Give syntax of different arrays.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Write in detail history of C.
    2) Write character set in C.
    3) Explain the term formatted out puts.

B) Answer the following questions. (Any One)   **06**
    1) Discuss in detail C-data types.
    2) Explain increment operators and decrement operator.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Describe the term basic structure of C programme.
    2) Write a programme to compute sum of 'n' numbers by using the for loop.
    3) Discuss two dimensional arrays.

B) Answer the following questions. (Any One)   **04**
    1) Explain else _____ if ladder with flow chart.
    2) Write a programme to find even number from 1 to 10 by using do while loop.

Q.5 Answer the following questions. (Any Two)   **14**
    1) Explain arithmetic and Relational operators.
    2) Explain the term simple if and if ___ else statement.
    3) An electric power distribution company charges its domestic consumer's as follow.

Consumption units	Rate of charge
0-200	Rs. 0.50 per unit.
201-400	Rs.100 + Rs 0.65 per unit
401-600	Rs. 230 + Rs 0.80 per unit
601-above	Rs. 390 + Rs 1.00 per unit excess of 600.

    Write a programme to read the consumer number and power consumed and prints the amount to be paid by the consumer.

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper - XVI)
QUALITY MANAGEMENT AND RELIABILITY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
          2) Figures to the right indicate full marks.
          3) Neat diagrams must be drawn wherever necessary.
          4) Graph papers will be supplied if required.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Cusum control charts were originated in _____.
   a) 1950s   b) 1960s
   c) 1920s   d) 1980s

2) Which of these is a reason, why the Cusum charts are better than the Shewhart control charts?
   a) Because they are having information about only one sample.
   b) Because the quantity plotted on the Shewhart control charts is variable.
   c) Because the quantity plotted on the Cusum chart contains information about more than one sample.
   d) Because the quantity plotted on the Cusum control charts is containing information about a single sample.

3) What is the full form of E in the EWMA chart?
   a) Exponentially   b) Experimentally
   c) Exactly   d) Estimated

4) EWMA charts are better than Shewhart control charts in detecting the _____ shift.
   a) Large process   b) Medium process
   c) Small process   d) Every process

5) What DMAIC process does is, to _____?
   a) Manufacture any product
   b) Define specification limits for a product.
   c) Solve root cause of quality and process problems.
   d) Define quality system standards.

6) The purpose of Acceptance sampling is to _____.
   a) Sentence lots   b) Estimate lot quality
   c) Estimate lot defectives   d) Estimate lot conformity

7) What is done in single sampling plan?
   a) Only one unit is checked
   b) Only the first lot is checked 100%
   c) Only n samples of 1 unit are checked
   d) Only one sample of n units is checked.

8) In acceptance sampling, when there is a finite probability that the lot may be accepted even if the quality is not really good, is called _____.
   a) Consumer's risk　　　　　　　b) Producer's risk
   c) Operator's risk　　　　　　　d) Owner's risk

9) Which of these is not a part of magnificent seven of SPC?
   a) Pareto chart　　　　　　　　b) Check Sheet
   c) Scatter Diagram　　　　　　d) 2k factorial design

10) Pareto chart identifies the _____ defects not the _____ defects.
    a) The most important, the most frequent.
    b) The most frequent, the most important.
    c) The smallest defects, the largest defects.
    d) The largest defects, the smallest defects.

11) A set of components whose functioning ensures the functioning of the system is known as _____.
    a) path set　　　　　　　　　　b) cut set
    c) minimal path set　　　　　　d) minimal cut set

12) The structure function of a binary system S takes any one of _____ possible values.
    a) 4　　　　　　　　　　　　　b) 2
    c) 3　　　　　　　　　　　　　d) None of these

13) A binary system S of 2 components has _____ number of possible state vectors.
    a) 1　　　　　　　　　　　　　b) 2
    c) 3　　　　　　　　　　　　　d) 4

14) Exponential distribution is _____.
    a) IFR　　　　　　　　　　　　b) DFR
    c) Both a and b　　　　　　　d) none of these

Q.2 A) Answer the following questions. (Any Four)　　　　　　　**08**
   1) What is the meaning of Quality?
   2) What is Producer's risk?
   3) What is ASN?
   4) Define a series system.
   5) Define a structure function of a system of n components.

B) Answer the following questions (Any Two)　　　　　　　　　**06**
   1) What is the value of upper control limit for the period $i = 1$ for a EWMA chart which has value of $\lambda = 0.10$, $L = 2.7$, $\sigma = 1$ and the value of $\mu o = 10$.
   2) If the value of $\bar{x}_i = 9.29$ and $C_{i-1} = -2.56$, what will be the value of the cumulative sum C_i for this sample, if the value of $\mu_0 = 10$.
   3) In a single sampling plan if sample size $n = 10$, acceptance number $C = 2$, and lot quality $p = 0.08$, find the probability of accepting the lot by using binomial distribution.

Q.3 A) Answer the following questions. (Any Two)　　　　　　　**08**
   1) Find the structure function of a parallel system of n components.
   2) Find the reliability of a parallel system of 2 independent components whose reliabilities are $p_1 = p_2 = 0.25$
   3) Define LTPD.

B) Answer the following questions. (Any One)　　　　　　　　　**06**
   1) What are the advantages of acceptance sampling?
   2) Write a note on DMAIC cycle.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1)   Write a note on a magnificent tool of quality- Control Chart.
    2)   Write a note on a magnificent tool of quality- cause and effect diagram.
    3)   Show that hazard rate of a series system of components having independent life times is summation of component hazard rates.

B) Answer the following questions. (Any One)   **04**
    1)   State the control limits of EWMA control chart for monitoring process mean.
    2)   In reliability theory, when a system is said to be coherent?

Q.5 Answer the following questions. (Any Two)   **14**
    1)   Explain the Tabular CUSUM for monitoring the process mean.
    2)   Write a procedure of single sampling plan.
    3)   Find the failure rate function (hazard rate) for a 2-out-of-3 system, where components are independent and life time T_1 of ith component is exponentially distributed with mean 100 hrs, for $i = 1,2,3$.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper - XVI)
TIME SERIES ANALYSIS

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of scientific calculators and statistical table is allowed.
4) Graph papers are to be supplied on demand.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) Long term fluctuations in time series are called _____ variations.
   a) trend   b) seasonal
   c) cyclical   d) irregular

2) Long term regular movement in time series is called _____.
   a) trend   b) seasonal
   c) cyclic   d) irregular

3) When components in the time series are independent _____ model is suitable.
   a) additive   b) multiplicative
   c) both (a) and (b)   d) neither (a) nor (b)

4) If Y = 600, T = 430, S = 90, C = 40 then under additive model I= _____.
   a) 30   b) 40
   c) 50   d) 60

5) Sum of quarterly seasonal indices in multiplicative model is = _____.
   a) 0   b) 400
   c) 600   d) 12000

6) In time series analysis independent variable is _____.
   a) time   b) Y values
   c) slop   d) intercept

7) Daily maximum temperature at certain place is recorded as time series data of first quarter. In this case trend is _____.
   a) increasing   b) decreasing
   c) constant   d) both (a) and (b)

8) Moving averages in time series are free from _____ variations.
   a) seasonal and cyclical   b) seasonal and irregular
   c) trend and cyclical   d) trend and random

9) If Y = 198 + 144t is an annual trend equation then monthly trend equation will be Y = _____.
   a) 16.5+ t   b) 16.5+ 12t
   c) 16.5+ 3t   d) None of these

10) Moving averages remove cyclic variations if _____.
   a) period is even   b) period is odd
   c) Period is same as that of cycle   d) the average is weighted

11) In time plot _____.
    a) the observations are plotted against time observations
    b) the scatter points are joined with free hand curve
    c) the various components are removed.
    d) all of these

12) Suppose monthly data for 5 years is available and we lag the series by 2 months then _____ pairs will be available for computing auto correlation.
    a) 60   b) 58
    c) 56   d) none of these

13) Single exponential smoothing is appropriate when there is _____.
    a) no upward trend   b) no downward trend
    c) both (a) and (b)   d) neither (a) nor (b)

14) In single exponential smoothing if smoothing constant is 0 then _____.
    a) $F_{t+1} = F_t$ b) F_{t+1} = constant
    c) both (a) and (b)   d) neither (a) nor (b)

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Define residuals in time series.
    2) Define seasonal fluctuation with suitable illustration.
    3) Write the single exponential function for next time point forecast.
    4) State two points of difference between additive model and multiplicative model.
    5) Give two examples of increasing trend.

B) Answer the following questions. (Any Two)   **06**
    1) Let the trend equation of annual sales of certain company be Y = 45 + 4.8x with 2005 as origin. (x unit = 1 year, Y unit = annual sales in lakh.)
       i) Write the monthly trend equation.
       ii) Estimate the trend value of annual sales for 2015.
    2) Given five values 10, 13, 16, 19, 22, obtain three yearly moving averages and de-trend the values.
    3) Distinguish between moving average method and single exponential smoothing.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Write a note on scatter plot.
    2) Define period of moving average and explain when, how and why you obtain centered moving averages.
    3) Explain how smoothing constant is decided in single exponential smoothing.

B) Answer the following questions. (Any One)   **06**
    1) Fit a second degree parabola by method of least squares for the following data.

Year	1992	1993	1994	1995	1996
Sales in thousands	20	22	23	20	18

    2) Discuss utility of time series.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Write merits and demerits of moving average method.
    2) Describe ratio to moving average method for seasonal indices.

3) State the specific components that can be observed in following time series.
   i) Daily record of number of customers in a bank
   ii) Prices of shares of a good company
   iii) Daily record of water level in a dam for non rainy season
   iv) Average monthly rainfall
   v) Reduced production in a factory due to strike

B) Answer the following questions. (Any One)   **04**
   1) Write a note on least square method for exponential function for estimating trend.
   2) Obtain the quarterly seasonal indices by simple average method assuming absence of trend.

Quarter → Year ↓	I	II	III	IV
1995	52	57	54	58
1996	57	48	57	56
1997	62	65	53	48
1998	35	50	54	52

Q.5 Answer the following questions. (Any Two)   **14**
   a) Write a note on de-seasonalization of time series for quarterly data.
   b) Estimate the trend using 10% smoothing constant for the following time series. Also obtain residuals.

t	1	2	3	4	5
Yt	31	37	39	41	43

   c) Write a note on time plot. Plot the following time series showing GDP rate in India from 2012 to 2019 and comment on the plot.

Year	2012	2013	2014	2015	2016	2017	2018	2019
GDP Rate in %	5.46	6.39	7.41	8.16	7.11	6.68	7.3	7.44

| Seat No. | | **Set** | **P** |

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Geology (Special Paper – XVI)
APPLIED GEOLOGY PART - II

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Which one of the following colours in the visible spectrum has maximum frequency?
    a)   Red   b)   green
    c)   violet   d)   yellow

2)   Gamma rays in electromagnetic spectrum has _____.
    a)   Short wavelength and high frequency
    b)   long wavelength and high frequency
    c)   Short wavelength and low frequency
    d)   long wavelength and low frequency

3)   Thermal IR spans the _____ range in the electromagnetic spectrum.
    a) 0.4-$0.7\mu m$ b) 3.0-$100\mu m$
    c) 100-$700\mu m$ d) $100\mu m$-$1m$

4)   Wavelengths of _____ region falling on water surface are completely absorbed.
    a)   Visible   b)   IR
    c)   UV   d)   Radio

5)   Band numbers of LANDSAT is _____.
    a)   NIR - near-infrared   b)   SWIR - short wave infrared
    c)   TIR-Thermal infrared   d)   RGB

6)   In the high oblique aerial photographs, tilt angle of the axis is _____.
    a) 5^{0}-6^{0} b) 20°-30°
    c) 30°-60° d) 60°-90^{0}

7)   The marks present at the centre of boarders of aerial photograph is known as _____ marks.
    a)   Fiducial   b)   alluvial
    c)   triangular   d)   principal

8)   A point on the ground directly in line axis of the aerial photograph is ____.
    a)   Kadir   b)   Nadir
    c)   Natial   d)   None of these

9)   Amphibolites and gabbros show _____ tone in the aerial photograph.
    a)   Black   b)   dark
    c)   intermediate   d)   light

10) Vector data is a type of _____ data.
    a)   Numerical   b)   non-spatial
    c)   Spatial   d)   pictorial

11) Outcrop of shale in vector format can be represented by _____.
   a) Point
   b) line
   c) polygon
   d) all of these

12) Which one of the following data is represented in grid form?
   a) Point
   b) vector
   c) polygon
   d) raster

13) The primary means of obtaining geological knowledge in the field is _____.
   a) Field
   b) field studies
   c) field geology
   d) none of the above

14) The tube bubble in Brunton compass is used to take _____ readings.
   a) Strike
   b) dip
   c) Plunge
   d) axis of fold

Q.2 A) Answer the following questions. (Any Four) 08
   1) What is microwave?
   2) What is Photogrammetry?
   3) Define Geographic information System.
   4) List the common types of projections.
   5) An inclined bed striking N30°W, what would be the probable two true dip directions?

B) Write notes. (Any Two) 06
   1) What is reflectance?
   2) Disadvantages of vector data model.
   3) Explain two types of base maps.

Q.3 A) Answer the following questions. (Any Two) 08
   1) What is radiance?
   2) Data acquisition for GIS.
   3) What are data input methods in GIS?

B) Answer the following questions. (Any One) 06
   1) What are the errors of flying?
   2) Write note on vector data structure.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Explain the construction of simple lens stereoscope.
   2) How faults can be interpreted on aerial photograph?
   3) What is difference between vector and raster data structure? Specify what geological applications are used in each data structure.

B) Answer the following questions. (Any One) 04
   1) Explain types of resolutions.
   2) Describe components of GIS.

Q.5 Answer the following questions. (Any Two) 14
   1) Explain spectral reflectance curve.
   2) What is attribute data in GIS? Write note on attribute data entry.
   3) Describe methods of locating field data on a base map.

Seat No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper – XVI)
CLINICAL MICROBIOLOGY – I

Day & Date: Friday, 11-10-2019　　　　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　Naglers reaction is shown by _____.
　　a)　Clostridium tetani　　　　　　b)　Clostridium perfringens
　　c)　Helicobacter pyelori　　　　　d)　Mycobacterium leprae

2)　Mantoux test is used for _____.
　　a)　Classification of leprosy　　　b)　diagnosis of cholera
　　c)　diagnosis of malaria　　　　　d)　diagnosis of tuberculosis

3)　The following test is used for diagnosis of leprosy _____.
　　a)　Lepromin test　　　　　　　　b)　skin biopsy
　　c)　Mantoux test　　　　　　　　d)　niacin test

4)　Single skin lesion is seen in _____ type of leprosy.
　　a)　LL　　　　　　　　　　　　　b)　TT
　　c)　BL　　　　　　　　　　　　　d)　BT

5)　Selective medium for Vibrio cholera is _____.
　　a)　TCBS　　　　　　　　　　　　b)　Stuart
　　c)　NIH　　　　　　　　　　　　　d)　dettol agar

6)　Oral thrush is caused by _____.
　　a)　Candida albicans　　　　　　b)　Aspergillus niger
　　c)　Treponema pallidum　　　　　d)　herpes simplex virus

7)　Weils disease is caused by _____.
　　a)　Leptospira　　　　　　　　　b)　Treponema
　　c)　Herpes virus　　　　　　　　d)　Helicobacter pylori

8)　*Pseudomonas aeruginosa* produces _____.
　　a)　pyocyanin pigments　　　　　b)　oxidase enzyme
　　c)　pyorubin pigments　　　　　　d)　all of these

9)　_____ causes epidemic typhus fever.
　　a)　*Salmonella typhi*　　　　　　b)　*Salmonella paratyphi A*
　　c)　*Ricketssia prowaeki*　　　　d)　*Ricketssia typhi*

10)　Complete Hepatitis virus particle is known as _____.
　　a)　Australia antigen　　　　　　b)　Dane particle
　　c)　HAV　　　　　　　　　　　　d)　cowdry bodies

11)　Typical lesion caused by Herpes virus is called _____.
　　a)　chancre　　　　　　　　　　b)　fever blister
　　c)　Impetigo　　　　　　　　　　d)　Carbuncle

12)　Penicillin inhibits synthesis of _____.
　　a)　RNA　　　　　　　　　　　　b)　DNA
　　c)　Cell wall　　　　　　　　　　d)　Protein

13) Urea breath test is used for diagnosis of _____ infection.
   a) Cholera
   b) *Helicobacter pylori*
   c) typhus fever
   d) *Mycobacterium tuberculosis*

14) Cerebral malaria is caused by _____.
   a) *Plasmodium malariae*
   b) *Plasmodium vivax*
   c) *Plasmodium falciparum*
   d) *Plasmodium ovale*

Q.2 A) Answer the following questions. (Any Four)   08
   1) How Ebola disease is transmitted?
   2) Draw a neat labeled diagram of structure of HIV.
   3) What is the mode of action of sulfonamide?
   4) Which pigments are formed by *Pseudomonas aeruginosa?*
   5) What is significance of Lepromin test?

B) Write notes on. (Any Two)   06
   1) Toxins produced by *Clostridium perfringens*
   2) Drug resistance
   3) Tuberculin test

Q.3 A) Answer the following questions. (Any Two)   08
   1) Aspergillosis.
   2) Diagnosis of Herpes.
   3) Primary syphilis.

B) Answer the following questions. (Any One)   06
   1) Virulence factors of *Vibrio cholera.*
   2) Infections caused by *Candida albicans.*

Q.4 A) Answer the following questions. (Any Two)   10
   1) Lepromatous leprosy.
   2) Diagnosis of *Helicobacter pylori infection.*
   3) Giardiasis.

B) Answer the following questions. (Any One)   04
   1) Mode of action of trimetoprim and penicillin.
   2) Structure of Rabies virus.

Q.5 Answer the following questions. (Any Two)   14
   1) Leptospirosis.
   2) Swine flu.
   3) Malaria.

| Seat No. | | **Set** | **P** |

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Special Paper – XVI)
CLINICAL MICROBIOLOGY – II

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Draw neat diagram wherever required.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The Oxidase test is positive and used for identification of _____.
    a) *Salmonella*   b) *Pseudomonas*
    c) *Pneumococcus*   d) *Staphylococcus*

2) The interval period between HIV infection and appearance of antibodies in serum is called _____ period.
    a) Intrinsic   b) Incubation
    c) window   d) Interval

3) On Mac Conkey's agar medium *Klebsiella* species forms _____ colonies.
    a) Colourless   b) Greenish
    c) Pink   d) Yellow

4) Causative agent for bacillary Tuberculosis is _____.
    a) *E. coli*   b) *M. lepriae*
    c) *Shigella*   d) *M. tuberculosis*

5) HIV is transmitted through _____.
    a) Food   b) Air
    c) water   d) blood

6) If pathogenicity/virulence of toxin is removed by heat or chemicals it is called _____.
    a) toxoid   b) antitoxin
    c) exotoxin   d) endotoxin

7) Swine flu is a _____ borne disease.
    a) water   b) air
    c) fungal   d) arthropod

8) *Pseudomonas* is an example of _____.
    a) gram positive bacteria   b) gram negative bacteria
    c) actinomyces   d) virus

9) Organism produces swarming growth on culture media is _____.
    a) Escherichia   b) Proteus
    c) Klebsiella   d) Shigella

10) Blood agar medium is _____ medium.
     a) enriched   b) selective
     c) differential   d) both a and c

11) _____ is NOT a viral disease.
     a) Hepatitis A   b) Rabies
     c) Malaria   d) HIV

12) _____ is acid fast bacterium.
   a) *Neisseria gonorrhoeae*
   b) *Staphylococcus aureus*
   c) *Mycobacterium tuberculosis*
   d) *Klebsiella pneumonia*

13) Germ tube test is used for the diagnosis of _____.
   a) Typhoid fever
   b) AIDS
   c) Syphilis
   d) Candidiasis

14) The reduction of virulence of a microorganism is known as _____.
   a) Attenuation
   b) Exaltation
   c) Inactivation
   d) Tyndallization

Q.2 A) Answer the following questions. (Any Four) 08
   1) Define the Vaccine.
   2) What is CDC?
   3) What are Fomites?
   4) What is Epidemiology?
   5) What is Acid fast organism?

B) Write notes on. (Any Two) 06
   1) Vitek-2 system in identification of bacteria
   2) Cultural properties of *Klebsiella pneumoniae*
   3) Isolation of *Streptococcus pyogenes*

Q.3 A) Answer the following questions. (Any Two) 08
   1) Use of microbes in Bioterrorism.
   2) Organisms responsible for Hospital acquired infection.
   3) What is a Pathogenicity islands?

B) Answer the following questions. (Any One) 06
   1) Disposal of sharp devices and culture media.
   2) Emerging and re-emerging of diseases.

Q.4 A) Answer the following questions. (Any Two) 10
   1) What is toxin and toxoid?
   2) Use of RFLP.
   3) Role of WHO in prevention of diseases.

B) Answer the following questions. (Any One) 04
   1) How to control of epidemics of diseases?
   2) What are Molecular epidemiological tools?

Q.5 Answer the following questions. (Any Two) 14
   1) Live attenuated vaccines.
   2) Aspergillosis.
   3) Human immunodeficiency virus.

Seat No.	

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper – XVI)
MODERN COMMUNICATION SYSTEM

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw the figures wherever necessary.
4) Use of log table and calculator is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) A satellite is kept in orbit by balance between two forces _____.
   a) Centripetal force and centrifugal force
   b) Magnetic force and electric force
   c) Electric force and gravitational force
   d) Centripetal force and gravitational force.

2) Total internal reflection takes place if light ray strikes the interface at an angle _____ critical angle.
   a) less than   b) greater than
   c) equal to   d) none of these

3) Fastest LAN topology is _____.
   a) Star   b) BUS
   c) Ring   d) square

4) Cellular phone uses _____ operation.
   a) Simplex   b) Duplex
   c) Full duplex   d) triplex

5) Start and stop bits are used with _____ data.
   a) Synchronous   b) asynchronous
   c) Random   d) all of these

6) Duplexer is a device used to _____.
   a) Feed more than one receiver from single antenna
   b) Connect two transmitter to same antenna
   c) Connect transmitter and receiver to same antenna
   d) All of these

7) Each cell contains _____.
   a) Cell site   b) repeater
   c) Control computer   d) touch tone processor

8) In optical fiber, cladding has refractive Index _____ core.
   a) More than   b) less than
   c) Equal to   d) none

9) The most common radar display is the _____.
   a) LED   b) LCD
   c) CRO   d) PPI

10) Modem converts _____ signal into _____ signal and vice versa.
   a) analog, digital
   b) dc, ac
   c) ac , dc
   d) audio, video

11) In avalanche photo diode _____ intrinsic layer is present.
   a) T
   b) L
   c) i
   d) π

12) _____ is used in receiver as a local oscillator along with cavity resonator.
   a) MOSFET
   b) MSIC
   c) gunn diode
   d) varactor diode

13) The most widely used data communication code is _____.
   a) baudot
   b) Morse
   c) ASCII
   d) five bit code

14) A circular orbit around the equator with 24 hours period is called _____ orbit.
   a) elliptical
   b) geostationary
   c) polar
   d) transfer

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) State the principle of optical fiber communication.
   2) What is communicable satellite?
   3) What is meaning of cell in cellular communication?
   4) Enlist the applications of microwaves.
   5) Enlist any four applications of internet.

B) Write notes on. (Any Two)   **06**
   1) Wave guide
   2) Star topology
   3) Working principle of optical fiber communication

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Explain need of light for optical communication.
   2) Explain use of satellite in surveillance.
   3) Explain applications of radar.

B) Answer the following questions. (Any One)   **06**
   1) Explain Ring and BUS topology.
   2) What is optical fiber? Explain its structure and types.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain the concept cellular system and its operation.
   2) Explain Klystron tube amplifier with neat diagram.
   3) Explain splicing technology used for optical fiber cable.

B) Answer the following questions. (Any One)   **04**
   1) Explain satellite transponder.
   2) Write a note on Wi-Fi.

Q.5 Answer the following questions. (Any Two)   **14**
   1) Explain LAN, WAN and MAN in brief.
   2) Explain transmitter and receiver of cell phone with necessary block diagram.
   3) Explain Avalanche photodiode as a light detector in optical fiber communication.

SLR-DK-239

Seat No.	

Set **P**

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Electronics (Special Paper – XVI)
VIRTUAL INSTRUMENTATION

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagram wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) The first stable graphical environment of LABVIEW made its appearance in _____.
   a) 1986   b) 1990
   c) 1992   d) 1993

2) The programming language used in Virtual Instrumentation Graphical environment is _____.
   a) Visual Basic   b) Visual C
   c) G – Language   d) C – Language

3) In LABVIEW, the user interaction takes place through the front panel while the code resides on _____.
   a) controls   b) Indicators
   c) block diagram   d) all of these

4) The major palette in LABVIEW is _____.
   a) tools   b) Controls
   c) functions   d) all of these

5) The variable that has panel but no diagram associated with it, is called _____ variable.
   a) local   b) Global
   c) integer   d) Float

6) The data can be displayed in a chart as _____.
   a) strip chart   b) scope chart
   c) sweep chart   d) all of these

7) _____ file is almost universally used in LABVIEW environment.
   a) ASCII   b) Binary
   c) measurement   d) none of these

8) The conversion code for hexadecimal integer is _____.
   a) d   b) B
   c) x   d) O

9) The LABVIEW interpretation of the code\r is _____.
   a) linefeed   b) Backspace
   c) carriage return   d) Space

10) The basic input and output file operation is _____.
   a) opening existing or creating a new file
   b) writing to reading from a file
   c) closing the file
   d) all of these

11) Almost all the properties of the cursor in chart can be accessed and modified using _____.
   a) operate tool   b) property node
   c) build array   d) plot legend

12) The function that assembles individual components into a single new cluster and also allows one to replace elements in an existing order is called _____ function.
   a) bundle   b) Unbundle
   c) bundle by name   d) unbundle by name

13) The function used to concatenate multiple arrays or append extra elements to an array is _____ function.
   a) array size   b) array subset
   c) build array   d) initialize array

14) The two timing VIs available in LABVIEW are _____.
   a) delay ms & delay until next ms
   b) loop ms & loop until next ms
   c) stop ms & stop until next ms
   d) wait ms & wait until next ms

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is LABVIEW?
   2) What is meant by Block Diagram in Virtual-VIEW Instrumentation?
   3) Is LABVIEW a compiled programming language? Explain.
   4) Do LABVIEW Vis work with source code control providers? Explain.
   5) What is a State Machine?

B) Write notes on. (Any Two)   **06**
   1) What are functional and behavioral level simulators? Explain.
   2) Explain the difference between local variables and global variables in LABVIEW.
   3) Give different features of LABVIEW.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Discuss the historical perspectives of Virtual Instrumentation.
   2) Write a note on Circuit Maker electronic tool for Virtual Instrumentation.
   3) How to create Sub VIs in LABVIEW? Explain.

B) Answer the following questions. (Any One)   **06**
   1) Explain the creation of Cluster Controls and Indicators in LABVIEW.
   2) Discuss the FOR and WHILE loops in LABVIEW, with suitable examples.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Discuss the Sequence and Case structures in LAB VIEW.
   2) Explain the Block Diagram and Architecture of Virtual Instrumentation.
   3) Discuss the basic features of VI tools.

B) Answer the following questions. (Any One)   **04**
   1) Explain the basic concept of Virtual Instrumentation.
   2) Write a note on Graphical Programming Language.

Q.5 Answer the following questions. (Any two)   **14**

    1) Design a VI based Data Acquisition System for the measurement of physical parameters using LABVIEW IDE.

    2) Discuss the comparative approach of LABVIEW and Proteus IDE for VI system.

    3) Explain the operation of Array Controls and Indicators using LABVIEW IDE.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Geology (Paper – II)
STRUCTURAL GEOLOGY

Day & Date: Wednesday, 20-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.

Q.1 Select the correct alternatives from the following and rewrite the sentence.   **08**

1) Structural geology forms an important part of the more comprehensive subject of _____.
   a) Geochemistry   b) Geotectonic
   c) Geophysics   d) Paleontology

2) Topographic maps represent the earth's surface with _____ lines.
   a) Strike   b) Dip
   c) Contour   d) Seismic

3) How is the plunge of a fold measured?
   a) Direction   b) Degree
   c) Depth   d) Both direction and degree

4) Attitude of the outcrop can be measured by _____ instrument.
   a) Brunton compass   b) Water level recorder
   c) Contact goniometer   d) Seismograph

5) A _____ line is a line of constant elevation.
   a) Contour   b) Dip
   c) Strike   d) Seismic

6) Outlines of the outcrops drawn on toposheet is known as _____ map.
   a) Geological   b) Topography
   c) Contour   d) Cadastral

7) Folds develop in which type of rock _____.
   a) Igneous rocks   b) Sedimentary rocks
   c) Metamorphic rocks   d) Any type of rock

8) The horizontal component of the displacement of a fault is called as _____.
   a) Throw   b) Hade
   c) Heave   d) Net slip

Q.2 Answer the following questions. (Any Four)   **08**
   1) How to determine asymmetrical hill in the map?
   2) What is plunge of fold?
   3) What is Net slip in fault?
   4) Define strike.
   5) Define contour.
   6) What is true dip and apparent dip?

Q.3 Answer the following questions. (Any Two)   **08**
   1) Explain normal and reverse fault.
   2) Explain strike slip and reverse fault.
   3) Describe different terminology related to bed as bedding plane and outcrop.

Q.4   **Answer the following questions. (Any Two)**   **08**
   1)   Explain overturned and recumbent fold.
   2)   Explain columnar joints.
   3)   Describe use of contours in identification of hills and Basin in topographic sheets.

Q.5   **Answer the following questions. (Any One)**   **08**
   1)   Describe Geometric classification of Joints.
   2)   What are Topographic and Geological maps? Describe their uses in Geology.

Seat
No.

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper – XVI)
ANGULAR JS

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1)   _____ directive is used to deactivate an Element in Angular JS.
    a)   ng-hide   b)   ng-show
    c)   ng-disable   d)   ng-deactivate

2)   _____ is correct way to apply multiple filters in AngularJs.
    a)   {{expression | filter1 | filter2 | ... }}
    b)   { {expression | {filter1} | {filter2} | ... } }
    c)   {{expression - {filter1} - {filter2} - … }}
    d)   {{ {filter1} | {filter2} | ...- expression}}

3)   Custom directives can be written for _____.
    a)   Element   b)   Class
    c)   Comment   d)   All of these

4)   _____ is the correct syntax of creating AngularJS Controller.
    a)   var app = angular.module('myApp', []);
        myapp.controller('myCtrl', function(app, $scope) {...});
    b)   var app = angular.module('myApp', []);
        app.controller('myCtrl', function($scope) {...});
    c)   var app = module('myApp', []);
        app.controller('myCtrl', function($scope) {...});
    d)   var app = angular.module('myApp', []);
        app.controller(function($scope) {...});

5)   _____ directive allows us to use a form in Angular Js.
    a)   ng-form   b)   ng-bind
    c)   ng-model   d)   ng-include

6) $dirty flag states that value has been changed.
    a)   True   b)   False

7)   _____ directive clones HTML elements once for each item in a collection such as an array.
    a)   ng-array   b)   ng-for
    c)   ng-repeat   d)   ng-loop

8)   Angular JS is ideal for _____ type of applications.
    a)   AJAX   b)   Multi Page Applications
    c)   Single Page Application   d)   Object oriented Application

9)   _____ of the following statement is true about ng-app directive.
    a)   ng-app directive defines and links an Angular JS application to HTML.
    b)   ng-app directive doesn't required for angular js application.
    c)   ng-app directive is applied multiple times in HTML page.
    d)   All of the above

10) _____ of the following directive is used in angular animation.
    a) ng-view   b) ng-include
    c) ng-change   d) ng-focus

11) Angular JS applications are built around a design pattern called _____.
    a) AJAX   b) OOP
    c) MVC   d) Procedural

12) The $route service is defined within a module called as _____
    a) ngService   b) ngAngular
    c) ngResource   d) ngRoute

13) _____ method will be notified when the value referred to by the expression changes.
    a) $apply   b) $watch
    c) $change   d) $changeexpression

14) _____ filter is used to returns an array to the specified size.
    a) Orderby   b) Json
    c) Limitto   d) filter

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) What is number filter? Explain with example.
    2) Explain ng-include directive.
    3) What is MVVC?
    4) Explain use of $scope variable.
    5) What is chaining of filters?

B) Answer the following questions. (Any Two)   **06**
    1) Explain Directive lifecycle in detail.
    2) Write angular is script for increment and decrement counter.
    3) What is module? Explain how to create and use module with example.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) What is Dependency injection? Explain in detail.
    2) Explain $watch with example.
    3) What is controller? Explain how to configure controller in external file. Explain with example.

B) Answer the following questions. (Any One)   **06**
    1) What is directive? Explain how to create custom directive with example.
    2) What is ngRoute module? Explain routing configuration with example.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) What is expression? Explain object and array expression with example.
    2) Explain ng-if, ng-hide and ng-show directive with example.
    3) Design anglarjs form with any two animations.

B) Answer the following questions. (Any One)   **04**
    1) What is need of Angular js? Explain in detail.
    2) Design angular js application which display 10 student information in table form. Give different colour for even and odd row.

Q.5 Answer the following questions. (Any Two)   **14**
    1) What is validation? Explain any four validations used in angular js with example.
    2) Explain angular JS architecture in detail.
    3) What is single page application? Explain how to create single page application with example.

Seat No.

B.Sc.(Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Computer Science (Special Paper – XVI)
LINUX OPERATING SYSTEM

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Which command is used to print a file?
   a) Print   b) Ptr
   c) Lpr   d) None

2) Environment variables can be accessed by _____.
   a) System programs   b) C programs
   c) Shell scripts   d) None

3) _____ command is used to list all processes whether active or inactive.
   a) Ps   b) Cat
   c) fg   d) rn

4) Multiple pattern for search can be given in _____.
   a) grep   b) egrep
   c) both a and b   d) none of these

5) Which command changes a file's group owner?
   a) cgrp   b) chgrp
   c) change   d) group

6) How do you rename file "new" to file "old"?
   a) mv new old   b) move new old
   c) cp new old   d) rn new old

7) _____ is used to allow or disallow other users to write to your terminal.
   a) write   b) mesg
   c) talk   d) mail

8) Which command is used with vi editor to save file and remain in the editing mode?
   a) X   b) Q1
   c) :w   d) :q

9) Core of Linux operating system is _____.
   a) Kernel   b) Shell
   c) Terminal   d) Command

10) The symbol used to represent pipelining is _____.
   a) &   b) @
   c) | d) <<

11) In the shell, by default, all variables are considered and stored as _____.
   a) string   b) integer
   c) character   d) float

12) _____ file contains secure group account information.
    a) / etc / passwd   b) / etc / shadow
    c) / etc/ group   d) / etc / gshadow

13) _____ Command is used in arithmetic operations and string handling.
    a) 1pr   b) expr
    c) test   d) none

14) _____ is used to assign network settings centrally from a server rather than configuring them locally on each and every workstation.
    a) DNS   b) Squid
    c) FTP   d) DHCP

Q.2 A) Answer the following questions. (Any Four)   08
    1) What is the use of traceroute?
    2) What is the use of GRUB?
    3) What is a redirection?
    4) What is inode?
    5) What is mounting and unmounting?

B) Write notes on (Any Two)   06
    1) What is the use of samba server?
    2) Which are the various administrative files?
    3) Explain NFS in short.

Q.3 A) Answer the following questions. (Any Two)   08
    1) Explain Vi editor in short.
    2) Explain process status command in detail.
    3) Explain various features of LINUX OS.

B) Answer the following questions. (Any One)   06
    1) Explain difference between Linux and Windows.
    2) Explain Chkconfig command in detail.

Q.4 A) Answer the following questions. (Any Two)   10
    1) Explain the various ways to run process in background with syntax and suitable example.
    2) Write a shell script program to find the greatest among three numbers.
S   3) Explain different types of blocks in file system.

B) Answer the following questions. (Any One)   04
    1) Explain the architecture of Linux operating system.
    2) Explain find command in detail.

Q.5 Answer the following questions. (Any two)   14
    1) Explain following network utilities in detail: ping, finger, traceroute.
    2) Explain different communication command.
    3) Explain various group management commands in detail.

Seat No.	

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
English
BREAKTHROUGH

Day & Date: Saturday, 05-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The ball party that M and Mme Loisel attended took place in the month of _____.
   a) June   b) March
   c) May   d) January

2) Which of the following statements is not true?
   a) Pyramus was the handsomest youth.
   b) Thisbe was the fairest maiden.
   c) They married against their parents' will.
   d) Their parents occupied adjoining houses.

3) The new diamond necklace that Loisel bought to give it to Mme Forester was priced _____.
   a) Forty five thousand francs   b) Thirty six thousand francs
   c) Thirty-nine thousand francs   d) Forty five hundred francs

4) Pyramus and Thisbe decided to meet at the foot of a _____.
   a) white mulberry tree   b) purple mulberry tree
   c) green mulberry tree   d) pink mulberry tree

5) Tom promises Jim to give _____ in exchange of whitewashing the fence.
   a) a jews-harp   b) a tin soldier
   c) a white alley   d) a spool cannon

6) Which of the following statement is not true?
   a) Bringing water from the town pump had always been hateful work in Tom's eyes.
   b) Tom wanted to bring water from the town pump instead of whitewashing the fence.
   c) Tom was ready to give Jim a mighty gay marvel in exchange of whitewashing the fence.
   d) Jim accepted the privilege of whitewashing the fence when Tom offered him money.

7) Which of the following is not played by the musicians *In the Bazaars of Hyderabad?*
   a) flute   b) Sarangi
   c) Drum   d) Sitar

8) Phillis Wheatley asks soul not to sink into _____.
   a) happiness   b) despair
   c) darkness   d) optimism

9) The speaker in the poem *On Virtue* asks his/her soul to court _____ for her promised bliss.
   a) virtue
   b) chastity
   c) Angel
   d) goddess

10) In the poem '*In the Bazaars of Hyderabad',* tunics are sold by _____.
   a) Merchants
   b) ironsmiths
   c) Goldsmith
   d) magicians

11) All that glitters is not gold. The underlined clause is _____.
   a) a noun clause
   b) a relative clause
   c) an adverbial clause
   d) a prepositional clause

12) 'Who killed Dr. Narendra Dabholkar is still a mystery'. The underlined clause is _____.
   a) an adverbial clause
   b) an adjectival clause
   c) a relative clause
   d) a noun clause

13) "What I say and what I do are two different things." This sentence is a _____.
   a) simple sentence
   b) complex sentence
   c) compound sentence
   d) both complex and compound sentence

14) The tag question for the sentence "No one is guilty" is _____.
   a) are they?
   b) isn't it?
   c) aren't they?
   d) isn't he?

Q.2 Attempt any four of the following questions.   **16**
   a) What is the message of the story *Whitewashing the Fence*?
   b) Comment on the end of the story *The Necklace.*
   c) How do you relate the tragic story of Pyramus and Thisbe to the modern age?
   d) What did Mathilde and Loisel do after the loss of the necklace?
   e) Why did Thisbe end her life?
   f) What did Tom's friends do when they saw him painting the fence?

Q.3 Attempt two of the following questions.   **12**
   a) What is Phillis Wheatley's attitude to life on earth?
   b) Comment on the use of imagery in the poem *In the Bazaars of Hyderabad.*
   c) Make a list of ways in which you usually waste your time and say how you can manage time better.
   d) You are a college student and addicted to internet, Facebook, and other social media.You are unable to concentrate on your study. How will you come out of the mire of social media and solve the problem.

Q.4 Attempt any one of the following questions.   **14**
   a) Describe in detail the great scientist Dr. APJ Abdul Kalam. Give the details of his personality.
                                    OR
   b) Describe the south Indian city you visited last year.

Q.5 **Read the following passage and summarize it.** 14

It is the height of selfishness for men, who fully appreciate in their own case the great advantages of a good education, to deny these advantages to women. There is no valid argument by which the exclusion of the female sex from the privilege of education can be defended. It is argued that women have their domestic duties to perform, and that, if they were educated, they would bury themselves in their books and have little time for attending to the management of their households. Of course it is possible for women, as it is for men, to neglect necessary work in order to spare more time for reading sensational novels. But women are no more liable to this temptation that men, and most women would be able to do their household work all the better for being able to refresh their minds in the intervals of leisure with a little reading. Nay, education would even help them in the performance of the narrowest sphere of womanly duty. For education involves knowledge of the means by which health may be preserved and improved, and enables a mother to consult such modern books as will tell her how to rear up her children into healthy men and women, and skillfully nurse them and her husband when disease attacks her household. Without education she will be not unlikely to listen with fatal results to the advice of superstitious quacks that pretend to work wonders by charms and magic.

But, according to a higher conception of woman's sphere, woman ought to be something more than a household drudge. She ought to be able not merely to nurse her husband in sickness, but also to be his companion in health. For this part of her wifely duty education is necessary, for there cannot well be congenial companionship between an educated man and an uneducated wife, who can converse with her husband on no higher subjects than cookery and servants' wages. Also one of a mother's highest duties is the education of her children at the time when their mind is most amenable to instruction. A child's whole future life, to a large extent, depends on the teaching it receives in early childhood and it needless to say, that this first foundation of education cannot be well laid by an ignorant mother. On all these grounds female education is a vital necessity.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Physics (Special Paper – XI)
ELECTRODYNAMICS

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.
         3) Use of log table or calculator is allowed.
         4) Neat diagrams must be drawn wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   **14**

1) Electric dipole moment (p) of dipole is _____.
   a) $p = q/d$ b) $p = q - d$
   c) $p = qd$ d) $p = q + d$

2) Unit of self and mutual inductance is _____.
   a) Hertz   b) Farad
   c) Ohm   d) Henry

3) Differential form of Gauss's law in electrostatics is _____.
   a) $\nabla . E = -\frac{\rho}{\epsilon}$ b) $\nabla . E = \frac{\rho}{2\epsilon}$
   c) $\nabla . E = \frac{\rho}{\epsilon}$ d) $\nabla . E = -\frac{\rho}{2\epsilon}$

4) Time of emission of radiation is called _____.
   a) response time   b) recovery time
   c) retarded time   d) retarded potential

5) Poynting vector (P) is defined as _____.
   a) $P = E \times H$ b) $P = E \times B$
   c) $P = -E \times H$ d) $P = -E \times B$

6) Differential form of Ampere's circuital law for steady current is _____.
   a) $\nabla . J = -\frac{\partial \rho}{\partial t}$ b) $\nabla . J = \rho$
   c) $\nabla . J = \frac{\rho}{\epsilon}$ d) $\nabla . J = 0$

7) The skin depth of electromagnetic waves in conductor is equal to _____.
   a) $r_s = -\frac{1}{\beta}$ b) $r_s = \frac{1}{\sqrt{\beta}}$
   c) $r_s = \frac{1}{2\beta}$ d) $r_s = \frac{1}{\beta}$

8) _____law states that an induced electromotive force always gives rise to a current whose magnetic field opposes the change in original magnetic flux.
   a) Ampere's   b) Gauss's
   c) Lenz's   d) Faraday's

9) Relation between relative permeability (μ_r) and magnetic susceptibility (Ψ) is _____.
   a) $\mu_r = \Psi$ b) $\mu_r = 1 - \Psi$
   c) $\mu_r = 1 + \Psi$ d) $\mu_r = 2\Psi$

10) Propagation constant (k) is defined as _____.
   a) $k = \frac{1}{2\pi\lambda}$
   b) $k = 2\pi\lambda$
   c) $k = \frac{\lambda}{2\pi}$
   d) $k = \frac{2\pi}{\lambda}$

11) Transmission coefficient (T) is defined as _____.
   a) $T = \frac{4n_1}{(n_1+n_2)^2}$
   b) $T = \frac{4n_1n_2}{(n_1+n_2)^2}$
   c) $T = \frac{4n_1}{(n_1-n_2)^2}$
   d) $T = \frac{(n_1-n_2)}{(n_1+n_2)^2}$

12) Incident and transmitted waves are _____.
   a) always in phase
   b) shifted with 45° phase
   c) shifted with 180° phase
   d) shifted with 90° phase

13) The equation of continuity is _____.
   a) $\nabla.E = -\frac{\partial\rho}{\partial t}$
   b) $\nabla.J = -\frac{\partial\rho}{\partial t}$
   c) $\nabla.B = -\frac{\partial\rho}{\partial t}$
   d) $\nabla.D = -\frac{\partial\rho}{\partial t}$

14) Electric intensity is the gradient of _____ function.
   a) vector
   b) scalar
   c) vector as well as scalar
   d) none of these

Q.2 A) Answer the following questions. (Any Four) 08
   1) State Coulomb's law.
   2) State the Biot-Savart's law.
   3) State Poynting's theorem.
   4) Define self and mutual inductance.
   5) What is total internal reflection?

B) Answer the following questions. (Any Two) 06
   1) Derive equation of continuity in differential form.
   2) Obtain Maxwell's correction to Ampere's circuital law.
   3) What is the radiation reaction?

Q.3 A) Answer the following questions. (Any two) 08
   1) Derive Poisson's and Laplace's equations.
   2) Define electromagnetic induction? Derive Faraday law in integral and differential form.
   3) What is skin depth? What is its relation with attenuation constant, conductivity and frequency?

B) Answer the following question. (Any One) 06
   1) Calculate the radius of circular orbit of an electron of 5 keV in magnetic field of 10^{-4} T. (Given data: $e = 1.6 \times 10^{-19}\,C, m = 9.1 \times 10^{-31}$ kg and $1eV = 1.6 \times 10^{-19}J$)
   2) Write short notes on
      i) Retarded time
      ii) Retarded potential

Q.4 A) Answer the following questions. (Any Two) 10
   1) Write short notes on
      i) Transmission coefficient
      ii) Reflection coefficient
   2) Obtain a general expression for the motional electromotive force.
   3) Obtain an expression for self-inductance of a solenoid.

B) **Answer the following questions. (Any One)** 04
1) Show that three vectors E, B and K are orthogonal.
2) Discuss the nature of trajectory when a charged particle entered in uniform electric field (E) that its initial velocity is perpendicular to E.

Q.5 **Answer the following questions. (Any two)** 14
a) States Maxwell's equations in point form and explain their physical significance.
b) Explain the boundary conditions for electric field at interface of two media.
c) Obtain intensity of plane electromagnetic waves in dielectrics medium.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Chemistry (Special Paper – XI)
PHYSICAL CHEMISTRY

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Draw neat diagrams and give equations wherever necessary.
              4) Use of logarithmic tables and scientific calculator is allowed.

Q.1 **Multiple Choice Questions.**   **14**

1) The liquid mixtures which distil with a change in composition are called
_____.
   a) azeotropic mixtures   b) equilibrium mixtures
   c) Zeotropic mixtures   d) None of these

2) The half-life of third order reaction is given by _____.
   a) $t_{1/2} = 0.693/k$ b) $t_{1/2} = k/0.693$
   c) $t_{1/2} = 2ka^2/3$ d) $t_{1/2} = 3/2ka^2$

3) The term fugacity has the dimensions of _____.
   a) temperature   b) volume
   c) length   d) pressure

4) Rotational spectra are observed in _____ region.
   a) far infrared   b) visible
   c) uv   d) radiowave

5) According to law of mass action, the rate at which a substance reacts is
directly proportional to its _____.
   a) active mass   b) active volume
   c) temperature   d) none of these

6) A homogeneous mixture of two or more chemical substance is called
as _____.
   a) solution   b) solute
   c) solvent   d) dilute solution

7) The molecularity of the reaction
$2FeCl_3 + SnCl_2 \rightarrow 2FeCl_2 + SnCl_4$ is _____.
   a) one   b) two
   c) three   d) four

8) Which of the following molecules have a dipole moment?
   a) CCl_4 b) CO_2
   c) C_2H_6 d) HCl

9) Boiling point of a solution of low vapour pressure will be _____.
   a) lower   b) higher
   c) equal   d) None of these

10) What effect does an increase in temperature of 10^0C have as the rate of the reaction?
   a) halved   b) doubled
   c) multiplied by 1.5   d) tripled

11) The free energy change for a reaction at equilibrium is _____.
   a) zero   b) small positive
   c) small negative   d) large negative

12) _____ diatomic molecule gives vibrational spectra.
   a) Hetero nuclear   b) homo nuclear
   c) tetra nuclear   d) poly nuclear

13) The work function (A) is defined as _____.
   a) $A = E - TS$ b) $A = E + TS$
   c) $A = TS - E$ d) None of these

14) Arrhenius equation is _____.
   a) $K = Ae^{-Ea/RT}$ b) $K = Ae^{Ea/RT}$
   c) $K = Ae^{-Ea/RT2}$ d) $K = Ae^{Ea/RT2}$

Q.2 A) Answer the following (Any Four)   **08**
   1) State Raoult's law.
   2) What is free energy?
   3) What you mean by parallel reaction?
   4) Write limitations of rotational spectra.
   5) Define critical solution temperature.

B) Write Notes on (Any Two)   **06**
   1) Force constant
   2) Opposing reaction
   3) Concept of fugacity

Q.3 A) Answer the following questions. (Any two)   **08**
   1) What are the conditions of boiling point of solution?
   2) Derive Gibb's-Helmholtz equation.
   3) Explain chain reaction with an example.

B) Answer the following question. (Any One)   **06**
   1) Calculate the reduced mass and moment of inertia of HCl if internuclear distance is 1.275×10^{-8} cm and atomic masses are H = 1.008 & Cl = 34.98 (N= 6.023×10^{23})
   2) Derive Van't Hoff's equation.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain partially miscible liquid of phenol-water system.
   2) Derive Clapeyron equation.
   3) Derive an expression for the third order reaction when the initial concentration of all reactants is same.

B) Answer the following question. (Any One)   **04**
   1) Draw well labeled boiling point diagrams of miscible liquids.
   2) For a certain reaction, the temperature coefficient k35 / k25 is 1.75. Calculate the energy of activation (R = 2 cals)

Q.5 Answer the following questions. (Any two)   **14**
   a) Draw and explain energy level diagram of a molecule.
   b) Kp for a certain reaction is 20.2 at 1218k and heat of reaction is - 88.492Kj/mole. Calculate Kp at 1338k. (R= 8.314jk^{-1}mol^{-1})
   c) Explain Collision theory of reaction rates.

Seat No.		Set	**P**

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Botany (Special Paper – XI)
MICROBIOLOGY AND PLANT PATHOLOGY

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) All questions carry equal marks.
3) Draw neat and labelled diagrams wherever necessary.
4) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   In microbial fermentation, useful _____ are generally used.
a) Fungi   b) Bacteria
c) Mycoplasma   d) Both a) and b)

2)   Dilution method is the example of _____.
a) Sterilization   b) Incubation
c) Isolation   d) None of the above

3)   Grain smut of Jowar disease is caused by _____ sp.
a) *Cercospora*   b) *Sclerospora*
c) *Sphecelotheca*   d) *Collectotrichum*

4)   Prokaryotic microbes include _____.
a) Bacteria   b) BGA
c) Mycoplasma   d) All of the above

5)   There occurs death and decay of tissue in _____ symptoms.
a) Necrotic   b) Atrophy
c) Hypertrophy   d) All of the above

6)   Idly is prepared by fermentation from _____.
a) Rice   b) Black gram
c) Peanuts   d) Both a) and b)

7)   Leaf curl of chilies is _____ disease.
a) Fungal   b) Bacterial
c) Viral   d) Mycoplasmal

8)   A culture that contains only _____ kinds of micro-organisms is called as pure culture.
a) One   b) Two
c) Three   d) Four

9)   Anthracnose of bean is caused by _____.
a) *Erysiphe polygoni*   b) *Sphacelothecasorghi*
c) *Colletotrichum lindemuthianum*   d) *Cercosporabeticola*

10) Bangadi disease of Potato is caused by _____ pathogen.
a) Viral   b) Fungal
c) Mycoplasma   d) Bacteria

11) The name *Bacillus thuringiensis* was first given in _____ by Berliner.
a) 1918   b) 1915
c) 1917   d) 1916

12) Doi et al, in _____ reported mycoplasma to be the causal agent of some diseases.
   a) 1970   b) 1969
   c) 1968   d) 1967

13) _____ process is known as pasteurization.
   a) Heating   b) Dilution
   c) Addition of chemical   d) None of these

14) Study deals with the viruses is known as _____.
   a) Bacteriology   b) Mycology
   c) Virology   d) Phycology

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define plant disease.
   2) What is antibiotic?
   3) Name any two fungi involved in citric acid production by fermentation.
   4) Define sterilization.
   5) What is incubation?

B) Write Notes on (Any Two)   **06**
   1) Write symptoms of Tikka disease of groundnut.
   2) Write uses of streptomycin.
   3) Write symptoms of anthracnose of bean.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Explain the chemical sterilization studied by you.
   2) Give the symptoms and control measures of grain smut of Jowar.
   3) Give the symptoms and control measures of leaf curl of chilies.

B) Answer the following question. (Any One)   **06**
   1) Write the classification of plant diseases based on mode of transmission.
   2) Write the isolation of fungi by serial dilution method.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Classify the plant diseases based on necrotic symptoms.
   2) Explain streak plate and pour plate method of pure culture.
   3) Describe general characters of algae as microbes.

B) Answer the following question. (Any One)   **04**
   1) Explain the method of preparation of cheese and uses.
   2) Write the general characters of Mycoplasma.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe the citric acid production with uses.
   b) Describe the sources and uses of mycopesticides.
   c) Give the method of production of alcohol by fermentation and state its uses.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Zoology (Special Paper – XI)
PHYSIOLOGY

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
         2) Draw neat labelled diagrams wherever necessary.
         3) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) In mouth the salivary amylase enzyme digests starch into _____.
   a) Dextrine & Maltose   b) Fatty acid & Glycerols
   c) Amino acid   d) Lactose and Galactose

2) Blood pressure in a healthy person is _____ mm/Hg.
   a) 90/60   b) 120/80
   c) 140/60   d) 80/120

3) In glycolysis the glucose is converted into _____.
   a) Citric acid   b) Malic acid
   c) Pyruvic acid   d) Fumaric acid

4) _____ Vitamin causes scurvy disease.
   a) A   b) D
   c) K   d) C

5) _____ is used when kidney function failed.
   a) Space maker   b) Dialyzer
   c) Stethoscope   d) Pace maker

6) _____ is waste product of Ornithine cycle.
   a) Ammonia   b) Creatinine
   c) Creatine   d) Vricacid

7) Bowmann's capsule is located in _____ region of kidney.
   a) Medulla   b) Cortex
   c) Pelvic   d) Calyx

8) Plasma membrane of striated myscle is called _____
   a) Neyrolemma   b) Plasmalemma
   c) Sarcolemma   d) Nucleolemma

9) Sliding filament theory of muscle contraction was firstly proposed by _____.
   a) Nicolson   b) Huxley & Hanson
   c) Watson   d) Robertson

10) _____ is a structural and functional unit of nervous system.
   a) Plexus   b) Neurone
   c) Ganglion   d) Blood vessel

11) The Synaptic gap is also called as _____.
   a) Junction   b) Cleft
   c) Joint   d) Connection

12) _____ is a water soluble vitamin.
    a) A   b) C
    c) D   d) K

13) Stress is particularly related to _____.
    a) Tension   b) Weight
    c) Illness   d) Weakness

14) Meditation process is related to _____.
    a) Body exercise   b) Mind exercise
    c) Diet control   d) Weight control

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Define Digestion and Absorption.
    2) Glyconeogenesis
    3) Role of vit. D
    4) Fatigue
    5) Benefits of Yoga

B) Answer the following questions. (Any Two)   **06**
    1) Glycogenesis
    2) Structure of Nephron
    3) Dialysis

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Give an account of vitamin A.
    2) Describe the ultrastructure of Neuron.
    3) Explain chloride shift.

B) Answer the following question. (Any One)   **06**
    1) Explain Kreb's cycle.
    2) Describe physiology of Urine formation.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Describe Ultrastucture of striated muscle fiber with sarcomere.
    2) Describe the Ornithine cycle.
    3) Give an account on chemical and nervous control of respiration.

B) Answer the following questions. (Any One)   **04**
    1) Give an account of conduction of heartbeat.
    2) Explain the CO_2 transport.

Q.5 Answer the following questions. (Any Two)   **14**
    a) Define digestion? Describe the process of digestion in Intestine.
    b) Explain synapse and synaptic transmission.
    c) What is stress? Describe in detail the physiology of stress.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov 2019
Mathematics (Special Paper – XI)
METRIC SPACE

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Norm is a function with domain l^2 and Range _____.
     a) $[0, \infty)$ b) $(-\infty, \infty)$
     c) $(-\infty, 0)$ d) None of these

2) The metric space $\langle R, d \rangle$ or R_d is called _____ Metric space.
     a) Normal   b) Discrete
     c) Absolute   d) None of these

3) Any polynomial function is _____ at each point in R.
     a) oscillate   b) not continuous
     c) continuous   d) None of these

4) In any metric space $\langle M, \rho \rangle$ both M and ρ are _____ sets.
     a) closed   b) empty
     c) Null   d) open and closed

5) Let E is subset of Metric space M, then E is closed subset of M if _____.
     a) $E = \overline{E}$ b) $E \neq \overline{E}$
     c) $E = \overline{\overline{E}}$ d) None of these

6) If A is not bounded then diam A = _____
     a) 1   b) ∞
     c) 0   d) $-\infty$

7) Every convergent sequence in metric space is _____.
     a) convergent   b) divergent
     c) Cauchy sequence   d) None of these

8) Every compact metric space is _____.
     a) complete and not bounded   b) bounded and not complete
     c) not complete and not bounded   d) compact and totally bounded

9) $\lim_{x \to \infty} [1/x^2]$ = _____
     a) 0   b) 1
     c) ∞ d) $-\infty$

10) M has a Heine-Borel property if M is _____.
     a) complete   b) compact
     c) connected   d) None of these

11) If $f : R^1 \to R^1$ and $a \in R'$, If f is continuous at a then $|f(x) - f(a)| < \in$, $(0 < |x - a| < \delta)$ such that _____
     a) $\in > 0$ b) $\in < 0$
     c) $\in = 0$ d) None of these

12) If A and B are open subset of R^1 then $A \times B$ is _____ subset of R^2
   a) empty
   b) closed
   c) open
   d) None of these

13) The metric ρ is absolute metric if _____
   a) $\rho(x,y) = |x+y|$
   b) $\rho(x,y) = |x-y|$
   c) $\rho(x,y) = |x.y|$
   d) None of these

14) If $\langle M, \rho \rangle$ is a complete metric space and A is closed subset of M then $\langle A, \rho \rangle$ is also _____
   a) complete
   b) compact
   c) connected
   d) None of these

Q.2 A) Answer the following questions (Any Four)   **08**
   1) Define metric space $\langle X, d \rangle$
   2) Prove that $\lim\limits_{x \to 3} [x^2 + 2x] = 15$
   3) Define Open Ball $B[q, r]$
   4) Define Clouse of E.
   5) Explain Heine - Borel property.

B) Answer the following questions (Any Two)   **06**
   1) Explain class l^2 with example for $s \in l^2$ and $t \in l^2$ then $s + t \in l^2$
   2) Explain open set with example.
   3) Explain Bounded set with diam A.

Q.3 A) Answer the following questions (Any two)   **08**
   1) If f, g are real-valued continuous function at $a \in R^1$ then $f+g, f-g, f.g$ and f/g $[g(a) \neq 0]$ are also continuous at a.
   2) If G_1 and G_2 are open subset of the metric space M then $G_1 \cap G_2$ is also open.
   3) Let f be a continuous function from Compact Metric space M_1 into Metric space M_2 then $f(M_1)$ of f is also compact.

B) Answer the following questions (Any One)   **06**
   1) State and prove Schwarz inequality.
   2) Define closed subset of M and if E is any subset of Metric space M then $\overline{E}$ is closed.

Q.4 A) Answer the following questions (Any Two)   **10**
   1) If f and g are real valued continuous function. If f is continuous at a and g is continuous at $f(a)$ then gof is continuous at a.
   2) Let G be an open subset of metric space M then $G' = M - G$ is closed. Also converse if F is closed then $F' = M - F$ is open.
   3) If Metric space M has Heine-Boral property then M is compact.

B) Answer the following questions (Any One)   **04**
   1) State and prove Minkowski inequality.
   2) If A is the subset of Metric space $\langle M, \rho \rangle$ is totally bounded then A is bounded.

Q.5 Answer the following questions (Any two)   **14**
   a) Let $\langle M, \rho \rangle$ be a metric space and 'a' be a point in M. Let f, g be real valued function whose domain are subset of M
   If $\lim\limits_{x \to a} [f(x)] = L$ and $\lim\limits_{x \to a} [g(x)] = M$ then $\lim\limits_{x \to a} [f(x).g(x)] = L.M$.
   b) Let $\langle M, \rho \rangle$ be a Complete Metric space. If T is a contraction on M then there is only one point x in M such that $T_x = x$
   c) Let $\langle M_1, \rho_1 \rangle$ and $\langle M_2, \rho_2 \rangle$ be Metric spaces and let $f: M_1 \to M_2$ then f is continuous on M_1 if and only if $f|(G)$ is open in M_1 (whenever G is open in M_2)

Seat No.	

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Statistics (Special Paper – XI)
STATISTICAL INFERENCE – II

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory and figures to the right indicate full marks.
      2) Use of scientific calculators and statistical tables is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The most pragmatic approach for determining $(1 - \alpha)\%$ confidence interval is to find out _____.
   a) Zero width confidence interval (C.I.)
   b) equal tail C.I.
   c) A C.I. such that area of both the tails is α
   d) none of these

2) For finding the C.I. for the ratio of variance of two normal populations which distribution is used?
   a) χ^2 b) F
   c) t   d) normal

3) For a random sample of size n from $N(\mu, \sigma^2)$ with known μ, the degrees of freedom of $\chi^2 = \frac{\sum (X_i - \mu)^2}{\sigma^2}$ is _____.
   a) $(n - 1)$ b) n
   c) $(n + 1)$ d) 0

4) The hypothesis under test is _____ hypothesis.
   a) simple   b) null
   c) composite   d) alternative

5) Among all critical regions (C.R.) of size α the C.R. which minimizes β is called _____ C.R.
   a) best   b) powerful
   c) minimum   d) optimum

6) If there are 10 symbols of two types equal in numbers, the maximum possible number of runs is _____.
   a) 8   b) 10
   c) 9   d) 11

7) Ordinary sign test considers the difference of observed values from the hypothetical median value in terms of _____ only.
   a) signs   b) magnitude
   c) both (a) and (b)   d) neither (a) nor (b)

8) Most frequently used method of breaking the tie is _____.
   a) mid-rank method
   b) to omit tied values
   c) average statistic approach
   d) most favorable statistic approach

9) Neyman-Pearson Lemma provides _____ test.
   a) an unbiased
   b) an admissible
   c) most powerful
   d) minimax

10) The SPRT decision about the hypothesis is taken _____.
    a) after each successive observation
    b) after a fixed number of observations
    c) after at least five observations
    d) when the experiment is over

11) The test $H_0: \mu = 70$ against $H_1: \mu > 70$ leads to _____ tailed test.
    a) left
    b) right
    c) two
    d) none of these

12) Which of the following test is appropriate for paired data?
    a) the sign test
    b) signed rank test
    c) median test
    d) both (a) and (b)

13) In SPRT the decision criterion is a function of probability of _____ error.
    a) type one
    b) type two
    c) both (a) and (b)
    d) neither (a) nor (b)

14) The probability of rejecting Ho when it is false is _____.
    a) type I error
    b) type II error
    c) power of a test
    d) size of test

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define simple and composite hypothesis.
   2) Define power function of a test.
   3) Define average sample number.
   4) State the assumptions of non-parametric tests.
   5) Define uniformly most powerful C.R. and uniformly most powerful test.

B) Answer the following questions. (Any Two)   **06**
   1) Define run used in run test with suitable illustration.
   2) Define pivotal quantity and illustrate with suitable example.
   3) State the advantages of non-parametric tests.

Q.3 A) Answer the following questions. (Any two)   **08**
   1) Obtain $100(1-\alpha)\%$ C.I. for the mean μ of $N(\mu, \sigma^2)$ distribution when σ^2 is unknown.
   2) Explain Wilkoxan's signed rank test for two independent samples.
   3) Let X be a $B(1, \theta)$ r.v. Construct SPRT of strength (α, β) for testing $H_0 : \theta = \theta_0$ against $H_1: \theta = \theta_1 (\theta_1 > \theta_0)$.

B) Answer the following questions. (Any One)   **06**
   1) Obtain L.R. test for testing $Ho: \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ based on a random sample from $N(\mu, \sigma^2)$ distribution when both μ and σ^2 are unknown.
   2) Obtain $100(1-\alpha)\%$ confidence interval for difference between means $(\mu_1 - \mu_2)$ in case of two normal populations $N(\mu_1, \sigma_1^2)$ and $N(\mu_1, \sigma_2^2)$, where $\sigma_1 and \sigma_2$ both are known.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe run test for two independent samples.
   2) Obtain SPRT for testing $H_0: \lambda = \lambda_0$ against $H_1: \lambda = \lambda_1 (\lambda_1 > \lambda_0)$ where λ is the mean of Poisson distribution.
   3) Obtain $100(1-\alpha)\%$ confidence interval for population proportion.

B) Answer the following questions. (Any One) 04
   1) Explain in brief median test.
   2) An urn contains 6 marbles of which θ are white and remaining are black. Suppose two marbles are drawn at random without replacement, in order to test $H_0: \theta = 3$ against $H_1: \theta = 4$. H_0 is rejected if both marbles are white otherwise accepted. Compute size of a test.

Q.5 Answer the following questions. (Any two) 14
   a) Write a note in detail on Mann-Whitney U test.
   b) State and prove Neyman-Pearson Lemma.
   c) Construct SPRT for testing $H_0: \theta = \theta_0$ against $H_1: \theta = \theta_1 (\theta_1 > \theta_0)$ in $N(0, \sigma^2)$ distribution.

Seat No.

Set **P**

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper - II)
BASIC TECHNIQUES IN MICROBIOLOGY

Day & Date: Wednesday, 13-11-2019   Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.

Q.1 Select the correct alternatives from the following and rewrite the sentence.   **08**

1) The refractive index of air is _____.
   - a) 0.50
   - b) 0.75
   - c) 1.00
   - d) 1.25

2) Bordeaux mixture used to spray in garden is _____.
   - a) Silver nitrate
   - b) Zinc oxide
   - c) Copper sulfate
   - d) Mercuric chloride

3) The suspension of more than two organisms is called as _____.
   - a) Pure culture
   - b) Mixed culture
   - c) Axenic culture
   - d) Auxotroph culture

4) All the following are components of compound microscope except _____.
   - a) Stage clips
   - b) Fine adjustment
   - c) Electron gun
   - d) Binocular eye piece

5) Mannitol salt agar is used for isolation of _____ microorganism.
   - a) *E. Coli*
   - b) *B. Subtilis*
   - c) *S. aureus*
   - d) *S. typhi*

6) The media composed of pure chemical compound with known chemical composition is called _____.
   - a) Non synthetic media
   - b) Synthetic media
   - c) Complex media
   - d) Enrichment media

7) In Mac conkey's agar _____ acts as selective component.
   - a) Sodium chloride
   - b) Bile salt
   - c) Yeast extract
   - d) Peptone

8) Vaccinia virus is cultivated in _____.
   - a) Primary cell culture
   - b) Embryonated chicken egg
   - c) Diploid cell culture
   - d) Plants

Q.2 Answer the following questions. (Any Four)   **08**
1) What is the time temperature used in autoclave commonly?
2) Define Mordant.
3) Define acidic stain.
4) Define focal length.
5) Define chromatic aberration.
6) Define complex media. Give an example.

Q.3   Answer the following questions. (Any Two)   **08**
    1)   Give an account on Negative Staining with example.
    2)   Discuss in brief spread plate method. Add a note on advantages of spread plate method.
    3)   Discuss in detail cultivation of viruses in tissue culture?

Q.4   Answer the following questions. (Any Two)   **08**
    1)   Write a note on Tyndallization.
    2)   Describe optical parts of compound microscope?
    3)   Explain steps of Gram staining. Give four examples of Gram negative bacteria.

Q.5   Answer the following questions. (Any One)   **08**
    1)   Explain in detail formation of image of Compound Microscope.
    2)   Discuss in detail dry heat as sterilizing agent.

Seat No.	

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Microbiology (Special Paper – XI)
MICROBIAL GENETICS

Day & Date: Monday, 07-10-2019　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Draw neat and labeled diagrams wherever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) Initiation of DNA replication requires a _____.
   a) Plasmid　　　　　　　　　b) DNAase
   c) DNA primer　　　　　　　d) RNA primer

2) Vectors designed to replicate in two different species is called as _____ vector.
   a) Phasmid　　　　　　　　b) Phagemid
   c) Shuttle　　　　　　　　d) Transfer

3) DNA fingerprinting technique was developed by _____.
   a) Francis Crick　　　　　　b) H. Khurana
   c) Alec Jeffrey　　　　　　d) James Watson

4) In the term NCBI the letter B stands for _____.
   a) Biochemical　　　　　　b) Biological
   c) Bioinformatics　　　　　d) Biotechnology

5) Semiconservative mode of DNA replication in E.coli was experimentally proved by _____.
   a) Watson & Crick　　　　　b) Meselson & Stahl
   c) Hershey & Chase　　　　d) Taylor

6) In DNA replication unwinding of DNA is carried out by _____ enzyme.
   a) Topoisomerase　　　　　b) Primase
   c) Helicase　　　　　　　d) DNA polymerase

7) If a particular short DNA sequence is AGATTC, the corresponding mRNA sequence will be _____.
   a) AGATTC　　　　　　　b) TCTAAG
   c) AGAUUC　　　　　　　d) UCUAAG

8) A base pair substitution mutation that changes a codon specifying an amino acid into a stop codon is called as _____ mutation.
   a) Missense　　　　　　　b) Non sense
   c) Frame shift　　　　　　d) Deletion

9) _____ provide the binding site for RNA polymerase in operon.
   a) Promoter　　　　　　　b) Operator
   c) Repressor　　　　　　　d) Inducer

10) _____ type of restriction enzyme most commonly used in r-DNA technology.
    a) Type I　　　　　　　　b) Type II
    c) Type III　　　　　　　d) Type IV

11) _____ is not a structural gene of Lac operon.
a) Lac Z
b) Lac Y
c) Lac A
d) Lac I

12) In the Lac-operon the genes in the operon are _____.
a) always expressed
b) expressed only when lactose is present
c) never expressed
d) only expressed when lactose is absent

13) _____ enzyme which add phosphate moiety at either 5'end or 3'end of DNA in gene manipulation.
a) S1 nuclease
b) Polynucleotide kinase
c) Phosphatase
d) RNase H

14) The restoration of function by a second mutation at a different site in the same gene is called _____.
a) Back mutation
b) Conditional lethal
c) Intragenic suppression
d) intergenic suppression

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Define Neutral mutation.
2) What is CAP? Give its role.
3) What is linker? Give its use.
4) What is phenotype?
5) Define Promoter.

B) Write Notes on (Any Two)   **06**
1) DNA polymerase III
2) Restriction endonucleases
3) RNA Polymerase

Q.3 A) Answer the following questions. (Any two)   **08**
1) Write on folded fiber model of *E.coli* chromosome.
2) Discuss briefly phenotypic lag.
3) Briefly explain Missense Mutations.

B) Answer the following questions. (Any One)   **06**
1) Explain in detail Positive control of Lac- Operon.
2) Describe the Finger printing technique.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Describe briefly DNA finger printing.
2) Discuss the applications of Protein engineering.
3) Describe process of DNA replication.

B) Answer the following questions. (Any One)   **04**
1) Write briefly on termination of Transcription.
2) Describe methods of detection & isolation of mutants.

Q.5 Answer the following questions. (Any two)   **14**
a) Explain in detail Negative control of Lac- Operon.
b) Describe briefly Cis- Trans test.
c) Discuss the applications of Genetic engineering.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Electronics (Special Paper – XI)
POWER ELECTRONICS

Day & Date: Monday, 07-10-2019　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Draw neat labeled diagram wherever necessary.
　　　　　　　　4) Use of logarithmic table and calculator is allowed.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) Reverse recovery current depends on _____.
   a) temperature　　　　　　　　b) storage time
   c) peak inverse voltage　　　　 d) forward current

2) Power BJT is _____ controlled device.
   a) current　　　　　　　　　　b) voltage
   c) field　　　　　　　　　　　d) both a) and b)

3) A conducting GTO can be turned off by applying a _____ to it.
   a) negative gate current　　　　b) positive gate current
   c) both a) and b)　　　　　　　d) none of these

4) _____ is important component in the SCR commutation circuit.
   a) Resistor　　　　　　　　　　b) Inductor
   c) Capacitor　　　　　　　　　d) All of these

5) Emitter, Gate and collector are terminals of _____.
   a) Power BJT　　　　　　　　　b) Power MOSFET
   c) IGBT　　　　　　　　　　　 d) All of these

6) A freewheeling diode is used in controlled rectifier in case of _____.
   a) resistive load　　　　　　　　b) inductive load
   c) capacitive load　　　　　　　d) all of these

7) Parallel connections of SCR's is used to improve _____ ratings.
   a) current　　　　　　　　　　b) voltage
   c) both a) and b)　　　　　　　d) none of these

8) The series inverter uses _____ type of commutation.
   a) class D　　　　　　　　　　b) class C
   c) class B　　　　　　　　　　d) class A

9) _____ is used for DC power to AC power conversion.
   a) Inverter　　　　　　　　　　b) Rectifier
   c) Chopper　　　　　　　　　　d) Amplifier

10) SMPS means _____ power supply.
    a) Single Mode　　　　　　　　b) Series Mode
    c) Shunt Mode　　　　　　　　 d) Switched Mode

11) Heat sink is used for the purpose of _____.
    a) absorbing heat　　　　　　　b) dissipating heat
    c) both a) and b)　　　　　　　d) none of these

12) In half wave controlled rectifier, the load power can be controlled in only _____ of the input AC supply.
   a) 90^0
   b) 180^0
   c) 270^0
   d) 360^0

13) Jones chopper uses _____ type commutation circuit.
   a) class A
   b) class B
   c) class C
   d) class D

14) _____ is heart of inverter.
   a) oscillator
   b) rectifier
   c) step up transformer
   d) filter

Q.2 A) Answer the following questions. (Any Four) 08
   1) Give construction of power diode.
   2) Draw equivalent circuit of IGBT.
   3) How to protect power devices from high dv/dt.
   4) Draw the circuit diagram of class B turn off method of SCR.
   5) Explain principle of phase control.

B) Answer the following questions. (Any Two) 06
   1) What is chopper?
   2) State typical applications of inverter.
   3) State principle of DC motor.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Give a brief account of SCRs connected in parallel.
   2) With neat diagram explain working of series inverter.
   3) Write a note on step up chopper.

B) Answer the following questions. (Any One) 06
   1) Write a note on UPS.
   2) Give a brief account of series connections of SCR.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Describe single phase half wave controlled rectifier with inductive load.
   2) Explain construction and switching characteristics of power BJT.
   3) With neat diagram, explain control circuit for DC motor.

B) Answer the following questions. (Any One) 04
   1) Write note on parallel inverter.
   2) Write a note on SMPS.

Q.5 Answer the following questions. (Any Two) 14
   a) Describe UJT triggering method of SCR along with its waveforms.
   b) Explain working of single phase full wave controlled rectifier with resistive load.
   c) Explain working of MC Murray Bedford inverter.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Computer Science (Special Paper – XI)
WEB TECHNOLOGY

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　 2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**　　　**14**
　　　1)　For Multiline TextBox _____ property of textbox is used.
　　　　　a)　MultiLine　　　　　　　　b)　TextMode
　　　　　c)　MultiLineText　　　　　　d)　None

　　　2)　_____ transfer execution directly to another page.
　　　　　a)　Server.Redirect　　　　　b)　Response.Redirect
　　　　　c)　Both A) and B)　　　　　 d)　None of the Above

　　　3)　_____ method is used to perform INSERT statements in Database.
　　　　　a)　executeUpdate()　　　　 b)　ExecuteInsert()
　　　　　c)　executeNonQuery()　　　 d)　all above

　　　4)　aspx stands for _____.
　　　　　a)　active server pages with xml
　　　　　b)　active server pages extensible
　　　　　c)　active server pages extended
　　　　　d)　active server pages with extension

　　　5)　_____ is NOT a directive.
　　　　　a)　@page　　　　　　　　　b)　@import
　　　　　c)　@Implements　　　　　　d)　@OutPut

　　　6)　_____ control is used to validate that two fields are equal?
　　　　　a)　RegularExpressionValidator　b)　CompareValidator
　　　　　c)　equals() method　　　　　　d)　RequiredFieldValidator

　　　7)　Type of code found in code behind code class is _____.
　　　　　a)　Server Side code　　　　　b)　client side code
　　　　　c)　both　　　　　　　　　　d)　none

　　　8)　When an .aspx page is requested from the web server, the output will be rendered to browser in _____ format.
　　　　　a)　HTML　　　　　　　　　b)　XML
　　　　　c)　WML　　　　　　　　　 d)　JSP

　　　9)　_____ is used to validate complex string patterns like an e-mail address?
　　　　　a)　Extended expressions　　　b)　Basic expressions
　　　　　c)　Regular expressions　　　　d)　Irregular expressions

　　　10)　In bulleted list if we want to display list item in Hyperlink format, _____ property need to be set.
　　　　　a)　DisplayMode　　　　　　b)　TextMode
　　　　　c)　HyperLink　　　　　　　d)　HyperLinkMode

11) To implement a specified .NET Framework interface @Reference directive is used.
   a) TRUE   b) FALSE

12) Range property is used to specify range in RangeValidator control.
   a) TRUE   b) FALSE

13) A Master Page enables you to share content across multiple pages in a website and a Theme enables you to control the appearance of the content.
   a) TRUE   b) FALSE

14) .asmx is extension of Web User Control File.
   a) TRUE   b) FALSE

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Write down @implements directive with attributes.
   2) List out features of ASP.NET
   3) List out uses of \APP_DATA folder.
   4) Write in short ASP.NET Page Structure.
   5) State how to use image as error notification.

B) Answer the following questions. (Any Two)   **06**
   1) List out differences between DataReader and DataAdapter.
   2) Explain use of @OutPutCache Directive.
   3) Explain ImageButton Control with example.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Write note on @Page directive.
   2) Write a note on Master Pages.
   3) Explain ListBox Control.

B) Answer the following question. (Any One)   **06**
   1) Explain Cross Page Posting with example.
   2) Design a web page that shows any TWO ways to add items in ListBox controls.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) List out difference between Client side and Server side validation.
   2) Explain CompareValidator Control with Example.
   3) Write Note on Global.asax.

B) Answer the following question. (Any One)   **04**
   1) Explain ValidationGroup with example.
   2) Design web page which demonstrates use of DataAdapter.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain CustomValidation Control with Example.
   b) Design web page which demonstrate use of stored procedure in Database.
   c) Design web page for simple calculator which performs basic arithmetic operations by using class.

Seat No.	

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Physics (Special Paper – XII)
MATERIALS SCIENCE

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
          2) Figures to the right indicate full marks.
          3) Neat diagrams must be drawn wherever necessary.
          4) Use of log table or calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Strength of Composite is _____.
   a) Low   b) High
   c) Zero   d) Infinite

2) Applied Force per Unit Cross Sectional area is called _____.
   a) Stress   b) Strain
   c) Creep   d) Ductility

3) Time dependent permanent deformation is called _____.
   a) Elasticity   b) Creep
   c) Plasticity   d) Fatigue

4) The dielectric strength is function of _____.
   a) Thickness   b) Length
   c) Charge   d) None of these

5) Bakelite is obtained by reaction of formaldehyde with _____.
   a) Phenol   b) Styrene
   c) Ethane   d) Urea

6) _____ polymers occurs naturally.
   a) Nylon   b) Starch
   c) PVC   d) Teflon

7) The degree of polymerization is the ratio of molecular weight of polymer to _____.
   a) Molecular weight of monomer   b) Atomic weight of monomer
   c) Atomic weight of polymer   d) None of these

8) _____ materials are combination of two or more materials which have different properties from constituent materials.
   a) Polymer   b) Crystalline
   c) Composite   d) Amorphous

9) Cermets are examples of _____.
   a) Micro composites   b) Continuous fibre composites
   c) Shortfibre composites   d) Large particle composites

10) _____ Structure can be studied by naked eye.
   a) Atomic   b) Grain
   c) Micro   d) Macro

11) Oxide ceramics are _____ materials.
    a) Semiconductor   b) Conductor
    c) Good conductor   d) Insulator

12) _____ technique is used to determine the crystal structure of material.
    a) SEM   b) XRD
    c) FTIR   d) UV-VIS

13) _____ Prepared and explained carbon nanotubes for first time.
    a) Richard Feynmann   b) Richard Smalley
    c) Eric Drexler   d) Sumia Iijima

14) _____ materials have occupied an important role in bone repairing materials in the medical field.
    a) Bioactive glasses and glass ceramics
    b) Polymers
    c) Composites
    d) Nanomaterials

Q.2 Attempt any seven of the following questions.   **14**
1) Define the terms :
    i) Hardness
    ii) Fatigue
2) What is Creep?
3) What is Homopoymer?
4) Define Thermosetting and Thermoplastic Polymers.
5) Give classification of ceramics.
6) What are composites?
7) What is Significance of Nanomaterials?
8) What is meant by biomechanism?

Q.3 A) Attempt any two of the following questions.   **10**
    1) Write note on Ceramic Processing.
    2) Write note on Biomaterial Processing.
    3) Discuss classification of materials.

B) What are biomaterials? Discuss the applications in medical field.   **04**

Q.4 Attempt any two of the following question.   **14**
a) Explain mechanical, electrical and magnetic properties of materials.
b) Explain different ceramic structures with suitable diagrams.
c) Explain methods fabrications of composite materials.

Q.5 Answer any one of the following.   **14**
a) Explain chemical bath deposition method of formation of thin film and discuss various techniques of characterization of nanostructured materials.
b) Define polymerization mechanism. Discuss various methods of fabrication of polymers in details.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Chemistry (Special Paper –XII)
INORGANIC CHEMISTRY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 8:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagram and give equations wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   The temperature at which the material becomes super conductor is called
_____.
a)   Initial temperature   b)   Final temperature
c)   Critical temperature   d)   None of these

2)   Corrosion increases with _____ in temperature.
a)   Increase   b)   Decrease
c)   Moderate   d)   None of these

3)   Alkyberillium compounds are _____.
a)   electron deficient   b)   electron rich
c)   ionic compound   d)   coordinate compound

4)   Actinides have _____ incomplete outer shells.
a)   one   b)   two
c)   three   d)   four

5)   In valence shell of diborane, there are _____ electrons.
a)   14   b)   12
c)   10   d)   8

6)   Among lanthanans _____ do not occurs in nature.
a)   Sm   b)   Pm
c)   Tm   d)   Nd

7)   Borazine is isoelectronic with _____.
a)   pyridine   b)   diborane
c)   benzene   d)   toluene

8)   When arsenic is added to silicon crystals _____ semi conductor is formed.
a)   n – type   b)   p – type
c)   n and p – type   d)   o – type

9)   Effect of oxygen on corrosion is explained by _____.
a)   Faraday's rule   b)   Keir's principle
c)   Whitney principle   d)   Evan's rule

10) Atomic number of element having name un-nit-trium is _____.
a)   133   b)   123
c)   113   d)   103

11) $Ni(CO)_4$ has _____ structure.
a)   octahedral   b)   tetrahedral
c)   trigonal bipyramidal   d)   square planar

12) As the temperature increase, the conductivity of semiconductors.
    a) Increases
    b) Decreases
    c) remain same
    d) None of these

13) In actinide series, the differentiating electrons are added in _____.
    a) 4 f-subshell
    b) 5 f-subshell
    c) (n-1) d sub-shell
    d) (n-2) d subshell

14) Concept of super conductivity was introduced by _____.
    a) Pauling
    b) Hund
    c) H.Bethe
    d) Kamerling Onnes

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Give applications of super conductors.
2) Why Ln and An are called inner transition elements?
3) Distinguish diborane and ethane
4) Define atmospheric and immersed corrosion.
5) Give synthesis of alkyl aluminium compounds.

B) Write the Notes on: (Any Two)   **06**
1) Heavy ion bombardment method
2) Protection methods of metals from corrosion
3) Bonding in metal carbonyls

Q.3 A) Answer the following questions. (Any two)   **08**
1) Explain separation of lanthanides by ion- exchange method.
2) Describe the structure of XeO_4.
3) Oxide film theory of passivity.

B) Answer the following questions. (Any One)   **06**
1) Define metallic bond. Explain free electron theory of bonding in metals.
2) Describe in detail structure of diborane.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Give the details electronics configuration of lanthanides.
2) Discuss with diagram, the classification of solids on the basis of band theory of metallic bonding.
3) Explain synthesis and structure of alkyl and aryl compounds of beryllium.

B) Answer the following questions. (Any One)   **04**
1) Explain structure of borazine.
2) Electrochemical theory of corrosion.

Q.5 Answer the following questions. (Any two)   **14**
a) What are actinides? Explain IUPAC nomenclature of super heavy elements with atomic number greater than 100.
b) Explain preparation, structure and properties of $YBa_2Cu_3O_{7-x}$ superconductor.
c) Describe in detail structures of P_4O_6 and P_4O_{10}.

Seat No.

Set **P**

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Botany (Special Paper – XII)
SYSTEMATICS OF ANGIOSPERMS

Day & Date: Wednesday, 09-10-2019　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Draw neat labelled diagrams wherever necessary.
　　　　　　　　3) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) The elongation of internode between corolla and stamen is called _____.
   a) Anthophore　　　　　　　　　b) Androphore
   c) Gynophore　　　　　　　　　　d) carpophore

2) The Monocotyledons of Engler and Prantl's system contains _____ orders.
   a) 11　　　　　　　　　　　　　　b) 22
   c) 33　　　　　　　　　　　　　　d) 44

3) Study of pollen grains and spores is called as _____.
   a) Cytology　　　　　　　　　　　b) Chemotaxonomy
   c) Ecology　　　　　　　　　　　　d) Palynology

4) In *Polygonum* embryo sac contains _____ haploid nuclei.
   a) 4　　　　　　　　　　　　　　　b) 6
   c) 8　　　　　　　　　　　　　　　d) 10

5) In *Oenothera,* development of embryo sac is _____ type.
   a) Monosporic 8 nucleated　　　　b) Monosporic 4 nucleated
   c) Bisporic　　　　　　　　　　　d) Tetrasporic

6) Monstrous development is seen in _____.
   a) *Nymphaea*　　　　　　　　　　b) *Paeonia*
   c) Rose　　　　　　　　　　　　　d) *Mussaenda*

7) Flower pollinated by water is called as _____.
   a) Hydrophilous　　　　　　　　　b) Ornithophilous
   c) Entomophilous　　　　　　　　　d) Anemophilous

8) The process of formation of megaspores from megaspore mother cell is called _____.
   a) Embryogenesis　　　　　　　　b) Microsporogenesis
   c) Megasporogenesis　　　　　　　d) Fertilization

9) _____ is an explosive fruit.
   a) *Urenalobata*　　　　　　　　　b) *Entadagigas*
   c) *Martyniadiandra*　　　　　　　d) *Boerhaviarepens*

10) *Zea mays belongs* to _____ family.
   a) Bignoniaceae　　　　　　　　　b) Poaceae
   c) Liliaceae　　　　　　　　　　　d) Capparidiaceae

11) Linnaeus system of classification is _____ type of system.
   a) Artificial　　　　　　　　　　　b) Natural
   c) Phyllogenetic　　　　　　　　　d) None of these

12) Verticilaster type of inflorescence is seen in _____ family.
   a) Bignoniaceae
   b) Poaceae
   c) Lamiaceae
   d) Rubiaceae

13) Endosperm is a _____ tissue.
   a) Haploid
   b) diploid
   c) Triploid
   d) tetraploid

14) _____ type of ovule is most common in Angiosperms.
   a) Anatropous
   b) Orthotropous
   c) Amphitropous
   d) Hemianatropous

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Give any four primitive features of flower.
   2) What is perisperm?
   3) Define Tapetum.
   4) Sketch and label Orthotropous ovule.
   5) What is self -sterility?

B) Write Notes on (Any Two)   **06**
   1) Role of cytology in relation with taxonomy
   2) Flower as a modified shoot with evidences
   3) Role of palynology in relation to taxonomy

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe Bennittitalean theory of origin of Angiosperms.
   2) Role of anatomy in relation with taxonomy.
   3) Describe flower as a modified shoot with evidences.

B) Write Notes on (Any Two)   **06**
   1) Give economic importance of family Cucurbitaceae.
   2) Give economic importance of family Rubiaceae.
   3) Describe cellular endosperm.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe the development of tetrasporic embryo sac with example.
   2) Describe nuclear endosperm.
   3) Explain double fertilization is a triple fusion.

B) Answer the following questions. (Any One)   **04**
   1) Explain in brief megasporogenesis.
   2) Write a note on dispersal by animals.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain in brief Engler and Prantle's system of classification, with merits and demerits.
   b) Describe development of male gametophyte.
   c) Describe development of typical dicot embryo with example.

Seat No.	

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov- 2019
Zoology (Special Paper –XII)
ENDOCRINOLOGY, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.
                        3) Draw neat labeled diagram whenever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Hormones are chemical messages secreted by _____.
    a) Exocrine gland   b) Endocrine gland
    c) Kidney   d) Liver

2)   Islets of Langerhans produces_____.
    a) Rennin   b) Ptylin
    c) Insulin   d) HCL

3)   Epinephrine and non-epinephrine are produced by the _____.
    a) anterior pituitary   b) pancreas
    c) adrenal cortex   d) adrenal medulla

4)   Thyroxin is a _____.
    a) phenolic hormone   b) Steroid hormone
    c) protenous hormone   d) fatty acid

5)   The hormone responsible for regulation of calcium and phosphorous metabolism is secreted by _____ gland.
    a) pancreas   b) adrenal
    c) thymus   d) parathyroid

6)   Endemic species are _____.
    a) rare species
    b) species localized in the specific region
    c) cosmopolitan in distribution
    d) critically endangered

7)   Conservation within the natural habitat is _____.
    a) in situ conservation   b) ex situ conservation
    c) ex wax conservation   d) in wax conservation

8)   An auto immune disease in which an antibody mimics the action of TSH is_____.
    a) Myxedema   b) Cretinism
    c) Acromegaly   d) Graves disease

9)   The most important reason for decrease in biodiversity is _____.
    a) habitat pollution   b) introduction of exotic species
    c) over evaporation   d) habitat destruction

10) Mytilus, has _____ adaptations.
    a) Plough like foot   b) Byssal threads
    c) Chitin plate   d) Hooked oral arms

11) Majority of pesticides can be degraded by _____.
   a) aquatic plants
   b) bacteria and fungi
   c) aquatic animals
   d) earthworm

12) Excess intake of substances than organism ability to remove it from the body is known _____.
   a) bio -remediation
   b) bio-accumulation
   c) bio-dynamics
   d) contamination

13) In the body both blood sodium and potassium levels are regulates by _____.
   a) androgen
   b) aldosterone
   c) cortisol
   d) pheromones

14) _____ are the species which are used to monitor the health of an environment or specific ecosystem.
   a) Biodegradation
   b) Biodistructor
   c) Biological indicator
   d) Biofussion

Q.2 A) Answer the following: (Any Four)   **08**
   1) Biodiversity
   2) Role of parathormone
   3) Toxicology
   4) Great Indian Bustard (GIB)
   5) Bio accumulation

B) Write Notes on: (Any Two)   **06**
   1) What are prevention methods of cruelty of animals?
   2) Waste water management
   3) Role of hormone secreted by islets of Langerhans

Q.3 A) Answer the following: (Any two)   **08**
   1) Neuro hormones any two
   2) Describe deciduous forest habitat.
   3) Describe genetic diversity.

B) Answer the following: (Any One)   **06**
   1) Solid waste management
   2) What is need of virtual dissection?

Q.4 A) Answer the following: (Any Two)   **10**
   1) Characteristic of terrestrial habitat.
   2) Application of toxicology
   3) Rain water harvesting

B) Answer the following: (Any One)   **04**
   1) Histological structure of adrenal gland
   2) Biological indicators of pollution

Q.5 Answer the following: (Any two)   **14**
   a) Write an account on adaptation of animals of fresh water habitat.
   b) Describe histological structure and hormones of Islets of Langerhans.
   c) Write brief account on classification of toxicants.

Seat No.		Set	P

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov 2019
Mathematics (Special Paper – XII)
NUMERICAL ANALYSIS

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of scientific calculators are allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   **14**

1) If $f(x) = x^3 - 5x^2 + 10$, then $\Delta^3 f(x) =$ _____
   a)   6
   b) -6
   c)   10
   d) -10

2) The nth forward difference of $f(x)$ is given by _____
   a) $\Delta^n f(x+h) - \Delta^{n-1} f(x)$
   b) $\Delta^{n-1} f(x+h) - \Delta^{n-1} f(x)$
   c) $\Delta^{n+1} f(x+h) - f(x)$
   d)   None of these

3) The value of $\Delta^n (e^x) =$ _____ the interval of differencing being 1.
   a) $(e+1)^n e^x$
   b) $(e-1)^n e^x$
   c) e^x
   d) $n\, e^x$

4) $\left(E^{\frac{1}{2}} + E^{-\frac{1}{2}}\right)(1+\Delta)^{\frac{1}{2}} =$ _____
   a) $\Delta + 1$
   b) $\Delta - 1$
   c) $\Delta + 2$
   d) $\Delta - 2$

5) $\Delta \tan^{-1} x =$ _____
   a) $\tan^{-1}\left\{\dfrac{h}{1+hx+x^2}\right\}$
   b) $\tan^{-1}\left\{\dfrac{h}{1-hx+x^2}\right\}$
   c) $\tan^{-1}\left\{\dfrac{h}{1+hx-x^2}\right\}$
   d)   None of these

6) If $\lambda_1, \lambda_1, \lambda_1$ are real and equal roots then C.F. = _____
   a) $c_1(\lambda_1)^n + c_2(\lambda_1)^n + c_3(\lambda_1)^n$
   b) $(c_1 + c_2 n + c_3 n^2)(\lambda_1)^n$
   c) $(c_1 - c_2 n - c_3 n^2)(\lambda_1{}^n)$
   d)   None of these

7) The order of equation $y_{n+2} - 2y_n + y_{n-1} = 1$ is _____
   a)   3
   b)   2
   c)   1
   d) -1

8) The particular integral of the equation $y_{n+2} - 4y_{n-1} + 3y_n = 5^n$ is _____
   a) $\dfrac{5^n}{18}$
   b) $\dfrac{8}{5^n}$
   c) $\dfrac{5^n}{8}$
   d) $\dfrac{-5^n}{8}$

9) Simpson's $\left(\frac{1}{3}\right)^{\text{rd}}$ rule is obtained by putting $n =$ _____ in general quadrature formula.
   a)   1
   b)   2
   c)   3
   d)   0

10) The Lagrange's interpolation formula for unequal intervals for n points is a polynomial of degree _____.
    a) $n+1$
    b) n
    c) $n-1$
    d) $n-3$

11) The number of strips required in Simpson's $\left(\frac{3}{8}\right)^{th}$ rule is multiple of _____.

a) 1   b) 2

c) 3   d) 4

12) The value of $\int\limits_{0}^{1} \frac{dx}{1+x} =$ _____

a) 0.69315   b) 0.69915

c) 0.96315   d) 0.69351

13) Interpolation is the technique of estimate the value of a function for any _____

a) Intermediate value of the constant

b) Intermediate value of the variable

c) Both a) and b)

d) None of these

14) If $f(0) = 1$, $f(2) = 5$, $f(3) = 10$ and $f(x) = 4$ then $x =$ _____

a) $\frac{5}{13}$ b) $\frac{-5}{13}$

c) $\frac{15}{13}$ d) $\frac{13}{5}$

Q.2 A) Attempt any four of the following questions.   **08**

1) Evaluate $\Delta^2(ab^x)$

2) With usual notation, prove that $hD = \log(1 + \Delta) = -\log(1 - \nabla)$

3) State Newton's backward interpolation formula.

4) Solve $y_{n+2} - 4y_n = 0$

5) Solve $y_{n+2} - 5y_{n+1} + 6y_n = 4^n$

B) Attempt any two of the following questions.   **06**

1) Find the by, $f(10)$ by using Lagrange's formula for

x	5	6	9	11
$f(x)$	12	13	14	16

2) Evaluate $\int\limits_{0}^{1} \frac{x^2}{1+x^3} \, dx$ by using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule.

3) Solve $y_{n+2} - 2y_{n+1} + y_n = n^2 2^n$

Q.3 A) Attempt any two of the following questions.   **08**

1) Prove that $1 + \delta^2 \mu^2 = \left(1 + \frac{1}{2}\delta^2\right)^2$

2) The following data gives the velocity of a particle for 20 seconds at interval of 5 seconds. Find the initial acceleration using the entire data:

Time t (sec) :	0	5	10	15	20
Velocity v (m/sec) :	0	3	14	69	228

3) Solve $y_{x+1}^2 - 3y_{x+1} \cdot y_x + 2y_x^2 = 0$

B) Attempt any one of the following question.   **06**

1) State the prove Newton's forward interpolation formula.

2) Given that :

x	1	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.451	9.451	9.750	10.031

Find $\frac{dy}{dx}$ at $x = 1.1$

Q.4 A) Attempt any two of the following questions. 10

1) Solve :

   i) $y_{n+2} - 2\cos\alpha.y_{n+1} + y_n = \cos\alpha\, n$

   ii) $u_{n+3} - 2u_{n+2} - 5u_{n+1} + 6u_n = 0$

2) State and prove Simpson's $\left(\frac{3}{8}\right)^{th}$ rule.

3) With usual notation, prove that

   i) $\Delta = E\nabla = \nabla E$

   ii) $E = e^{hD}$

B) Attempt any one of the following question. 04

1) Solve $y_{x+1} - y_x + xy_{x+1}\, y_x = 0$ given $y_1 = 2$

2) The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface

x = height :	100	150	200	250	300	350	400
y = distance :	10.63	13.03	15.04	16.81	18.42	19.90	21.27

   Find the value of y when $x = 410$ ft

Q.5 Attempt any two of the following questions. 14

a) State the prove Trapezoidal rule hence evaluate $\displaystyle\int_0^6 \frac{dx}{1+x^2}$

b) State and prove Lagrange's interpolation formula for unequal intervals.

c) Evaluate:

   i) $\Delta^2 \cos 2x$

   ii) $\Delta^2 \left(\frac{5x+12}{x^2+5x+6}\right)$

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov- 2019
Statistics (Special Paper- XII)
DESIGNS OF EXPERIMENT

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) In RBD with 5 treatments and 4 replicates a treatment is added, the increase in error degrees of freedom will be: _____.
    a) 1   b) 2
    c) 3   d) 4

2) In a RBD, which of the following is an unbiased estimator of error variance?
    a) Treatment sum of squares   b) Treatment mean sum of squares
    c) Error sum of squares   d) Error mean sum of squares

3) The factors like date of sowing and breeds are often used as: _____.
    a) experimental unit   b) Treatments
    c) replicates   d) none of these

4) Randomization is a process in which the treatments are allocated to the experimental units: _____.
    a) In a sequence   b) With equal probability
    c) At the will of the investigator   d) None of these

5) A LSD controls: _____.
    a) two way variation   b) three way variation
    c) multi-way variation   d) None of these

6) In CRD with 5 treatments, degrees of freedom for treatment S.S is: _____.
    a) 3   b) 4
    c) 5   d) 6

7) The total number of interaction effects in a 2^2 factorial experiment is: _____.
    a) 1   b) 2
    c) 3   d) 4

8) The analysis of split-plot design consists of: _____.
    a) Main-lot analysis   b) Sub-plot analysis
    c) Both a) and b)   d) Neither a) nor b)

9) If different effects are confounded in different replicates, it is said to be _____.
    a) Complete confounding   b) Balanced confounding
    c) Partial confounding   d) None of these

10) In a LSD, number of rows, columns and treatments are: _____.
    a) all different   b) always equal
    c) not necessarily equal   d) None of these

11) In RBD with 4 blocks and 5 treatments having one missing value, the error degrees of freedom in ANOVA table will be: _____.
a) 12
b) 11
c) 10
d) 9

12) A medicine is a treatment applied to: _____.
a) A patient
b) A field plot
c) Both a) and b)
d) None of these

13) Local control helps to: _____.
a) Reduce the no. of treatments
b) Increase the no. of plots
c) Reduce the error variance
d) Increase the error d.f.

14) A factorial experiment with three factors each at two levels is called: _____.
a) 2×3 factorial experiment
b) 3×2 factorial experiment
c) 3^2 factorial experiment
d) 2^3 factorial experiment

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Explain split-plot design.
2) Explain total confounding.
3) State the mathematical model used in R.B.D.
4) Define critical difference (C.D.)
5) Describe randomization principle of design of experiment.

B) Write Notes on: (Any Two)   **06**
1) Define block and yield.
2) Give analysis of variance table in case of LSD.
3) State formula to obtain two missing values in RBD.

Q.3 A) Answer the following questions. (Any two)   **08**
1) What is meant by interaction effect in a 2^2 factorial experiment?
2) What is RBD? Give its ANOVA table.
3) Define treatment with an illustration.

B) Answer the following question. (Any One)   **06**
1) Explain Yate's procedure to obtain factorial effect totals in a 2^2 factorial experiment.
2) Give layout of Latin square design.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Describe the ANOVA technique for one- way classification.
2) Obtain the formula for estimating efficiency of RBD over CRD.
3) Explain the procedure of testing equality of two specified means in case of RBD.

B) Answer the following question. (Any One)   **04**
1) Give situations where missing plot technique is applicable.
2) Derive the expression for interaction effects in 2^3 factorial experiment.

Q.5 Answer the following questions. (Any two)   **14**
a) Derive the equations to estimate two missing values in LSD.
b) Obtain the formula for estimating efficiency of LSD over CRD.
c) Explain two principles of design of experiments; local control and replication.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
English (Compulsory)
GOLDEN PETAL

Day & Date: Thursday, 07-11-2019　　　　　　　　　　　　　Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing correct alternative given below.　14

1)　Charlie Chaplin was of _____ years old, when he entered in the film industry.
　　a)　31　　　　　　　　　　　　b)　29
　　c)　35　　　　　　　　　　　　d)　25

2)　Charlie Chaplin was signed with _____ dollars a week by the keystone production company.
　　a)　160　　　　　　　　　　　　b)　150
　　c)　170　　　　　　　　　　　　d)　151

3)　Charlie Chaplin was born in _____.
　　a)　1924　　　　　　　　　　　b)　1915
　　c)　1914　　　　　　　　　　　d)　1920

4)　Shanti Tigga joined the Territorial Army at the age of _____.
　　a)　27　　　　　　　　　　　　b)　35
　　c)　28　　　　　　　　　　　　d)　31

5)　Shanti Tigga was awarded by _____ for her extra ordinary achievements.
　　a)　Smt. Indira Gandhi　　　　　b)　Smt. Pratibha Patil
　　c)　Smt. Sushama Swaraj　　　　d)　Smt. Sonia Gandhi

6)　Shanti Tigga was kidnapped on May 29 _____.
　　a)　2011　　　　　　　　　　　b)　2010
　　c)　2012　　　　　　　　　　　d)　2013

7)　When the _____ dies our soul continues to exits.
　　a)　heart　　　　　　　　　　　b)　body
　　c)　mind　　　　　　　　　　　d)　voice

8)　Nachiketa waited at the gates of Yama for _____ days without food or water.
　　a)　4　　　　　　　　　　　　　b)　2
　　c)　5　　　　　　　　　　　　　d)　3

9)　Vajasrawas told Nachiketa to go to Yama out of _____.
　　a)　anger and annoyance　　　　b)　sadness and melancholy
　　c)　love and affection　　　　　d)　strength and admiration

10)　The poem I Find No Peace is written by _____.
　　a)　Sir Charles　　　　　　　　b)　Sir Thomas Wyatt
　　c)　Sir Alfred Wyatt　　　　　　d)　Sir Thomas Kyd

11)　Emily Dickinson is from _____.
　　a)　Africa　　　　　　　　　　b)　America
　　c)　England　　　　　　　　　d)　Ireland

12) Are you staying at _____ Bristol Hotel?
   a) an   b) in
   c) the   d) a

13) Last week, I _____ him twice in connection of the purchase of the car.
   a) Met   b) Meet
   c) Meeting   d) Will meet

14) Ram has written all the information in his book. What is the tense of the sentence?
   a) Present defect
   b) Past perfect
   c) Present perfect continuous tense
   d) Past perfect continuous tense

Q.2 Answer any four of the following questions.   **16**
   a) How did Chaplin get his first role in the films?
   b) Describe the get up of Charlie Chaplin.
   c) What did Shanti Tigga's relative feel about - her death?
   d) Describe the first woman Jawan - Shanti Tigga in your words.
   e) What did Nachiketa learn from Yama Deva?
   f) What were the three boons that Nachiketa ask of the God of Death?

Q.3 Answer any two of the following questions.   **12**
   a) What is the theme of the poem - I Find No Peace?
   b) What is the theme of the poem - Success is counted sweetest?
   c) Describe in detail what is communication.
   d) You forgot to do your homework and got scolded by the teacher. State possible causes for it.

Q.4 Answer any one of the following questions.   **14**
   Explain where and why the following communication channels are used in making communication effective Email, Video calls, Mobile phones, radio and movies.
                                    OR
   Why do you think we need language skills and vocabulary to communicate our thoughts to others?

Q.5 Define communication. What makes communication effective?   **14**

Seat No.

Set **P**

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Microbiology (Special Paper –XII)
MICROBIAL BIOCHEMISTRY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The process of conversion of soil No_3 to N_2 is called _____.
   a) nitrification   b) denitrification
   c) ammonification   d) nitrogen fixation

2) _____ is the composition of nucleoside.
   a) A sugar + base   b) A sugar + phosphate
   c) A base + phosphate   d) Phosphate + histidine

3) _____ is allosteric protein.
   a) Gelatin   b) Albumin
   c) Globulin   d) Hemoglobin

4) Urease is example of _____ specificity.
   a) relative   b) absolute
   c) group   d) Steriochemical

5) _____ is inactivator for aspartate transcarbamoylase.
   a) TTP   b) UTP
   c) CTP   d) ATP

6) _____ acid contains pyrimidine nucleus and is the key intermediate in pyrimidine synthesis.
   a) Orotic   b) Inosinic
   c) Acetic   d) Citric

7) In _____ CAP/CRP binds with DNA.
   a) end production inhibition   b) feedback inhibition
   c) catabolite repression   d) end product repression

8) GOGAT play role in assimilation of _____.
   a) Carbon   b) Sulfate
   c) Phosphate   d) Ammonia

9) _____ is starting amino acid in protein synthesis in prokaryotes.
   a) Methionine   b) N - formyl methionine
   c) Aspartic acid   d) Glutamic acid

10) _____ is nonsense codon.
   a) UAG   b) AUG
   c) GAU   d) AGU

11) Enzyme is _____.
   a) Biocatalyst   b) Buffer
   c) Inhibitor   d) Mordant

12) Non protein inorganic component is called _____.
    a) Coenzyme   b) Coactivator
    c) Cofactor   d) Prosthetic group

13) Lux gene is responsible for _____ property of bacteria.
    a) Luminescent   b) Antigenic
    c) Phagocytic   d) Sporulating

14) _____ is used in immobilization.
    a) $NaCO_3$ b) $NaNO_3$
    c) $NaCl_2$ d) Na - alginate

Q.2 Attempt any seven of the following questions.   **14**
   1) Stereo chemical specificity
   2) Properties of enzymes
   3) List luminescent bacteria
   4) Operon
   5) Ribozyme
   6) Transcription
   7) Nucleotide
   8) Carboxysomes
   9) Translocation

Q.3 A) Attempt any two of the following questions.   **10**
   1) Extraction of extracellular enzymes
   2) Initiation protein synthesis
   3) Enzyme assay

   B) Ion exchange chromatography.   **04**

Q.4 Attempt any two of the following question.   **14**
   a) Glyonylate cycle
   b) Arabinose operon
   c) Assimilation of carbon

Q.5 Attempt any two of the following.   **14**
   a) Hexose mono phosphate pathway
   b) Gel electrophoresis
   c) Bioluminescence

Seat No.

Set | **P**

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Electronics (Special Paper- XII)
ADVANCED COMMUNICATION

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams wherever necessary.
4) Use of log table and calculator is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   _____ is the best source of light for fiber optic communication.
    a) Bulb   b) LED
    c) ILD   d) LCD

2)   The main function of a communication satellite is as a _____.
    a) repeater   b) reflector
    c) recorder   d) receiver

3)   The height of geostationary satellite is about _____ km.
    a) 35800   b) 3600
    c) 800   d) 200

4)   Cellular telephones use _____ type of operation.
    a) simplex   b) half duplex
    c) full duplex   d) triplex

5)   The transmission of user from weaker cell to stronger cell is called as _____.
    a) hand off   b) transfer
    c) migration   d) none

6)   Refractive index of core is _____ that of clad.
    a) less than   b) equal to
    c) greater than   d) double

7)   Microwaves are the frequencies above _____.
    a) $1 KH_z$ b) $1 MH_z$
    c) $1 GH_z$ d) $1 H_z$

8)   The cavities in klystron tube produce _____ modulation of electron beam.
    a) amplitude   b) frequency
    c) phase   d) velocity

9)   The most widely used data communication code is _____.
    a) Baudot code   b) Morse code
    c) ASCII code   d) None

10)   For high speed data communication the bandwidth of communication channel must be _____.
    a) zero   b) low
    c) moderate   d) high

11)   _____ is the most widely used LAN configuration.
    a) Star   b) Ring
    c) Bus   d) Delta

12) _____ is not a microwave device.
 a) BJT   b) Tunnel diode
 c) Gunn diode   d) Klystron tube

13) The cellular system operates in the _____ frequency range.
 a) 800-900 H_z b) 800-900 KH_z
 c) 800-900 MH_z d) 800-900 GH_z

14) In C-band the up link and down link frequencies are _____ respectively.
 a) 6 GH_z and 4 GH_z b) 4 GH_z and 6 GH_z
 c) 12 GH_z and 14 GH_z d) 14 GH_z and 12 GH_z

Q.2 A) Answer the following questions. (Any Four)   **08**
 1) What is protocol?
 2) Define bit rate and baud rate.
 3) Give the applications of satellite communication.
 4) What is geostationary satellite? What is its advantage?
 5) What is wave guide?

B) Write Notes on: (Any Two)   **06**
 1) Transmission line
 2) Transponder
 3) Morse code

Q.3 A) Answer the following questions. (Any two)   **08**
 1) Explain step index and graded index fibers.
 2) Write a note on cavity resonator.
 3) Explain the working of Gunn diode.

B) Answer the following question. (Any One)   **06**
 1) What is LAN, MAN and WAN?
 2) Explain the principle and working of pulsed radar.

Q.4 A) Answer the following questions. (Any Two)   **10**
 1) Explain the working of klystron tube.
 2) Explain the block diagram of QPSK modulator.
 3) Explain optical transmitter using LED.

B) Answer the following question. (Any One)   **04**
 1) Explain in brief the block diagram of mobile hand set.
 2) Write a note on internet.

Q.5 Answer the following question. (Any Two)   **14**
 a) What are different network topologies? Explain star, ring and bus topologies.
 b) Explain the block diagram of optical fiber communication system.
 c) Explain earth station in satellite communication.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Computer Science (Special Paper – XII)
ADVANCED JAVA

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   _____ is not related with servlet.
  a) init ( )   b) service ( )
  c) destroy ( )   d) load ( )

2)   _____ interface is used for handling events generated by JButton.
  a) MouseListener   b) KeyListener
  c) ActionLisener   d) ItemListener

3)   _____ method is used to perform INSERT statements in JDBC.
  a) execute ( )   b) executeQuery ( )
  c) executeUpdate ( )   d) all above

4)   JSTL stands for _____.
  a) Java Server Tag Library   b) JSP Server Tag Library
  c) JSP Standard Tag Library   d) Java Standard Tag Library

5)   _____ is NOT a directive.
  a) page   b) include
  c) Taglib   d) scriptlet

6)   Which is the correct syntax to declaration of JSP element?
  a) <%! Code !%>   b) <%! Code %>
  c) <jsp: scriptlet code />   d) <% jsp code %>

7)   _____ loads Driver specific Classes.
  a) Driver   b) JDBC
  c) DriverManager   d) All

8)   _____ invokes Servlet.
  a) Web Browser   b) Web Server
  c) JVM   d) a & b

9)   _____ package represents classes and interfaces for HTTP request only.
  a) javax.servlet   b) javax.servlet.http.*
  c) javax.servlet.api.*   d) a & b

10) _____ used to execute SQL Procedure or Function.
  a) Statement   b) PreparedStatement
  c) CallableStatement   d) All

11) writeString ( ) method of Graphics class is used to draw a string on a Applet.
  a) True   b) False

12) Web component settings can be described by Deployment Descriptor.
  a) True   b) False

13) TheResultSet.RowNextUp ( ) method is used to move next row of resultset.
   a) True   b) False

14) JSP session object is used to get initialization parameter from web.xml.
   a) True   b) False

Q.2 A) Solve Any Four.   **08**
1) List out uses of CallableStatements.
2) Define Cookies.
3) List Out applications of servlet.
4) What is MVC?
5) List out uses of ServletContext Object.

B) Solve Any Two   **06**
1) List out uses of Filter.
2) Explain JSP Taglib directive.
3) Differentiate between JSP and Servlet.

Q.3 A) Solve Any Two   **08**
1) Write a servlet program to display "Welcome" message.
2) Write a note on servlet Life Cycle.
3) Write a note on JSP Response Object.

B) Solve Any One   **06**
1) Explain JSTL core tags with advantages.
2) Write a JSP page to create custom tag which display simple message.

Q.4 A) Solve Any Two   **08**
1) List out difference between Get and Post methods.
2) Explain JButton Class with example.
3) Write a note on JSP Exception Handling.

B) Solve Any One   **06**
1) Write a program to demonstrate use of include directive in JSP.
2) Explain JCheckBox Component with Example.

Q.5 Solve any two   **14**
a) What is Java Bean? List out advantages and dis-advantages of Java Beans.
b) Explain Different types of LayoutManager.
c) Write a program to display student record (rollnum, stud_name, class, div, cell_number etc).from STUD table. (Use TYPE-IV Drivers).

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Physics (Special Paper - XIII)
ATOMIC, MOLECULAR PHYSICS AND QUANTUM MECHANICS

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
        2) Figures to the right indicate full marks.
        3) Neat diagram must be drawn wherever necessary.
        4) Use of log tables and calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) In Alkali spectra, the selection rule for j in emission transition is _____.
   a) $\Delta j = 0$ b) $\Delta j = \pm 1$
   c) $\Delta j = 0, \pm 1$ d) $\Delta j = \pm 2$

2) The $1s^2\, 2s^2\, 2p^6\, 3s^1$ is the electronic configuration of _____.
   a) Li   b) Na
   c) K   d) Rb

3) If the coupling between 1* and s* is broken in an external magnetic field, then we observe _____.
   a) Anomalous Zeeman effect   b) Stark effect
   c) Strong field Stark effect   d) Paschen-Back effect

4) In strong field Stark effect the degeneracy in fine structure is lifted to 4 levels for n = _____.
   a) 1   b) 2
   c) 3   d) 4

5) The rotational kinetic energy of a diatomic molecule for J = 2 is _____.
   a) 0B   b) 2B
   c) 4B   d) 6B

6) Raman shift occurs in _____.
   a) Infra-red   b) Ultaviolet
   c) Visible   d) Microwave

7) If e^{3x} is eigen function and d^2/dx^2 is operator the eigen value of function is _____.
   a) 9   b) 6
   c) 3   d) 12

8) The momentum operator is given by _____.
   a) $\dfrac{\hbar}{i}\dfrac{\partial^2}{\partial x^2}$ b) $i\hbar\dfrac{\partial}{\partial x}$
   c) $\dfrac{\hbar}{i}\dfrac{\partial}{\partial x}$ d) $-\dfrac{\hbar}{i}\dfrac{\partial^2}{\partial x^2}$

9) The separation between two successive energy levels in Harmonic oscillator is _____.
   a) $2\hbar w$ b) $\hbar w$
   c) $3/2\hbar w$ d) $1/2\hbar w$

10) Eigen value of L_z is _____.
    a) $m^2\hbar$　　　　　　　　　　　　b) $m\hbar^2$
    c) mh　　　　　　　　　　　　　　d) $m\hbar$

11) The Hamiltonian operator is given by _____.
    a) $-i\hbar\frac{\partial}{\partial x}$　　　　　　　　　　b) $i\hbar\frac{\partial}{\partial t}$
    c) $-\frac{\hbar^2}{2m}\nabla^2 + V(r)$　　　　　d) $-\frac{\hbar^2}{2m}\nabla^2$

12) The zero point energy of Linear Harmonic Oscillator is given by _____.
    a) $1/2\hbar w$　　　　　　　　　　　b) $\hbar w$
    c) 0　　　　　　　　　　　　　　d) mc^2

13) There can be only _____ electrons with same principle quantum number.
    a) $2n$　　　　　　　　　　　　　b) $2n^2$
    c) n^2　　　　　　　　　　　　　d) n

14) For a free particle the potential energy $V(r) =$ _____.
    a) +1　　　　　　　　　　　　　　b) -1
    c) ∞　　　　　　　　　　　　　d) 0

Q.2　A)　Answer the following questions. (Any Four)　　　　　　　　08
1) Define principle quantum number and spin quantum number.
2) Write selection rules for Paschen-Back effect.
3) Draw neat labeled diagram for vibrational-rotational transitions.
4) Calculate De-broglie wavelength of an electron which has energy 12 eV. (m=9.1X10^{-31}kg)
5) Write Schrodinger's wave equation for 1-D time independent equation.

B)　Answer the following questions. (Any Two)　　　　　　　　06
1) Write characteristic properties of Raman lines.
2) What are the requirements of wave function ψ?
3) Obtain Eigen values of L_z.

Q.3　A)　Answer the following questions. (Any Two)　　　　　　　08
1) Explain in brief spectrum of Sodium.
2) Write a note on electronic spectra of Diatomic molecule.
3) Calculate ground state energy and first excited state energy of an electron confined to move in 1-D box of length 1A^0.
   (h = 6.626X10^{-34} J-s, m = 9.1X10^{-31}kg)

B)　Answer the following questions. (Any One)　　　　　　　　06
1) Write a note on Stark effect of Hydrogen atom.
2) What are the intensity rules of fine structure doublet?

Q.4　A)　Answer the following questions. (Any Two)　　　　　　　10
1) Write a note on zero point energy.
2) Derive Schrodinger's time independent wave equation in one dimension.
3) Calculate the rotational energy of NO corresponding to J=1 in joules and cm^{-1} assuming it as a rigid rotator.
   (^{14}N = 14.004 amu, ^{16}O = 15.9994amu, bond length = 115pm, C = 3 x 10^8 m/s, h = 6.626X10^{-34} J-s)

B)　Answer the following questions. (Any One)　　　　　　　　04
1) What is Paschen-Back effect? Draw principal series doublets in Paschen Back effect.
2) Write a short note on linear harmonic oscillator.

Q.5 **Answer the following questions. (Any Two)** **14**

    a) Solve Schrodinger's equation for hydrogen atom and discuss the radial wave equation.

    b) Apply Schrodinger's wave equation to a particle in 1D rigid box to calculate energy eigen values, give energy levels.

    c) Obtain an expression for rotational energy of a Diatomic molecule with rotational energy levels.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov- 2019
Chemistry (Special Paper - XIII)
ORGANIC CHEMISTRY

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.
             3) Draw neat diagrams and give equations whenever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) In Cellulose glucose units are joined by _____ glycosidic bonds.
   a) $\beta - 1:4$ b) $\beta - 1:6$
   c) $\propto -1:4$ d) $\propto -1:6$

2) In Skraup's synthesis of quinoline _____ is used as an oxidizing agent.
   a) aniline   b) nitrobenzene
   c) H_2SO_4 d) glycerol

3) $\propto -D(+)$ glucose and $\beta - D(+)$ glucose differ only in the configuration at _____ carbon atom.
   a) C-1   b) C-2
   c) C-3   d) C-4

4) Quinoline on sulphonation gives _____.
   a) quinoline - 2 - sulphonic acid   b) quinoline - 4 - sulphonic acid
   c) quinoline - 6 - sulphonic acid   d) quinoline - 8 - sulphonic acid

5) Adrenaline is a _____derivative.
   a) resorcinol   b) quinol
   c) catechol   d) p-nitroaniline

6) Reaction of ethyl isonicotinate with hydrazine forms _____.
   a) penicillin - G   b) tolbutamide
   c) isoniazide   d) brufen

7) Chloromycetin is an example of _____.
   a) analgesics   b) anesthetics
   c) sedatives   d) antibiotics

8) Thiazolidine ring is present in _____ drug.
   a) Penicillin – G   b) Penicillin – V
   c) Penicillin – O   d) All these

9) Synthetic fibres are dyed with _____ dyes.
   a) disperse   b) indigo
   c) mordant   d) sulphur

10) The chromophore present in nitroso dye is _____.
    a) $-NO_2$ b) $-N=N-$
    c) $-N=0$ d) $-N=S$

11) For chain shortening of carbohydrates _____ reaction is used.
    a) Chichibabin   b) Weerman
    c) Kiliani   d) None of these

12) Chemical name of ethophan is _____.
   a) 2- chloroethyl phosphoric acid
   b) 1- chloroethyl phosphoric acid
   c) chloromethyl phosphoric acid
   d) dichloromethyl phosphoric acid

13) _____ is a natural insecticide.
   a) DDT
   b) IAA
   c) Carbaryl
   d) Pyrethrum

14) Thyroxine is a _____ derivative of thyronine.
   a) monoiodo
   b) diiodo
   c) triiodo
   d) tetraiodo

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Pyrrole is weaker base than pyridine. Why?
   2) Draw the structure of Sucrose.
   3) Explain the terms :
      i) Analgesics
      ii) Antipyretics
   4) How will you prove that thyroxine contains primary amino and carboxyl group?
   5) What are ingrain dyes? Write their types.

B) Write Notes on (Any Two)   **06**
   1) Chair conformations of $\propto -D(+)$ glucose and $\beta - D(+)$ glucose
   2) Qualities of an ideal drug
   3) Synthesis of Carbaryl

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) How will you convert glucose into fructose?
   2) Give the synthesis and uses of tolbutamide.
   3) What are agrochemicals? How are they classified?

B) Answer the following question. (Any One)   **06**
   1) Give any two methods for the synthesis of pyrrole. What is the action of following reagents on pyrrole
      i) CrO_3/H_2SO_4
      ii) Br_2/CH_3OH
      iii) $C_6H_5N_2Cl$
   2) How is the constitution of vitamins – A established on the basis of analytical evidences?

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain mutarotation with its mechanism.
   2) What are hormones? Give the method for the synthesis of adrenaline.
   3) How is malachite green synthesized?

B) Answer the following questions. (Any One)   **04**
   1) Define antimalarials. Give the synthesis of Paludrine.
   2) What are heterocyclic compounds? Explain S_E and S_N reactions of quinoline with one example of each.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Discuss the method used for the determination of configuration of $D(+)$ glucose form $D-$arabinose.

b) How is pyridine prepared from -
   i)   acetylene and hydrogen cyanide
   ii) Piperidine
   Complete the following reactions -

$$\text{(pyridine)} \xrightarrow[\;300^0\ C\;]{KNO_3\ /\ H_2SO_4} \quad ?$$

$$\text{(pyridine)} \xrightarrow[\;300^0\ C\;]{SO_3\ /\ H_2SO_4} \quad ?$$

$$\text{(pyridine)} \xrightarrow{NaNH_2\ /\ 100^0\ C} \quad ?$$
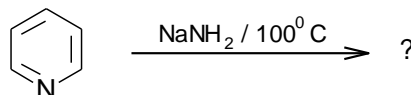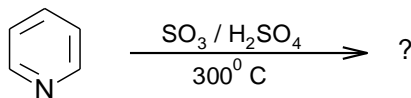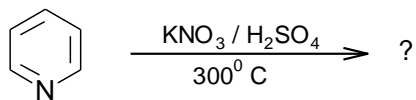
c) What are dyes? How are they classified on the basis of structure? Give the synthesis of phenolphthalein.

Seat No.

Set **P**

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Botany (Special Paper – XIII)
MICROBIAL GENETICS, PLANT BREEDING AND BIOSTATISTICS

Day & Date: Thursday, 10-10-2019　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　 2) Draw neat and labelled diagrams wherever necessary.
　　　　　　　 3) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**
　　1)　The uptake of DNA from surrounding by a bacterium is called as _____.
　　　　a)　Transformation　　　　　　b)　Recombination
　　　　c)　Conjugation　　　　　　　d)　Transduction

　　2)　Sugarcane is improved by _____ Selection method.
　　　　a)　Mass　　　　　　　　　　b)　Clonal
　　　　c)　Pure line　　　　　　　　d)　Both a and b

　　3)　TMV is single stranded _____.
　　　　a)　DNA Molecule　　　　　　b)　RNA Molecule
　　　　c)　DNA + Protein Molecule　　d)　RNA + Protein Molecule

　　4)　Cotton is improved by _____.
　　　　a)　Introduction　　　　　　　b)　Mutation breeding
　　　　c)　Hybridization　　　　　　d)　All the above

　　5)　The genetic material in virus is _____.
　　　　a)　DNA & RNA　　　　　　　b)　RNA Only
　　　　c)　DNA Only　　　　　　　　d)　None of these

　　6)　The mean is _____.
　　　　a)　The statistical or arithmetic average
　　　　b)　The middle most score
　　　　c)　The most frequently occurring score
　　　　d)　All the above

　　7)　The Data represented in circle form is called _____.
　　　　a)　Pie diagram　　　　　　　b)　Bar diagram
　　　　c)　Line diagram　　　　　　d)　Point diagram

　　8)　In plant, polyploidy is artificially induced by _____.
　　　　a)　Radiation　　　　　　　　b)　Injury
　　　　c)　Chemical　　　　　　　　d)　All the above

　　9)　_____ is not a method of data collection.
　　　　a)　Questionnaires　　　　　　b)　Interview
　　　　c)　Experiment　　　　　　　d)　Observation

　　10)　Aim of plant breeding is to produce _____.
　　　　a)　High yielding varieties　　　b)　Disease resistant varieties
　　　　c)　Early maturing varieties　　d)　All the above

　　11)　T-series bacteriophage can be recognized by its _____.
　　　　a)　Irregular shape　　　　　　b)　Rounded shape
　　　　c)　Tadpole shape　　　　　　d)　Rhomboidal shape

12) Central sugarcane breeding research institute is situated at _____.
   a) Lucknow   b) Delhi
   c) Coimbatore   d) Pune

13) _____ is chemical mutagenic agent used in mutation breeding.
   a) DES   b) EMS
   c) MMS   d) All the above

14) DNA viruses are _____ shaped.
   a) Helical   b) Tadpole
   c) Disc   d) Rod

Q.2 A) Answer the following questions. (Any Four)   08
   1) Draw and label T-4 bacteriophage.
   2) What is Selection?
   3) Define Transformation.
   4) What is Hybridisation?
   5) What is Clone?

B) Write notes on (Any Two)   06
   1) Define the terms Mean, Mode and Median.
   2) Chi-square test
   3) Transduction

Q.3 A) Answer the following questions. (Any Two)   08
   1) Explain t- test.
   2) Describe the method of preservation of Data.
   3) Calculate Median of following data
      12, 22, 26,18, 28

B) Answer the following questions. (Any One)   06
   1) Role of Mutation in plant breeding.
   2) Give the applications of computer in plant science.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Describe the method of mass selection.
   2) Describe Conjugation.
   3) Explain RNA viruses.

B) Answer the following questions. (Any One)   04
   1) Describe the method of Clonal selection.
   2) Give the Aims and Objectives of plant breeding.

Q.5 Answer the following questions. (Any Two)   14
   a) Explain graphical representation of Data.
   b) Explain in detail pure line selection.
   c) Describe the method of plant breeding in cotton and sugarcane.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Zoology (Special Paper- XIII)
MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Day & Date: Thursday, 10-10-2019　　　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Draw neat labeled diagrams wherever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) Beads on a string structure relates to _____ structure.
　　a) Transcriptome　　　　　　　　b) Genome
　　c) Proteome　　　　　　　　　　d) Nucleosome

2) Classical transformation experiment was performed by _____.
　　a) Griffith　　　　　　　　　　b) Beadum
　　c) Blanford　　　　　　　　　　d) Franklin

3) Replication always takes place by _____ method.
　　a) Conventional　　　　　　　　b) Conservative
　　c) Semi conservative　　　　　　d) Dispersive

4) The process of formation of RNA from gene is known as _____.
　　a) Translation　　　　　　　　　b) Transcription
　　c) Replication　　　　　　　　　d) Reverse Transcription

5) _____ codon serves as a termination codon.
　　a) AUG　　　　　　　　　　　　b) GUG
　　c) UGA　　　　　　　　　　　　d) AUA

6) Poly-A-tail is added to which type of RNA _____.
　　a) m-RNA　　　　　　　　　　　b) r-RNA
　　c) Sn-RNA　　　　　　　　　　　d) t-RNA

7) _____ bond formed between amino acids during protein synthesis.
　　a) Phosphodiester　　　　　　　b) Peptide
　　c) Hydrogen　　　　　　　　　　d) Ester

8) _____ cell organelle is involved in translation of genetic information from m-RNA.
　　a) Lysosome
　　b) Golgi Complex
　　c) Ribosome
　　d) Smooth Endoplasmic Reticulum

9) The nucleotide sequence on m-RNA is read by t-RNA as _____ called codons.
　　a) Doublets　　　　　　　　　　b) Singlets
　　c) Quadrates　　　　　　　　　d) Triplets

10) _____ technique is used to detect unknown protein from a sample.
　　a) Western Blotting　　　　　　b) Northern Blotting
　　c) RFLP　　　　　　　　　　　d) DNA Microarray

11) Kohler and Milstein are credited with the discovery of _____ technology.
   a) Electrophoresis
   b) Hybridoma Technology
   c) DNA Fingerprinting
   d) Blotting

12) A total of 64 codons code for _____ types of amino acids.
   a) 61
   b) 64
   c) 20
   d) 22

13) _____ are radiolabelled molecules used to detect target nucleotide fragments.
   a) Probes
   b) Primers
   c) Promoters
   d) Enhancers

14) Hybridoma technology is used to synthesize _____.
   a) Insulin
   b) Growth hormone
   c) Interferons
   d) Monoclonal antibodies

Q.2 A) Answer the following questions. (Any Four) 08
   1) *Taq* Polymerase
   2) DNA Probes
   3) Polyribosome
   4) Anticodon
   5) Polyadenylation

B) Write Notes on (Any Two) 06
   1) Discuss solenoid model of nucleosome.
   2) Elaborate the applications of monoclonal antibodies.
   3) Briefly discuss the mechanism of capping of eukaryotic m-RNA and its application.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Explain with suitable example properties and advantages of plasmid vector.
   2) Discuss general mechanism of splicing of introns.
   3) Define and discuss hybridoma technology.

B) Answer the following question. (Any One) 06
   1) Describe RNA polymerase in prokaryotes.
   2) Explain the principle, methodology and applications of PCR.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Explain the mechanism of replication in prokaryotes.
   2) Discuss the principle and applications of Northern blotting.
   3) Elaborate the properties of genetic code and add a note on wobble hypothesis.

B) Answer the following question. (Any One) 04
   1) Discuss the role of restriction enzymes and DNA ligase in recombinant DNA technology.
   2) Explain the principle, method and applications of Southern blotting.

Q.5 Answer the following questions. (Any Two) 14
   a) Describe the mechanism of transcription in prokaryotes.
   b) Discuss steps involved in translation.
   c) Explain the principle, mechanism and applications of DNA fingerprinting.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Mathematics (Special Paper – XIII)
INTEGRAL TRANSFORM

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) $L\left\{\frac{e^{at}+e^{-at}}{2}\right\} =$ _____.
   a) $p/_{p^2 + a^2}$
   b) $p/_{p^2 - a^2}$
   c) $2p/_{p^2 - a^2}$
   d) None of these

2) If $L\{f(t)\} = f(p)$ then $L\{e^{-at}f(t)\} =$ _____.
   a) $af(p)$
   b) $f(p + a)$
   c) $\frac{1}{a}f(p)$
   d) None of these

3) If $L\{f(t)\} = f(p)$ then $L\{t^2 f(t)\} =$ _____.
   a) $(-1)^2 \frac{d}{dp}f(p)$
   b) $(-1)^2 \frac{d^2}{dp^2}f(p)$
   c) $\frac{d^2}{dp^2}f(p)$
   d) None of these

4) If $L\{f(t)\} = f(p)$ then $L\{f'''(t)\} =$ _____.
   a) $p^3 f(p) - p^2 f(0) - pf'(0) - f''(0)$
   b) $p^2 f(p) - pf(0) - f'(0)$
   c) $p^2 f(p) + pf(0) - f'(0)$
   d) None of these

5) The initial value theorem is _____.
   a) $\lim_{t\to\infty} f(t) = \lim_{p\to 0} pf(p)$
   b) $\lim_{t\to 0} f(t) = \lim_{p\to\infty} pf(p)$
   c) $\lim_{t\to\infty} f(p) = \lim_{p\to\infty} pf(p)$
   d) None of these

6) If $L^{-1}\{f(p)\} = f(t)$ then $L^{-1}\{f(Kp)\} =$ _____.
   a) $Kf(t)$
   b) $\frac{1}{K}f(t)$
   c) $\frac{1}{K}f(t/K)$
   d) None of these

7) $L^{-1}\left\{p/_{p^2 + a^2}\right\} =$ _____.
   a) $\frac{\cos at}{a}$
   b) $\cos at$
   c) $\frac{\cos at}{p}$
   d) None of these

8) The value of $|\star|\star|\star|$ ----- n times = _____.
   a) t^{n-1}
   b) $\frac{t^{n-1}}{(n-1)!}$
   c) $\frac{t^{n-1}}{n!}$
   d) None of these

9) If $L^{-1}\left\{\frac{1}{p-a}\right\} = e^{at}$ then $L^{-1}\left\{\frac{1}{(p-a)^3}\right\} = $ _____.
  a) $t^2 e^{at}$
  b) $\frac{1}{2} t^2 e^{at}$
  c) $t^3 e^{at}$
  d) None of these

10) $L^{-1}\left\{\frac{3}{p^2-3}\right\} = $ _____.
  a) $\sqrt{3} \sin h\sqrt{3}t$
  b) $\sin h\sqrt{3}t$
  c) $\sqrt{3} \sin \sqrt{3}t$
  d) None of these

11) The solution of $\frac{d^2y}{dt^2} + y = 0$ under condition that $y = 1, \frac{dy}{dt} = 0$ when $t = 0$ is _____.
  a) $\sin t$
  b) $\cos t$
  c) $\cos ht$
  d) None of these

12) If $y(x,t)$ is function of x and t the $L\left\{\frac{\partial^2 y}{\partial t^2}\right\} = $ _____.
  a) $p^2\bar{y}(x,p) - py(x,0) - y_t(x,0)$
  b) $p^2\bar{y}(xp) + py(x,0)$
  c) $p^2\bar{y}(x,p) - py_t(x,0) - y(x,0)$
  d) None of these

13) If $y(x,t)$ is function of x and t then $L\left\{\frac{\partial y}{\partial t}\right\} = $ _____.
  a) $x\bar{y}(x,p) + y(x,0)$
  b) $p\bar{y}(x,p) - y(x,0)$
  c) $p\bar{y}(x,0) - y(x,p)$
  d) None of these

14) A rational algebraic function is called proper fraction if _____.
  a) degree of numerator = degree of denominator
  b) degree of numerator > degree of denominator
  c) degree of numerator < degree of denominator
  d) None of these

Q.2 A) Answer the following questions. (Any Four) 08
  1) Solve $L\{\sin t . \cos t\}$
  2) Solve $L\left\{\frac{e^{at}-1}{a}\right\}$
  3) Solve $L^{-1}\left\{\frac{1}{p^{7/2}}\right\}$
  4) State Learch's theorem.
  5) State Linearity property of Laplace transform.

B) Answer the following questions. (Any Two) 06
  1) Solve $L\{3 \sin h2t - 5 \cos h2t\}$
  2) Solve $L^{-1}\left\{\frac{p}{p^2+2} + \frac{6p}{p^2-16} + \frac{3}{p+3}\right\}$
  3) Solve $(D^2 - 2D + 2)y = 0 \quad y = Dy = 1$ when $t = 0$

Q.3 A) Answer the following questions. (Any Two) 08
  1) Evaluate $L\{\sin \sqrt{t}\}$
  2) Show that $L^{-1}\{f(p-a)\} = e^{at} L^{-1}\{f(p)\}$
  3) Solve $ty'' + y' + 4ty = 0$ when $y(0) = 3, y'(0) = 0$

B) Answer the following questions. (Any One) 06
  1) If $L\{f(t)\} = f(p)$ then $L\{f(at)\} = \frac{1}{a}f(p/a)$
  2) Solve $L^{-1}\left\{\log \frac{(p+3)}{(p+2)}\right\}$

Q.4 A) Answer the following questions. (Any Two) 10

1) If $f(t)$ is function of calls A and if $L\{f(t)\} = f(p)$ then show that
$$L\{t^n f(t)\} = (-1)^n \frac{d^n f(p)}{dp^n}$$

2) Evaluate $L^{-1}\left\{\frac{3p-7}{p^2-2p-3}\right\}$

3) Solve $\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial x^2}$, $y(x,0) = 3 \sin 2\pi x$, $y(0,t) = 0 = y(1,t)$, $0 < x < 1$, $t > 0$

B) Answer the following questions. (Any One) 04

1) Prove that
$$L^{-1}\left\{\frac{f(p)}{p^2}\right\} = \int_0^t \int_0^t f(x)dx \, dy$$

2) Prove that $L = \left\{\frac{\sin t}{t}\right\} = \tan^{-1} 1/p$ and hence find $L\left\{\frac{\sin at}{t}\right\}$.
Does the $L\left\{\frac{\cos at}{t}\right\}$ exist?

Q.5 Answer the following questions. (Any Two) 14

a) If $F(t)$ is periodic function with period $T > 0$ i.e. $F(u + T) = F(u), F(u + 2T=F(u)$ etc. then show that
$$L\{f(t)\} = \int_0^T \frac{e^{-Pt}}{1 - e^{-Pt}} f(t)dt$$

b) State and prove convolution theorem for inverse Laplace transformation.

c) Solve $(D - 2)x - (D + 1)y = 6e^{3t}$
$(2D - 3)x + (D - 3)y = 6e^{3t}$
with condition that $x(0) = 3, y(0) = 0$

Seat No.	

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Mathematics (Paper - XIII)
INTEGRAL TRANSFORM

Day & Date: Tuesday, 19-11-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                      2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) $L\{t^n\} =$ _____.
   a) $\frac{n!}{P^n}$
   b) $\frac{n!}{P^{n+1}}$
   c) $\frac{(n+1)!}{P^n}$
   d) $\frac{(n+1)!}{P^{n+1}}$

2) $L\{\sin 4t\} =$ _____.
   a) $\frac{4}{P^2+16}$
   b) $\frac{4}{P^2+4}$
   c) $\frac{P}{P^2+16}$
   d) $\frac{P}{P^2+4}$

3) $L\{f(t)\} = f(P)$ then $L\{e^{at}f(t)\} =$ _____.
   a) $af(p)$
   b) $\frac{1}{a}f(p)$
   c) $f(P+a)$
   d) $f(P-a)$

4) $L\{\sin h3t\} =$ _____.
   a) $\frac{3}{P^2-3}$
   b) $\frac{P}{P^2-9}$
   c) $\frac{3}{P^2-9}$
   d) $\frac{P}{P^2-3}$

5) $\int_0^\infty t\, e^{-3t}\, \sin t\, dt =$ _____.
   a) $\frac{3}{25}$
   b) $\frac{3}{50}$
   c) $\frac{2}{50}$
   d) $\frac{124}{125}$

6) $L^{-1}\left\{\frac{1}{P^2-a^2}\right\} =$ _____.
   a) $\frac{\sin hat}{a}$
   b) $\frac{\cos hat}{a}$
   c) $\sin hat$
   d) $\cos hat$

7) $L^{-1}\{f(P)\} = f(t)\}$ then $L^{-1}\{f(KP)\} =$ _____.
   a) $kf(kt)$
   b) $\frac{1}{k}f(kt)$
   c) $\frac{t}{k}f\left(t/k\right)$
   d) $\frac{1}{k}f\left(t/k\right)$

8) $L^{-1}\{f(p)\} = f(t)$ then $L^{-1}\{f^n(p)\} =$ _____.
   a) $t^n f(t)$
   b) $(-1)^n t^n f(t)$
   c) $(-1)^n f(t)$
   d) $(-1)^n \frac{d^n f(p)}{dp^n}$

9) Convolution of two function is always _____.
   a) Commutative
   b) Associative
   c) Both a and b
   d) None of these

10) $L^{-1}\left\{\frac{P}{(p^2+a^2)^2}\right\} = $ _____.

   a) $\frac{t\sin at}{2a}$

   b) $\frac{t\cos at}{2}$

   c) $t\sin at$

   d) $t\cos at$

11) If $L\{f(t)\} = f(p)$ then $L\{f''(t)\} = $ _____.

   a) $Pf(p) - f(o) - f'(o)$

   b) $P^2f(p) - pf(o) - f'(o)$

   c) $P^2f(p) - pf'(o) - f(o)$

   d) $P^2f(p) - f(o) - pf'(o)$

12) $| \star | \star | \star | $ ----- (n times) = _____.

   a) $\frac{t^n}{n!}$

   b) $\frac{t^{n-1}}{(n-1)!}$

   c) $\frac{t^{n-1}}{(n-1)}$

   d) $t^n/(n-1)!$

13) $L\{f(t)\} = f(p)$ then initial value theorem states that _____.

   a) $\lim_{t\to\infty} f(t) = \lim_{p\to 0} pf(p)$

   b) $\lim_{t\to 0} f(t) = \lim_{p\to\infty} pf(p)$

   c) $\lim_{t\to 0} f(t) = \lim_{p\to 0} pf(p)$

   d) $\lim_{t\to\infty} f(t) = \lim_{p\to\infty} pf(p)$

14) If $y(x,t)$ is function of X and t then $L\left\{\frac{\partial^2 y}{\partial t^2}\right\} = $ _____.

   a) $P^2\bar{y}(x,p) - py(x,o) - y_t(x,o)$

   b) $P^2\bar{y}(x,p) + py(x,o)$

   c) $P^2\bar{y}(x,o) - py_t(x,o) - y(x,o)$

   d) $P^2\bar{y}(x,p) - py_t(x,o) + y(x,o)$

Q.2 A) Answer the following questions. (Any Four)   **16**

   1) Find $L\{\sin t \cos t\}$

   2) State Linearity property of laplace transform.

   3) Find $L^{-1}\left\{\frac{4}{p-2}\right\}$

   4) Solve $L^{-1}\left\{\frac{6}{2p-3} - \frac{(3+4p)}{9p^2-16}\right\}$

   5) Find $L\{3\sin 2t - 2\cos 2t\}$

B) Answer the following questions. (Any Two)   **12**

   1) Find $L\{t\cos at\}$

   2) If $L^{-1}\{f(p)\} = f(t)$ then show that $L^{-1}\{f(p-a\} = e^{at}f(t)$

   3) Solve $\frac{d^2y}{dt^2} + y = 0$ under the condition that $y = 1, \frac{dy}{dt} = 0$ when $t = 0$.

Q.3 A) Answer the following questions. (Any Two)   **14**

   1) Find $L\{\sin\sqrt{t}\}$

   2) Find $L^{-1}\left\{\frac{3p-2}{p^2-4p+20}\right\}$

   3) Solve the differential equation using laplace transformation
   $y'' + 4y' + 4y = 4e^{-2t}, y(o) = -1, y'(o) = 4$

B) Answer the following questions. (Any One)

   1) Solve $L\{7e^{2t} + 9e^{-2t} + 5\cos t + 7t^3 + 5\sin 3t + 2\}$

   2) Find $L^{-1}\left\{Log\left(\frac{P+3}{P+2}\right)\right\}$

Q.4 A) Answer the following questions. (Any Two)

   1) If $f(t) = t^2, 0 < t < 2$ and $f(t+2) = f(t)$ find $L\{f(t)\}$

   2) Using convoluation theorem solve $L^{-1}\left\{\frac{1}{(p+1)(P+2)}\right\}$

   3) Solve $(D^2 + g)y = \cos 2t, y(0) = 1, y(^\pi/_2) = -1$

B) Answer the following questions. (Any One)

1) If $L\{f(t)\} = f(p)$ and $G(t) = \begin{cases} f(t-a) & t > a \\ 0 & t < a \end{cases}$ then show that

$$L\{G(t)\} = e^{-ap} f(p)$$

2) Prove that

$$L^{-1}\left\{\frac{f(p)}{p^2}\right\} = \int_0^t \int_0^t f(x)\, dxdy.$$

Q.5 Answer the following questions. (Any Two)   **14**

a) State and prove convolution theorem for inverse laplace transform.

b) Prove that $L\left\{\frac{\sin t}{t}\right\} = \tan^{-1}\frac{1}{p}$ and hence find $L\left\{\frac{\sin at}{t}\right\}$. Does $L\left\{\frac{\cos at}{t}\right\}$ exist?

c) Solve

$$Dx + Dy = t$$
$$D^2 x - y = e^{-t}$$

If $X(0) = 3, X'(0) = -2, y(0) = 0$.

Seat No.	

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Statistics (Special Paper- XIII)
LIMIT THEOREMS, RELIABILITY AND QUEUING THEORY

Day & Date: Thursday, 10-10-2019　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Use of scientific calculators and statistical tables is allowed.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) Which of the following statement/s is/are correct?
We can find distribution of _____ using order statistics of a random sample of odd size.
i)　$min\{Xi\}$
ii)　$Max\{Xi\}$
iii)　sample range
iv)　sample median
a)　only (i)　　　　　　　　　　b)　only (i) and (ii)
c)　only (i), (ii) and (iv)　　　　d)　all of these

2) If $\{Xn\}$, $\{Yn\}$ be two sequences of random variables (r.vs.) with $Xn \xrightarrow{p} x$ and $Yn \xrightarrow{p} Y$ where X and Y are r.vs., then _____.
a)　$(Xn + Yn) \xrightarrow{Law} X + Y$　　　b)　$(Xn\,Yn) \xrightarrow{p} X/Y$
c)　$(Xn/Yn) \xrightarrow{Law} \frac{X}{Y}$　　　　d)　$(Xn/Yn) \xrightarrow{Law} X$

3) Suppose $R_i(t)$ = reliability of ith component for $i = 1, 2$ and $R(t)$ is reliability of a series system of 2 independent components, then _____.
a)　$R(t) \leq R_1(t)$　　　　　　b)　$R(t) \leq Min\{R_1(t), R_2(t)\}$
c)　$R(t) \leq Max\{R_1(t), R_2(t)\}$　d)　$R(t) \leq R_2(t)$

4) If $Y_1 < Y_2 < \cdots < Yn$ is an order statistic from a distribution with pdf f(x) and CDF F(X) then probability distribution of Yr can be obtained using _____.
a)　of multinominal concept distribution
b)　concept of first definition of derivative
c)　both a and b
d)　neither a nor b

5) A three component parallel system works if _____.
a)　at least 1 components is working
b)　at least 2 components are working
c)　at least 3 components are working
d)　none of these

6) Let $\{Xn, n > 0\}$ be a sequence of iid r.vs. each with mean μ and variance σ^2. If $Sn = X_1 + X_2 + \dots + Xn$, then the distribution of Z is N (0,1) as $n \to \infty$ if Z= _____
a)　$\frac{(S_n - \mu)}{\sigma/\sqrt{n}}$　　　　　　　b)　$\frac{(S_n - n\,\mu)}{\sigma\sqrt{n}}$
c)　$\frac{(S_n - n\mu)}{\sigma/\sqrt{n}}$　　　　　　d)　$\frac{(S_n - \mu)}{n\sigma^2}$

7) In FCFS behavior the customers are served _____.
   a) randomly
   b) priority
   c) in the reverse order of arrival
   d) in the order of arrival

8) A series system is a particular case of k out of n system if _____.
   a) $k < n$
   b) $k = n$
   c) $k = 1$
   d) $k = 0$

9) In M/M/1 : ∞ / FCFS model the inter arrival time is assumed to be distributed like _____
   a) exponential
   b) Poisson
   c) normal
   d) Geometric

10) If X is a continuous r.v. with mean 5 and variance 4 then using Chebysheve's inequality $p[|X - 5| \geq 6]$ is _____.
    a) equal to $\frac{1}{36}$
    b) less than $\frac{8}{9}$
    c) Less than $\frac{4}{36}$
    d) greater than $\frac{4}{9}$

11) If $\Phi(X)$ is a structure function of a system then $\Phi(X)$ is _____ r.v.
    a) geometric
    b) bernoullie
    c) poisson
    d) exponential

12) In usual notations, if $\lambda = 5$ per hour and $\mu = 4$ per hour then in M/M/1 : ∞ / FIFO model, traffic intensity will be _____.
    a) 1.25
    b) 0.8
    c) 1
    d) Cannot be obtained

13) In M/M/1 : ∞ / FCFS model the parameter 1 represents _____.
    a) allowable number of customers in queue
    b) number of customers served
    c) number of service channels
    d) first preference to specific customer

14) Distribution of _____ can be obtained using order statistic.
    a) mean
    b) variance
    c) summation of Xi
    d) none of these

Q.2 A) Answer the following questions. (Any Four) 08
   1) Describe the parameters M and M, in M/M/1 : ∞/FIFO model.
   2) Give any two illustrations where you can observe use of queuing models.
   3) Define minimal cut set and minimal path set.
   4) State the conditions for existence of W.L.L.N.
   5) Let X is N(μ, σ^2) r.v. Then using Chebysheve's inequality find the lower bound for $P[|X - \mu| < 3\sigma]$.

B) Write Notes on: (Any Two) 06
   1) Let $Y_1 < Y_2 < Y_3 < Y_4$ be an order statistic corresponding to a random sample of size 4 from exp(1) distribution. Find $P(Y_1 < 2)$.
   2) W.L.L.N. does not hold for Cauchy distribution. Justify.
   3) Obtain all possible minimal cut sets for a series system of three components.

Q.3 A) Answer the following questions: (Any Two) 08
   1) Define series system and find its structure function.
   2) Write a note on customer behavior and queue discipline.
   3) Define
      i) convergence in probability
      ii) convergence in distribution of a sequence of r.vs

    B) **Answer the following question. (Any One)**   **06**
1) Using CLT for a sequence of iid P(1) distribution, show that
$\sum_{i=0}^{n} \frac{e^{-n}n^x}{x!} = \frac{1}{2}$ as n $\rightarrow \infty$.
2) Obtain the distribution of service time in queuing system.

Q.4 **A)** **Answer the following questions. (Any Two)**   **10**
1) Define order statistic and find the distribution of rth order statistic.
2) Consider n trials of an experiment of which each trial results in success with constant probability p or failure with probability (1 - p). Let X = No. of successes in n trials. Test whether the proportion of successes in n trials converges in probability to p as $n \rightarrow \infty$.
3) Show that for a parallel system of two components
$R(t) = Max \{R_1(t), R_2(t)\}$

    B) **Answer the following question. (Any One)**   **04**
1) In usual notations state the relationship between Ls, Lq, Ws, Wq
2) Define :
    i) IFR distribution
    ii) DFR distribution

Q.5 **Answer the following questions. (Any Two)**   **14**
    a) Let $Y_1 < Y_2 < Y_3 < Y_4 < Y_5$ be an order statistic corresponding to a random sample of size 5 from exp (θ) distribution. Find distribution of Y2 and show that $U = Y_2$ and $V = Y_4 - Y_2$ are independently distributed.
    b) State and prove Central Limit Theorem (CLT) for a sequence of iid r.vs. with common mean μ and variance σ^2.
    c) Define.
    i) parallel system
    ii) series system
    iii) k out of n system
    Obtain structure function for a series system and parallel system of 3 components.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Chemistry (Paper - I)
PHYSICAL CHEMISTRY

Day & Date: Friday, 08-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Draw neat diagram and give equations wherever necessary.
               4) Use of logarithmic table and scientific calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) No machine has _____efficiency.
    a) 100%   b) 0%
    c) 20%   d) 80%

2) Integration of dx is _____.
    a) X   b) X+C
    c) log X   d) log X+C

3) Ostwald's isolation method is used to determine _____of reaction.
    a) order   b) molecularity
    c) rate   d) velocity

4) $P_c, V_c,$ & T_c are known as _____.
    a) Gas constant   b) Van der Waal's constant
    c) Velocity constant   d) Critical constant

5) The rate of reaction _____with increase in concentration.
    a) decreases   b) increases
    c) remains constant   d) All of these

6) Joule-Thomson expansion of an ideal gas produces _____.
    a) heating   b) cooling
    c) no change in temp.   d) heating above inversion temp

7) Order of chemical reaction may be _____.
    a) zero   b) integer
    c) half integer   d) all of these

8) The equation, y = mx+c represents the equation of a _____.
    a) parabola   b) hyperbola
    c) straight line   d) none of these

9) Decomposition of nitrogen pentoxide is an example of _____reaction.
    a) Pseudo order   b) first order
    c) second order   d) zero order

10) The unit of first order rate constant is _____.
    a) sec^{-1} b) $dm^3 mole^{-1} sec^{-1}$
    c) $mole^{-1}$ d) $mole^1 dm^3$

11) Derivative of exponential function remains _____.
    a) same   b) constant
    c) unchanged   d) all of these

12) Entropy of universe tends to _____.
    a) decrease   b) remain constant
    c) increase   d) none of these

13) Van der Walls equation explains the behavior.
    a) mixture of gases   b) real gas
    c) ideal gas   d) none of these

14) In a certain first order reaction, the time for half change was 128.5 seconds. Find the rate constant.
    a) $0.00437\ S^{-1}$ b) $0.00539\ S^{-1}$
    c) $0.03795\ S^{-1}$ d) $0.06394\ S^{-1}$

Q.2 A) Attempt any four of the following question.   **08**
    1) Define order of a chemical reaction.
    2) What is heat engine? Give examples.
    3) Give any four rules of Integration.
    4) Define the term critical temperature.
    5) Give any two statements of second law of thermodynamics.

B) Write Notes on (Any Two)   **06**
    1) Molecularity of reaction.
    2) Explain the exceptional behavior of hydrogen and helium gases.
    3) Velocity of reaction & its unit.

Q.3 A) Attempt any two of the following question.   **08**
    1) What is liquefaction of gases & critical phenomenon?
    2) Explain Pseudounimolecular reactions.
    3) What is differentiation? State any six rule of differentiation.

B) Answer the following questions. (Any One)   **06**
    1) Give characteristics of first order reaction.
    2) What is graph? How slope and intercept determined by graph?

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) What is second order reaction? Derive the expression of rate constant of second order reaction with equal concentration of reactants.
    2) What is isotherm? Explain Andrew's isotherm for CO_2.
    3) A first order reaction is one half complete in 80 seconds, in how much time it will be ¾ complete.

B) Answer the following questions. (Any One)   **04**
    1) What are the effects of following factors on rate of reaction?
         i) Temperature   ii) Concentration
    2) What are Ideal & Real gases.

Q.5 Answer the following questions. (Any two)   **14**
    a) Mention various methods to determine order of reaction. Discuss half change method in detail.
    b) What is Joule-Thomson effect? What is its application?
    c) State & explain Carnot's theorem, calculate % efficiency of steam engine operating between 373 K & 673 K.

Seat No.	

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Microbiology (Special Paper- XIII)
ENVIRONMENTAL MICROBIOLOGY

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
      2) Figures to the right indicate full marks.
      3) Draw well diagram wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) _____ play an importance role in uranium leaching.
  a) *E.coli*   b) *Xanthomonas campestris*
  c) *Bacillus polymyxa*   d) *Thiobacillus Ferrooxidans*

2) Marine bacteria grow best at salt concentration of _____%.
  a) 2.5 to 4   b) 1.5 to 2
  c) 0.1 to 1   d) 0.5 to 2

3) Ozone layer is depleted due to _____.
  a) Hydrocarbons   b) PAN
  c) Radioactive waste   d) Chlorofluoro carbon

4) Zoogloeal film formation is the characteristics feature of _____.
  a) Oxidation ponds   b) Trickling filter
  c) Septic tank   d) Aerated lagoons

5) Incubation time for B.O.D test is _____ days.
  a) 5   b) 2
  c) 1   d) 3

6) _____ is the main cause of Eutrophication.
  a) Reduction in DO   b) Algal mass
  c) Pollutants   d) Animal population

7) In safe drinking water coliform count should not exceed _____.
  a) 100   b) 1
  c) 10   d) 500

8) _____ gas is responsible for acid rain.
  a) H_2 b) CO_2
  c) SO_2 d) CH_4

9) _____ is a photochemical oxidant.
  a) PAN   b) PAH
  c) SO_3 d) CO_2

10) Oil and grease are common in waste from _____ industry.
  a) Dairy   b) Textile
  c) Paper   d) Sugar

11) Study of animal in germ free environment is known as _____.
  a) Biology   b) Gnotobiology
  c) Geology   d) Geomicrobiology

12) In Primary oil recovery _____% oil is recovered.
   a) 10
   b) 20
   c) 5
   d) 30

13) Bhopal gas tragedy is a case of _____ pollution.
   a) Water
   b) Air
   c) Radioactive
   d) Soil

14) MPN test is performed for determination of number of _____ in water.
   a) Algae
   b) Coliforms
   c) Bacilli
   Proteus species

Q.2 A) Answer the following questions. (Any Four) 08
   1) Define C.O.D.
   2) Define Coliforms.
   3) Define Bioaerosol.
   4) Explain role of ozone layer.
   5) Give composition of sewage.

B) Answer the following questions. (Any Two) 06
   1) Primary oil recovery
   2) Presumptive test
   3) Oxidation ponds

Q.3 A) Answer the following questions. (Any Two) 08
   1) Explain Trickling filter.
   2) Biochemistry of bioleaching
   3) Explain various pollutants for air pollution.

B) Answer the following questions. (Any One) 06
   1) Characteristics of marine organisms
   2) Effects of air pollution

Q.4 A) Answer the following questions. (Any Two) 10
   1) Effects of eutrophications
   2) MEOR
   3) Sources of air pollution

B) Answer the following questions. (Any One) 04
   1) Bioremediation
   2) Explain Andersen's sampler

Q.5 Attempt any two of the following questions. 14
   a) Describe characteristics and treatment of textile industry waste.
   b) Biological safety
   c) Qualitative tests for examination of water

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Electronics (Special Paper- XIII)
EMBEDDED SYSTEM DESIGN

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagram wherever necessary.
4) Use of Log-table and calculator is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) Which of the following statement is correct for an embedded system?
   a) Clock circuit is optional.
   b) Reset circuit is optional.
   c) both clock and reset circuits are optional.
   d) both clock and reset circuit is essential.

2) Which of the following is most suitable example of embedded system?
   a) computer   b) laptop
   c) printer   d) keyboard

3) An embedded system is _____ system.
   a) Autonomous   b) dependent
   c) computer aided   d) light weight

4) The data range of integer variable is _____ bytes.
   a) 10   b) 2
   c) 4   d) 8

5) The C language is having _____ keywords.
   a) 32   b) 64
   c) 128   d) 256

6) Which of the following expression has lowest priority of execution ?
   a) division   b) exponentiation
   c) multiplication   d) addition

7) Standard baud rate for serial communication with the computer is_____ bps.
   a) 9600   b) 1100
   c) 110592   d) 12000

8) According to the structure of embedded C program _____ file should be included.
   a) control statement   b) user's defined function
   c) reg51.h   d) superloop

9) Which of the following timer is used to control baud rate for serial communication?
   a) Timer 1   b) Timer 0
   c) Timer 2   d) Timer 0 or Timer 2

10) The address of second line of 16 x 2 LCD is _____.
   a) 80H
   b) C0H
   c) 90H
   d) 01H

11) Which of the following IDE is used to develop software for embedded system?
   a) Flash magic
   b) Embedded developer
   c) Windows7
   d) Kiel Microvision

12) The pin VEE of the 16 x 2 LCD is used for _____.
   a) displaying character
   b) contrast adjustment
   c) used to send command
   d) used to display command

13) If ADC 0804 is interfaced to port 1 of the microcontroller, then which of following statement should be used in embedded C program before reading the digital data.
   a) P1 = 0xff;
   b) P1 = 0x00;
   c) P1 = 0x08
   d) P1 = 0xf0;

14) Microcontroller based PWM technique can be used to _____.
   a) to control the speed of dc motor
   b) to monitor temperature
   c) for frequency to voltage conversion
   d) for voltage to current conversion.

Q.2 A) Answer the following questions. (Any Seven)   **14**
   1) Mention any four characteristics of an embedded system.
   2) What are types and ranges of the variables?
   3) Give the structure of an embedded C program.
   4) Draw circuit diagram to interface relay to microcontroller
   5) Give character set of C language.
   6) Draw circuit diagram to interface LED to microcontroller.
   7) What do you mean by superloop?
   8) Mention IO statements in langauge.
   9) What is need of interfacing?

Q.3 A) Answer the following questions. (Any Two)   **10**
   1) Describe expressions and operators of C Language.
   2) Discuss interfacing of seven segment display to the microcontroller 89s51.
   3) With the help of suitable diagram explain minimum hardware for microcontroller based an embedded system.

   B) Write short notes on Flash Magic a tool for programming the device.   **04**

Q.4 Answer the following questions. (Any Two)   **14**
   1) Discuss salient features of an embedded system.
   2) Discuss the interfacing of 16 x 2 LCD to microcontroller.
   3) Write a program to generate square wave of frequency 4 KHz at Pin P3.1

Q.5 Answer the following questions. (Any Two)   **14**
   a) Discuss with suitable diagram the interfacing of ADC 0804 to microcontroller.
   b) Describe in detail the designing of an embedded system for measurement of temperature.
   c) Discuss the interfacing of optocouplers to microcontroller.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Computer Science (Special Paper - XIII)
OPERATING SYSTEM - II

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) _____ command is used to print a file.
    a) print   b) ptr
    c) lpr   d) none of the mentioned

2) _____ command changes a file's group owner.
    a) cgrp   b) Chgrp
    c) chang   d) group

3) _____ of the following enables multi-tasking in UNIX?
    a) Time Sharing   b) Multi programming
    c) Multi user   d) Modularity

4) Unix is _____ kind of Operating System?
    a) Multi User   b) Multi Processes
    c) Multi Tasking   d) All of the mentioned

5) _____ command creates an empty file if file does not exist?
    a) cat   b) touch
    c) ed   d) read

6) _____ tar command option is used to list the files in a tape archive format?
    a) cvf   b) tvf
    c) xvf   d) ovf

7) _____ option of rmdir command will remove all directories a, b, c if path is a/b/c.
    a) -b   b) -o
    c) -p   d) -t

8) _____ command is used to change permissions of files and directories?
    a) mv   b) chgrp
    c) chmod   d) set

9) The permission -rwxr-r- represented in octal expression will be _____.
    a) 777   b) 666
    c) 744   d) 711

10) _____ command is used to close the vi editor?
    a) q   b) wq
    c) both q and wq   d) none of the mentioned

11) _____ command is used to delete the character before the cursor location in vi editor?
    a) X   b) x
    c) D   d) d

12) File descriptor table indexes _____ kernel structure.
   a) struct file
   b) Strruct fs_struct
   c) files_struct
   d) struct inode

13) The expression expr -9 % 2 evaluates to: _____.
   a) 0
   b) 1
   c) -1
   d) 2

14) In vi editor, _____ command reads the content of another file?
   a) read
   b) r
   c) ex
   d) none of the mentioned

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is nested directories?
   2) Explain gzip command.
   3) Explain mv & cp command.
   4) Define ls -l command.
   5) What is shell? Give its types.

B) Write Notes (Any Two)   **06**
   1) Command-line arguments
   2) Splitting a file using split command
   3) History of Linux

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What are the different types of Modes used in VI editor?
   2) Explain the architecture of Linux Operating system.
   3) Explain how to kill and wait background processes to finish in a shell script.

B) Answer the following questions. (Any One)   **06**
   1) Explain how to create User Defined Commands in Linux.
   2) Explain compression and decompression command.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain different features of Linux Operating System.
   2) Explain grep command with different options and their description.
   3) Write a program to check given number is Armstrong or not.

B) Answer the following questions. (Any One)   **04**
   1) Explain chown & chgrep command.
   2) Explain the Linux file system structure with diagram.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain file permission in detail.
   b) Explain find command with all options.
   c) What is LILO? Explain in detail.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Physics (Special Paper - XIV)
ELECTRONICS AND INSTRUMENTATION

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator or log table is allowed.
4) Neat diagram must be drawn whenever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Normal way to turn ON a dice by _____.
   a) emitter voltage   b) breakdown voltage
   c) gate voltage   d) emitter current

2)   Triac is a _____ switch.
   a) unidirectional   b) bi-directional
   c) either of the above   d) none of these

3)   The commonly used semiconductor is _____.
   a) germanium   b) Carbon
   c) silicon   d) Sulphur

4)   The optical properties of liquid crystal depends on the direction of _____.
   a) Air   b) Solid
   c) Light   d) water

5)   In seven segment display, LED's are used _____.
   a) 8   b) 7
   c) 9   d) 6

6)   In seven segment display individual segments are coded _____.
   a) Randomly   b) clockwise
   c) 7 to 0   d) anticlockwise

7)   Function of transducer is to convert _____.
   a) electrical signal into nonelectrical quantity
   b) non electrical quantity into electrical signal
   c) electrical signal into mechanical quantity
   d) all of these

8)   _____ is not an example of transducer.
   a) Analog voltmeter   b) Thermocouple
   c) Thermistor   d) Photoelectric cell

9)   An SCR is made of silicon and not germanium because silicon _____.
   a) is inexpensive   b) is mechanically string
   c) has small leakage current   d) is tetravalent

10)   Electrons of SEM are reflected through _____.
   a) glass funnel   b) metal coated surface
   c) Specimen   d) vacuum chamber

11) The full form of LCD is _____.
    a) Logical Crystal Display   b) Liquid Crystal Display
    c) Logical Ceramic Display   d) Liquid Ceramic Display

12) _____ is used in electron microscope.
    a) Electron beams
    b) Light waves
    c) Electron beams & magnetic fields
    d) Magnetic field

13) _____ instrument is more useful to study the surface details of a specimen.
    a) Light microscope   b) SEM
    c) TEM   d) Compound microscope

14) A monostable multivibrator has $R = 120\ k\Omega$ and the time delay $T = 1000ms$, calculate the value of C.
    a) $0.9\ \mu F$ b) $1.32 \mu F$
    c) $7.5\ \mu F$ d) $2.49\ \mu F$

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Define active and passive transducer with an example.
    2) What are backscattered electrons?
    3) Draw the labeled circuit diagram of photodiode.
    4) Draw basic blocks of IC-555.
    5) Astable multivibrator operating at 150Hz has a discharge time of 2.5 ms. Find the duty cycle of the circuit.

B) Answer the following questions. (Any Two)   **06**
    1) Write a note on gas discharge plasma display.
    2) Describe selection criteria for transducer.
    3) Draw and explain an op-amp as differentiator.

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Explain in detail electrical characteristics of sensor-dry reed relay.
    2) List the important features of LCD's.
    3) An op-amp is used in non mode with $R_1 = 2\ k\Omega, R_2 = 14\ k\Omega, V_{cc} = \pm 15V$. Calculate outpur voltage for
       i) input voltage = 240 mv
       ii) input voltage = 5 V

B) Answer the following questions. (Any One)   **06**
    1) Explain V-I characteristics of SCR.
    2) Give the applications of SEM and TEM.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Explain with a diagram the operation of a seven segment display using gaseous discharge.
    2) State and explain different elements used as a sensor in RTD.
    3) A monostable mutivibrtor is used as voltage time converter. Find the time period of it. $R = 10\ M\Omega, c = 0.01\ \mu f$

B) Answer the following questions. (Any One)   **04**
    1) Draw and explain the schematic diagram of pin configuration of IC-555.
    2) Explain Schmitt trigger.

Q.5 **Answer the following questions. (Any Two)** **14**

1) Explain construction and working of diac.
2) Explain construction and working of TEM.
3) Explain in brief linear ramp generator using IC-555 with the help of numerical.
   For linear ramp generator,$R_1 = R_2 = 10\ k\Omega, V_{cc} = 0.5V$. Calculate V_E

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Chemistry (Special Paper – XIV)
ANALYTICAL AND INDUSTRIAL ORGANIC CHEMISTRY

Day & Date: Friday, 11-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) All questions are carry equal marks.
4) Draw neat diagrams and give equations wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) Lathering properties of soap are increases by addition of _____.
   a) Acetic acid b) Abietic acid
   c) Malonic acid d) Succinic acid

2) Which of the following is used as antioxidant in the manufacture of soap.
   a) Sodium carbonate b) Sodium hypochlorite
   c) Sodium hyposulphite d) Sodium sulphate

3) The surfactants containing anionic and cationic groups are known as ___.
   a) Ampholytic b) Cationic
   c) Anionic d) Non-ionic

4) Bakelite is obtained by condensation of phenol with ____.
   a) Acetaldehyde b) Formaldehyde
   c) Benzaldehyde d) Butaraldehyde

5) Heating rubber with sulphur and aromatic amines. This process is called_____.
   a) Polymerisation b) Addition
   c) Cyclisation d) Vulcanisation

6) Which of the following enzyme used in the conversion of glucose and fructose in ethyl alcohol.
   a) Maltage b) Invertage
   c) Zymase d) Glucosidage

7) Mixture of 95% ethyl alcohol and 5% water is called as _____.
   a) Power alcohol b) Absolute alcohol
   c) Rectified spirit d) Lime alcohol

8) Among the following which is not synthetic fiber.
   a) Nylon b) Wool
   c) Rayon d) Polyester

9) Which reaction is involved in bleaching of cotton with NaOCl.
   a) Reduction b) Addition
   c) Oxidation d) Hydrolysis

10) Biocatalytic reactions are _____.
    a) Highly specific b) Non-specific
    c) Stereo specific d) Both a and b

11) The zeolites are regenerated by soaking it with a solution of _____.
   a) 10%HCl
   b) 10% NaCl
   c) 10% NaOH
   d) H_2O

12) Which of the following is exchangeable ion in zeolite?
   a) Si^{4+}
   b) Al^{3+}
   c) Na^+
   d) Fe^{3+}

13) The silica gel is used in column chromatography as____.
   a) Effluent
   b) Adsorbent
   c) Column support
   d) All the above

14) What is the percentage of water in massecuite?
   a) 9-11%
   b) 15-20%
   c) 20-30%
   d) 50-60%

Q.2 A) Answer the following questions. (Any Four) 08
   1) Give advantage of TLC.
   2) Explain the term bleaching and dying.
   3) What are zeolites? Give their uses.
   4) Give synthesis of Buna – N.
   5) What is fermentation? Give conditions for successful fermentation.

B) Answer the following questions. (Any two) 06
   1) Give brief classification of fibers.
   2) Give the preparation and uses of teepol.
   3) What is scouring? Explain scouring of cotton.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Give synthesis and uses of Buna-S.
   2) Discuss the classification of polymers based on their structure.
   3) Discuss byproducts of sugar industry.

B) Answer the following questions. (Any One) 06
   1) What is chromatography? Discuss in detail with respect to technique and methodology of gas chromatography.
   2) What are biocatalytic reactions? Explain hydroxylation and oxidation reactions.

Q.4 A) Answer the following questions. (Any Two) 10
   1) What are soaps? Discuss the manufacture of soap by hot process.
   2) Describe the process of crystallisation and separation of sugar in sugar industry.
   3) What is RF value? Discuss experimental technique of paper chromatography.

B) Answer the following questions. (Any One) 04
   1) Discuss column chromatography in detail? Give its applications.
   2) Explain the microwave assisted reaction with example.

Q.5 Answer the following questions. (Any Two) 14
   1) What is saponification? Describe the raw materials used in the preparation of soaps.
   2) Describe how ethyl alcohol is obtained from molasses by fermentation.
   3) Discuss in detail thin layer chromatography. Give its applications.

Seat No.

Set **P**

B.Sc.(Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Botany (Special Paper – XIV)
MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Day & Date: Friday, 11-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) The name Kary Mullis is associated with _____.
   a) Gel retardation assay b) Chain termination reaction
   c) RFLP d) PCR

2) The Sothern Blotting technique is used in _____.
   a) DNA b) RNA
   c) Protein d) Both a and b

3) _____ are known as molecular glue.
   a) DNA ligase b) Restriction endonuclease
   c) RNA polymerase d) DNA polymerase

4) The organ of the plant parts used for tissue culture is known as _____.
   a) scion b) Explants
   c) stock d) Callus

5) TATAAT is called _____ box.
   a) Hogness b) Pribnow
   c) Genetic d) Both a and b

6) During DNA replication, unwinding of DNA takes place due to _____.
   a) DNA polymerase-I b) DNA polymerase-II
   c) DNA polymerase-III d) Helicase

7) _____ is an undifferentiated mass of tissue.
   a) Embryoid b) Plantlet
   c) Explant d) Callus

8) Lac operon was explained by _____.
   a) Jacob and Monad b) Holley et al.
   c) Robert Phillips d) H. G. Khorana

9) An enzymes _____ is known as molecular scissors.
   a) DNA ligase b) DNA polymerase
   c) DNA Polymerase-II d) Restriction endonuclease

10) In DNA, Adenine is always paired with _____.
    a) Cytosine b) Guanine
    c) Thymine d) Uracil

11) Polyethylene glycol is used as _____ in tissue culture.
    a) Sterilization agent b) stabilizing medium
    c) Fusogen d) isolation medium

12) Tag DNA polymerase is used in _____ technique.
    a) Blotting   b) PCR
    c) DNA fingerprinting   d) all of these

13) The two strands of DNA are held together by _____.
    a) hydrogen bonds   b) peptide bonds
    c) phosho diester bonds   d) s-s bonds

14) The sequence of the structural gene in lac operon is _____.
    a) lac Z - lac Y - lac A   b) lac A - lac Y - lac Z
    c) lac Z - lac A - lac Y   d) lac Y - lac A - lac Z

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Enlist the enzymes involved in DNA replication.
2) What is the chemical composition of DNA?
3) Define somatic hybridization.
4) Define replication of DNA.
5) Give two applications of micropropagation.

B) Write notes (Any Two)   **06**
1) Enzymes are involved in DNA recombinant technology
2) Applications of another culture
3) Lac-operon

Q.3 A) Answer the following questions. (Any two)   **08**
1) Write a note on PCR.
2) Explain in brief Bacteriophage as a vector.
3) Describe the Denaturation of DNA.

B) Answer the following questions. (Any One)   **06**
1) Describe the helical structure of DNA.
2) Describe method for protoplast culture.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain operon concept.
2) Write a note on DNA fingerprinting.
3) Describe the mechanism of DNA replication.

B) Answer the following questions. (Any One)   **04**
1) What is plasmid? Explain with its significance.
2) Describe the construction of c-DNA library.

Q.5 Answer the following questions. (Any two)   **14**
1) What is plant tissue culture? Explain the method of protoplast isolation.
2) What is recombinant DNA technology? Explain Southern blotting technique.
3) Describe biological method of gene delivery.

Seat No.

B.Sc.(Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Zoology (Special Paper – XIV)
BIOTECHNIQUES AND APPLIED ZOOLOGY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and labeled wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) _____ deals with fish culture.
   a) Apiculture   b) Sericulture
   c) Silviculture   d) Pisciculture

2) _____ is a technique for separation of charged molecules based on molecularsize.
   a) electrophoresis   b) Chromatography
   c) angiography   d) Mixography

3) TLC means _____.
   a) Thin layer chromatography
   b) Thick layer chromatography
   c) Transparent layer chromatography
   d) None of these

4) In gel electrophoresis fragments are separated on basis of _____.
   a) Size   b) Charge
   c) Both a and b   d) None of these

5) To remove negatively charged molecules through matrix of agarose, nucleic acid molecules are separated by applying _____.
   a) electric current   b) electric field
   c) magnetic field   d) all of above

6) The casting of skin in silkworm is called _____.
   a) Hibernation   b) Ecdysis
   c) Cocoon formation   d) Silk production

7) The media prepared artificially by using several nutrients for the cell culture are called as _____ media.
   a) Synthetic   b) Systematic
   c) Biological   d) Physiological

8) In the formation of lubricants, paints, cosmetics _____ of fish is used.
   a) body oil   b) Skeleton
   c) fin   d) Scales

9) _____ is good source of fish oil.
   a) Oil Sardine   b) Pomfret
   c) Mrigal   d) Catla

10) The Stem Cells are _____ in nature.
    a) Nutripotent   b) Pleuripotent
    c) Totipotent   d) Electropotent

11) The full form of PAGE is _____.
    a) Poly Acrylamide Gel Electrophoresis
    b) Poly Amyl Gel Electrophoresis
    c) Poly Amide Gel Electrophoresis
    d) Poly Acyl Gel Electrophoresis

12) _____ incubators provide the suitable environmental conditions to the growing animal cell in a culture media.
    a) O_2 b) NO_2
    c) SO_2 d) CO_2

13) _____ deals with Honey bee culture.
    a) Apiculture   b) Sericulture
    c) Silviculture   d) Pisciculture

14) In biological control of pests _____ are used.
    a) Chemicals   b) Fumigants
    c) Biological agents   d) Pheromones

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Applications of Column Chromatography.
   2) Spectrophotometer.
   3) Gill net.
   4) Pyrilla.
   5) Trawler.

B) Write notes (Any Two)   **06**
   1) Economic importance of Bee Wax
   2) Silkworm Viral diseases
   3) Centrifuge

Q.3 A) Answer the following questions. (Any two)   **08**
   1) Write a note on Hooks and lines.
   2) Give a Note on IPM.
   3) Give an account on Paper chromatography.

B) Answer the following questions. (Any One)   **06**
   1) Write about the Government schemes for propagation of sericulture.
   2) Give an account on Applications of colorimeter.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Give an account on Electrophoresis.
   2) Describe in detail Cryopreservation and its application.
   3) Give an account on Costal fishery Sardine.

B) Answer the following questions. (Any One)   **04**
   1) Give an account on Economic importance of Pearl culture.
   2) Describe Sericulture and its Economic importance.

Q.5 Answer the following questions. (Any two)   **14**
   1) Write in brief about Crab Fishery and its applications.
   2) Explain the principle of PAGE.
   3) Write about fishing crafts and Gears.

Seat No.

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Mathematics (Special Paper – XIV)
PROGRAMMING IN C

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Who is father of C language?
   a)   Bjarne Stroustrup   b)   James A Gosling
   c)   Dennis Ritchie   d)   None of these

2)   Every programme statement in C ends with _____.
   a)   Colon   b)   Semi colon
   c)   Comma   d)   None of these

3)   The character '\t' means _____.
   a)   new line   b)   vertical line
   c)   Horizontal tab   d)   None of these

4)   Integer data type requires _____ bytes of memory.
   a)   01   b)   02
   c)   04   d)   None of these

5)   Arithmetic expression is evaluated form _____.
   a)   right to left   b)   left to right
   c)   top to bottom   d)   None of these

6)   C supports as many as _____ relational operators.
   a)   5   b)   6
   c)   7   d)   None of these

7)   _____ is standard input function in C-language.
   a)   printf()   b)   scanf()
   c)   getch ()   d)   None of these

8)   In C, -14% 3 = _____.
   a)   2   b)   -2
   c)   4   d)   None of these

9)   Multiway selection can be accomplished using an else if statement or the _____ statement.
   a)   Go to   b)   While
   c)   Switch   d)   None of these

10) _____ is a jump statement.
   a)   Go to   b)   While
   c)   Switch   d)   None of these

11) Which is correct for loop statement?
   a)   For (increment : test-condition: initialization)
   b)   For (initialization : test-condition: increment)
   c)   For (initialization: increment : test condition)
   d)   None of these

12) _____ is exit controlled loop in C language.
   a) while   b) do-while
   c) for   d) None of these

13) One dimensional array is also called as _____.
   a) vector   b) matrix
   c) both a) and b)   d) None of these

14) By default function return _____.
   a) Character value   b) Float value
   c) Integer value   d) None of these

Q.2 A) Answer the following questions. (Any Four) 08
   1) Write any two mathematical function used in C.
   2) Write any two reserved keyword.
   3) Write logical operator in C.
   4) What is size of operator?
   5) Write note on reading a character.

B) Answer the following questions. (Any Two) 06
   1) Explain switch statement.
   2) Write a programme to accept the radius of circle and calculate the area of circle.
   3) Give syntax of different arrays.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Write in detail history of C.
   2) Write character set in C.
   3) Explain the term formatted out puts.

B) Answer the following questions. (Any One) 06
   1) Discuss in detail C-data types.
   2) Explain increment operators and decrement operator.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Describe the term basic structure of C programme.
   2) Write a programme to compute sum of 'n' numbers by using the for loop.
   3) Discuss two dimensional arrays.

B) Answer the following questions. (Any One) 04
   1) Explain else _____ if ladder with flow chart.
   2) Write a programme to find even number from 1 to 10 by using do while loop.

Q.5 Answer the following questions. (Any Two) 14
   1) Explain arithmetic and Relational operators.
   2) Explain the term simple if and if ___ else statement.
   3) An electric power distribution company charges its domestic consumer's as follow.

Consumption units	Rate of charge
0-200	Rs. 0.50 per unit.
201-400	Rs.100 + Rs 0.65 per unit
401-600	Rs. 230 + Rs 0.80 per unit
601-above	Rs. 390 + Rs 1.00 per unit excess of 600.

   Write a programme to read the consumer number and power consumed and prints the amount to be paid by the consumer.

Seat No.

B.Sc.(Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Statistics (Special Paper - XIV)
C - PROGRAMMING

Day & Date: Friday, 11-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of simple or scientific calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) C is a programming language developed at _____.
   a) Micrisoft Corp.,USA
   b) IBM, USA
   c) Borland International, USA
   d) AT & T's Bell Laboratories of USA

2) Which of the following is not a keyword in C?
   a) Double b) int
   c) Mean d) return

3) The assignment statement $x = x - b$; is equivalent to _____.
   a) $x -= b$; b) $x = -b$;
   c) $b -= x$; d) none of these

4) Which of the following shows the correct hierarchy of arithmetic operations in C?
   a) $/ + * -$ b) $* - / +$
   c) $+ - / *$ d) $* / + -$

5) What is an array?
   a) An array is a collection of variables that are of the dissimilar data type.
   b) An array is a collection of variables that are of the same data type.
   c) An array is not a collection of variables that are of the same data type.
   d) none of these

6) In C, an arithmetic expression $5/(3 + 2) + 39 / 6$ results in _____.
   a) 7 b) 7.5
   c) 8 d) 9

7) Which of the following is not true while constructing an integer constant in C?
   a) An integer constant must have at least one digit.
   b) It could be either positive or negative.
   c) Default sign is positive.
   d) It must have a decimal point.

8) The C program execution always begin with the function _____.
   a) Scanf() b) Main()
   c) Printf() d) Return()

9) Which of the following is allowed in a C arithmetic instruction?
   a) [ ] b) { }
   c) ( ) d) None of these

10) C variable cannot start with _____.
    a) An alphabet
    b) A number
    c) A special symbol other than underscore
    d) both (b) and (c)

11) C programs are converted into machine language with the help of _____.
    a) An Editor   b) A compiler
    c) An operating system   d) None of these

12) What will be the output of the following statement?
    int k =10;   k=5%2;   printf("%d", k+2);
    a) 12   b) 1
    c) 2   d) 3

13) For char type variable, _____ is used as conversion specifier.
    a) %d   b) %f
    c) %c   d) none of these

14) What is the right way to initialization array?
    a) int num[6]={2,4,12,5,45,5};   b) int num{ }={2,4,12,5,45,5};
    c) int num{6}={2,4,12};   d) int num{6}={2,4,12,5,45,5};

Q.2 A) Answer the following questions. (Any Four)   08
    1) What is a keyword in C?
    2) How to declare variables in C?
    3) Give the syntax of ternary operator.
    4) State the use of break statement.
    5) State the use of return statement.

B) Answer the following questions. (Any Two)   06
    1) Covert the following algebraic expression into C arithmetic expression:
       $$\frac{a+10}{b-10} + e^{3k}$$
    2) Find the value of the variable y in the following:
       int a=10, b=20, c=30
       int y;
       y=a+b/c-a*c/5+b%3;
    3) What does $i + +$ really mean?

Q.3 A) Answer the following questions. (Any Two)   08
    1) Give the syntax of if statement.
    2) What is an user defined function?
    3) Give the syntax of do…while statement.

B) Answer the following questions. (Any One)   06
    1) Write a C program for addition of two integers.
    2) Write a C program for squaring an integer.

Q.4 A) Answer the following questions. (Any Two)   10
    1) Explain switch statement. Illustrate by one example.
    2) Write a note on array.
    3) Explain for loop. Illustrate by one example.

B) Answer the following questions. (Any One)   04
    1) Explain pow() function.
    2) Write a C program for finding the value of m^n, where m and n are any integers.

Q.5 **Answer the following questions. (Any Two)** **14**
1) Write a C program for finding factorial of a positive integer.
2) Write a C program for finding sum of squares of n values.
3) Explain $strlwr(\ )$ and $strupr()$. Illustrate each by one example.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Chemistry (Paper – II)
INORGANIC CHEMISTRY

Day & Date: Saturday, 09-11-2019   Max. Marks: 70
Time: 11:30 AM To 2:00 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Draw neat and labeled diagram and give equations wherever necessary.
               4) All questions carry equal marks.
               5) Use of logarithmic table and calculator is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Principle quantum number represents _____.
    a) energy of electron   b) spin of electron
    c) orientation of orbitals   d) shape or orbitals

2) _____ is an ionic compound.
    a) NaCl   b) CCl_4
    c) HF   d) Cl_2

3) Geometry of IF_7 is _____.
    a) octahedral   b) trigonal bipyramidal
    c) pentagonal bipyramidal   d) square planer

4) In homonuclear diatomic molecule, exchange energy is _____.
    a) maximum   b) minimum
    c) intermediate   d) less

5) Degenerate atomic orbitals have _____ energy.
    a) different   b) very low
    c) very high   d) same

6) The coordination number of Cs^+ ion in CsCl is _____.
    a) six   b) four
    c) eight   d) two

7) Geometry of molecule depends upon _____.
    a) type of overlap   b) type of hybridization
    c) nature of overlap   d) type of orbitals

8) Bond order of Li_2 is _____.
    a) 1   b) 2
    c) 3   d) 4

9) Amongst the halogens, _____ is more reactive.
    a) I   b) Br
    c) Cl   d) F

10) The electrostatic force of attraction between oppositely charged ions is knows as _____ bond.
    a) chemical   b) ionic
    c) covalent   d) metallic

11) _____ is the d-orbital participating in sp^3d hybridization.
   a) dz^2 b) $dx^2\text{-}y^2$
   c) dxy   d) dxz

12) The stability of molecule _____ with increase in bond order.
   a) decreases   b) remains same
   c) increases   d) first increases then decreases

13) Radius ratio for CsCl is _____.
   a) 0.732   b) 0.524
   c) 0.225   d) 0.933

14) _____ molecule has distorted T-shape structure.
   a) NH_3 b) H_2O
   c) IF_7 d) ClF_3

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define
      i) atomic radius
      ii) ionic radius
   2) What is the radius ratio effect on geometry of ionic crystals?
   3) Give the limitations of VBT.
   4) Distinguish between atomic orbitals and molecular orbitals.
   5) Give the significance of Fajan's rule.

B) Write Notes. (Any Two)   **06**
   1) Importance of Born-Haber Cycle
   2) Steps in hybridization
   3) Nonbonding molecular orbitals

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What is electron affinity? Give the factors affecting it and explain its trend in periodic table.
   2) Give the conditions of hybridization.
   3) Explain the bonding and antibonding molecular orbitals.

B) Answer the following questsions. (Any One)   **06**
   1) Draw the molecular orbital diagram for C_2 molecule. Comment on its bond order, stability and magnetic character.
   2) Describe the structure of NaCl w.r.t. unit cell, coordination number and stoichiometry.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) State and explain Aufbau's principle, Hunds rule of maximum multiplicity and Pauli's exclusion principle.
   2) Give the characteristics of ionic compounds.
   3) What is s-p hybridization? Explain it with example of $BeCl_2$.

B) Answer the following questions. (Any One)   **04**
   1) Give the assumptions of VSEPR Theory.
   2) What are the conditions for successful overlap? Explain in brief s-s overlap.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Discuss the concept of radius ratio and calculate the radius ratio for an ionic solid having octahedral geometry.
   b) Explain the bonding and formation of NH_3 on the basis of VSEPR theory.
   c) Draw the molecular orbital diagram for CO and comment on its magnetic character. Give reason, why CO is more stable than N_2 though both have same bond order?

Seat No.

Set **P**

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Microbiology (Special Paper - XIV)
MEDICAL MICROBIOLOGY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) _____ is used to prevent Malaria.
   a) Mebendazole   b) Chloroquine
   c) Inactivatedvaccine   d) Zinc table

2) Quinolones inhibit _____ enzyme.
   a) DNA gyrase   b) RNA polymerase
   c) DNA ligase   d) Transpeptidase

3) The following test is used for classification of types of leprosy _____.
   a) lepromin test   b) urea breath test
   c) mantoux test   d) niacin test

4) Single skin lesion is seen in _____ type of leprosy.
   a) LL   b) TT
   c) BL   d) BT

5) TCBS is used as selective medium for _____.
   a) *Treponema pallidum*   b) *Candida albicans*
   c) *Pseudomonas aeruginosa*   d) *Vibrio cholerae*

6) Oral thrush is caused by _____.
   a) *Candida albicans*   b) *Aspergillus niger*
   c) *Treponema pallidum*   d) Herpes simplex virus

7) _____infection acts as predisposing factor for duodenal cancer.
   a) Tuberculosis   b) Syphilis
   c) Herpes virus   d) *Helicobacter pylori*

8) *Pseudomonas aeruginosa* produces _____.
   a) pyocyanin pigments   b) oxidase enzyme
   c) pyorubin pigments   d) all of these

9) Swine flu is transmitted by _____.
   a) ingestion of contaminated water
   b) ingestion of contaminated food
   c) mosquito bite
   d) inhalation of air

10) Complete Hepatitis virus particle is known as _____.
   a) Australia antigen   b) Dane particle
   c) HAV   d) cowdry bodies

11) Typical lesion caused by Herpes virus is called _____.
   a) chancre   b) fever blister
   c) impetigo   d) Carbuncle

12) Streptomycin inhibits synthesis of _____.
    a) RNA   b) DNA
    c) Cell wall   d) Protein

13) Urea breath test is used for diagnosis of _____ infection.
    a) Cholera   b) *Helicobacter pylori*
    c) Typhus fever   d) *Mycobacterium tuberculosis*

14) Nystatin is ____ agent.
    a) antibacterial   b) Antifungal
    c) antiprotozoal   d) Antiviral

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) How Ebola disease is transmitted?
    2) Draw a neat labeled diagram of structure of HIV.
    3) What is the mode of action of vancomycin?
    4) Which pigments are formed by *Pseudomonas aeruginosa?*
    5) What is hospital infection?

B) Write notes on (Any Two)   **06**
    1) Disc diffusion assay
    2) Mechanism of Drug resistance
    3) Tuberculin test

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Prophylactic measures for swine flu.
    2) Diagnosis of Herpes.
    3) Biological weapons.

B) Answer the following questions. (Any One)   **06**
    1) Virulence factors of *Vibrio cholera.*
    2) Infections caused by *Candida albicans.*

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Lepromatous leprosy.
    2) Diagnosis of *Helicobacter pylori infection.*
    3) Serological tests used for diagnosis of syphilis.

B) Answer the following questions. (Any One)   **04**
    1) Mode of action of quinolones and penicillin.
    2) Structure of Rabies virus.

Q.5 Answer the following questions. (Any Two)   **14**
    1) Compare and contrast between Hepatitis A and B.
    2) Gas gangrene.
    3) Malaria.

Seat No.

Set **P**

B.Sc.(Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Electronics (Special Paper – XIV)
MEASUREMENT INSTRUMENTATION AND CONTROL SYSTEM

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) In the resting state the bio-potential generated is _____.
    a) -70mV   b) -20mV
    c) +20mV   d) +70mV

2) In case of DMM, to measure the value of unknown resistance the _____ source is utilized.
    a) constant voltage   b) constant current
    c) variable voltage   d) variable current

3) The standard glass pH electrode is of _____ electrode.
    a) potentiometric   b) Ampeometric
    c) variable capacitive   d) variable inductive

4) In case of bio-potential, the cell in the action state is called as _____.
    a) polarized   b) Depolarized
    c) repolarized   d) none of these

5) The _____ instrument is used to detect the electrical activity of the brain of human body.
    a) EMG   b) ECG
    c) EEG   d) EOG

6) In case of CRO, the delay line circuit is introduced in _____ channel.
    a) horizontal   b) Vertical
    c) dual   d) none of these

7) The frequency of the bioelectrical signals is _____
    a) low   b) High
    c) moderate   d) Can not say

8) To develop bio-potential the _____ ion are responsible.
    a) Na^+ b) K^+
    c) Cl^- d) all of these

9) The pulse oximeter is used to measure the oxygen saturation of the ____ blood.
    a) Venous   b) heart
    c) Arterial   d) lungs

10) The _____ programming language is mostly preferable for PLC programming.
    a) ladder diagram   b) C
    c) Basic   d) none of these

11) In case of PD control system the output of the controller is linearly proportional to the _____.
a) the input error signal
b) rate of change of the input error signal
c) both a and b
d) average change of the input error signal

12) The _____ instrument is used to detect the electrical activity of the muscles of human body.
a) EMG
b) ECG
c) EEG
d) EOG

13) The _____ control system is the discontinuous automatic control system.
a) ON-OFF
b) proportional
c) proportional integral
d) proportional derivative

14) The servo motor is _____ of motor.
a) brushed type
b) brushless type
c) rotary or linear type
d) all of these

Q.2 A) Answer the following questions. (Any Four) 08
1) Give the salient features of LCR-Q meter.
2) Give the symbols of ladder diagram.
3) State the principle of conductivity meter.
4) Give the advantage and disadvantage of the PI control system.
5) Enlist various knobs of CRO.

B) Answer the following questions. (Any Two) 06
1) State the salient feature and application of the PLC.
2) Discuss the advantages and disadvantages of the PD control system.
3) Explain the basic control action.

Q.3 A) Answer the following questions. (Any Two) 08
1) Explain the digital tachometer with the block diagram.
2) Explain the resting and action potentials.
3) Explain in detail automatic control system with its classification.

B) Answer the following questions. (Any One) 06
1) Explain the digital multimeter (DMM) with the block diagram.
2) Explain the ultrasonic imaging system.

Q.4 A) Answer the following questions. (Any Two) 10
1) Explain DSO with the help of block diagram.
2) Explain in detail the ECG recorder with block diagram.
3) Explain the Robotics arm control system in detail.

B) Answer the following question. (Any One) 04
1) Explain the digital controller.
2) Describe the temperature control system in detail with functional diagram.

Q.5 Answer the following questions. (Any Two) 14
1) Describe the origin of the bio-electrical signals.
2) Explain the Digital Storage Oscilloscope (DSO).
3) Explain function generator with its applications.

Seat No.

Set **P**

B.Sc. (Semester - VI) (Old) (CGPA) Examination Oct/Nov-2019
Computer Science (Special Paper - XIV)
DATA COMMUNICATION AND NETWORKING - II

Day & Date: Friday, 11-10-2019　　　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) Which one of the following is a transport layer protocol used in Internet?
   a) TCP　　　　　　　　　　　　b) UDP
   c) Both (a) and (b)　　　　　　d) None of the mentioned

2) _____ protocol is used for transforming mails on the internet.
   a) POP　　　　　　　　　　　　b) IP
   c) SMTP　　　　　　　　　　　d) HTTP

3) HTTH uses _____ port number to access world wide web.
   a) 23　　　　　　　　　　　　　b) 25
   c) 69　　　　　　　　　　　　　d) 80

4) _____ is a FTP server.
   a) INN　　　　　　　　　　　　b) TVX
   c) Vsftpd　　　　　　　　　　d) Samba

5) User datagram protocol is called connectionless.
   a) True　　　　　　　　　　　　b) False

6) Web server uses distributed file service.
   a) True　　　　　　　　　　　　b) False

7) TCP protocol is connection oriented protocol.
   a) True　　　　　　　　　　　　b) False

8) In asymmetric key cryptography, the private key is kept by _____.
   a) Sender
   b) receiver
   c) sender and receiver
   d) all the connected devices to the network

9) FTP stands for File transfer protocol.
   a) true　　　　　　　　　　　　b) false

10) Exact range of Bluetooth devices are _____.
    a) 10 m　　　　　　　　　　　b) 20 m
    c) 30 m　　　　　　　　　　　d) 40 m

11) A proxy firewall filters at the _____.
    a) Physical layer　　　　　　　b) Application layer
    c) Data link layer　　　　　　d) Network layer

12) Bluetooth uses Time division multiplexing.
    a) true　　　　　　　　　　　　b) false

13) GSM is a digital cellular phone system using _____.
  a) FDMA   b) TDMA
  c) CDMA   d) Both (a) and (b)

14) HTTP stands for Hypertext Transmit protocol.
  a) true   b) false

Q.2 Answer the following questions. (Any Seven)   14
 a) Define Encryption and Decryption.
 b) What is meant by GPS?
 c) SNMP and SMTP stands for.
 d) TLS and MIME stands for?
 e) What is HUB?
 f) GPRS and SGM stands for.
 g) What is buffering?
 h) What is meant by piconet?
 i) Explain flow control.

Q.3 A) Answer the following questions. (Any Two)   10
  1) Explain Firewall in detail.
  2) Explain HTTP in detail.
  3) Explain Digital Signature in detail.

 B) Explain three way handshaking mechanism in detail.   04

Q.4 Answer the following questions. (Any Two)   14
 a) Explain SSL Encryption in detail.
 b) Explain router in detail.
 c) Explain user management of Linux in detail.

Q.5 Answer the following questions. (Any Two)   14
 1) Explain Audio and Video Compression in detail.
 2) Explain Message Authentication in detail.
 3) Explain UDP protocol in detail.

Seat
No.

B.Sc. (Semester – I) (Old) (CBCS) Examination Oct/Nov-2019
Physics (Paper – I)
MECHANICS AND PROPERTIES OF MATTER

Day & Date: Monday, 11-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.

Q.1   Fill in the blanks by choosing the correct alternatives given below.   14

1)   Moment of inertia of a rectangular lamina about an axis passing through its
centre and parallel to one of its side is _____.
a) $\dfrac{Ml^2}{12}$ b) $12\,Ml^2$

c) $\dfrac{1}{2}Ml^2$ d) $\dfrac{12}{Ml^2}$

2)   If radius of a spherical shell is doubled then its moment of inertia about its
diameter _____.
a)   becomes two times   b)   reduces to half
c)   becomes four times   d)   remains constant

3)   Force in translational motion is analogous to the _____ in rotational
motion.
a)   Torque   b)   Moment of inertia
c)   Mass   d)   Angular momentum

4)   The length of an equivalent simple pendulum of the compound pendulum
is _____.
a) $\dfrac{k^2+l^2}{2}$ b) $\dfrac{k^2+l^2}{l}$

c) $\dfrac{k^2}{l^2}+l$ d) $k^2 + l^2$

5)   The time period of compound pendulum is maximum when _____.
a) $l = k$ b) $l = 0$
c) $l = 2k$ d) $l = 3k$

6)   The tendency of a liquid surface to contract is due to the following property
_____.
a)   Adhesion   b)   Cohesion
c)   Viscosity   d)   surface tension

7)   The theoretical limiting values of Poisson's ratio are _____.
a)   -1 and + 0.5   b)   +1 and -0.5
c)   -1 and -0.5   d)   -1 to +1

8)   _____ indicates the resistance of elastic solid to elongation.
a)   Bulk modulus   b)   Elastic limit
c)   Modulus of rigidity   d)   Young's modulus

9) For iron, $Y = 18 \times 10^{11}$ N/m^2 and $\eta = 12 \times 10^{11}$ N/m^2. What is the value of bulk modulus (k) _____.
   a) $4 \times 10^{11} \, N/m^2$
   b) $8 \times 10^{11} \, N/m^2$
   c) $12 \times 10^{11} \, N/m^2$
   d) $16 \times 10^{11} \, N/m^2$

10) The C.G.S. unit of surface tension is _____.
    a) Dyne. cm
    b) Dyne/cm^2
    c) dyne /cm
    d) Dyne. cm^2

11) With the Increasing temperature, surface tension _____.
    a) Increases
    b) Decreases
    c) does not change
    d) either decreases or increases

12) The modulus of rigidity of the material of wire can be determined using _____ Pendulum.
    a) Simple
    b) Bifilar
    c) Torsional
    d) Kater's

13) The profile of advancing liquid in the capillary tube is a _____.
    a) Ellipse
    b) Circle
    c) Parabola
    d) Hyperbola

14) Dimensions of coefficient of viscosity are _____.
    a) $[M^0L^1T^{-1}]$
    b) $[M^{-1}L^{-1}T^{-1}]$
    c) $[M^{-1}L^1T^{-1}]$
    d) $[M^1L^{-1}T^{-1}]$

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Calculate the moment of inertia of a circular disc having diameter 12 cm and mass 500 gm about an axis passing through centre and perpendicular to its plane.
2) State any two sources of errors in compound pendulum.
3) Define modulus of rigidity and bulk modulus.
4) Give two applications of surface tension.
5) Define viscosity of liquid.

B) Write Notes. (Any Two)   **06**
1) Advantages of compound pendulum over simple pendulum.
2) Experimental method to determine surface tension.
3) Factors affecting surface tension.

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Using theory of compound pendulum, obtain the condition for maximum and minimum time period.
2) Poisson's ratio for a rubber tube is 0.35. When it is loaded at one end the change in volume is 1.8 cc and change in length is 1.1 cm. Calculate the area of cross section of the tube.
3) Obtain the equation of continuity for steady fluid flow.

B) Answer the following questions. (Any One)   **06**
1) Derive an expression for moment of inertia for Flywheel.
2) Describe bar pendulum and explain how it is used to determine acceleration due to gravity and radius of gyration.

Q.4 A) Answer the following questions (Any Two)   **10**
1) Define compound pendulum. Show that oscillations of compound pendulum perform simple harmonic motion.
2) Show that shear strain is equivalent to compression and extension strain.
3) Explain the working of venturimeter for the measurement of rate of flow of liquid through a pipe.

B) Answer the following questions. (Any One) 04
1) A rectangular lamina of mass 200 gm has length 15 cm and breadth 12 cm. Calculate its moment of inertia about an axis passing through its centre and perpendicular to its plane.
2) Show that excess of pressure in the liquid drop of radius r is 2T/r.

Q.5 Answer the following questions. (Any Two) 14
a) Derive an expression for moment of inertia of a spherical shell about one of its diameter.
b) State and prove Bernoulli's theorem for the flow of liquids in pipes and discuss any one application based on Bernoulli's theorem.
c) Describe Jaeger's method to determine surface tension of a liquid. Also state advantages of Jaeger's method.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Paper - II)
INORGANIC CHEMISTRY

Day & Date: Saturday, 09-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.

Q.1 **Select the correct alternatives from the following and rewrite the sentence.** **08**

1) The geometry of $SiCl_4$ molecules is _____.
   a) Trigonal
   b) Tetrahedral
   c) Square planer
   d) Octahedral

2) The bond length of $N \equiv N$ bond in N_2 molecule is _____.
   a) 1.31 A°
   b) 1.09 A°
   c) 1.21 A°
   d) 1.128 A°

3) Born-Haber cycle is discovered in _____.
   a) 1919
   b) 1819
   c) 1719
   d) 2009

4) General electronic configuration of V_A group elements is _____.
   a) $ns^2 np^2$
   b) $ns^2 np^3$
   c) $ns^2 np^5$
   d) $ns^2 np^6$

5) If bond order increases, the stability of molecules _____.
   a) Decreases
   b) Increases
   c) Remain same
   d) First increases then decreases

6) O_2 molecule contains _____ unpaired electrons.
   a) Zero
   b) Two
   c) One
   d) Three

7) The structure of Caesium Chloride is _____.
   a) FCC
   b) BCC
   c) Square planer
   d) Pentagonal

8) The radius ratio of Cs^+ to Cl^- in CsCl is _____.
   a) 0.414
   b) 0.524
   c) 0.155
   d) 0.93

Q.2 **Answer the following questions. (Any Four)** **08**
1) Why the decomposition of PCl_5 molecule takes place in PCl_3 & Cl_2?
2) Define coordinate bond with suitable example.
3) Define hydrogen bond with suitable example.
4) Define the term –
   1) Covalent bond
   2) Hybridization
5) Why ionic compounds are hard and brittle?
6) Explain why Barium Sulphate is insoluble in water?

Q.3 **Answer the following questions. (Any Two)** **08**
    1) Describe trend of Melting and Boiling point of elements along group & along the period. In the periodic table.
    2) Explain in detail formation of antibonding molecular orbitals.
    3) Discuss the crystal structure property of ionic solids.

Q.4 **Answer the following questions. (Any Two)** **08**
    1) Explain Pauli's exclusion principle.
    2) Give the limitation of Pauling - Slater theory.
    3) State & Explain Hunds rule of maximum multiplicity.

Q.5 **Answer the following questions. (Any One)** **08**
    1) Explain the need of hybridization.
       Give the structure of SF_6 on the basis of VBT.
    2) Draw the molecular orbital diagram for O_2 molecule. Comment on its bond order, stability & magnetic character.

Seat No.

B.Sc. (Semester – I) (Old) (CBCS) Examination Oct/Nov-2019
Physics (Paper – II)
OPTICS AND LASER

Day & Date: Wednesday, 13-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Draw a neat labeled diagram wherever necessary.
           4) Use of log table and scientific calculator is allowed.

Q.1 Fill in the blanks by choosing the correct alternatives given below.   **14**

1) Ramsden's eyepiece is _____ type of eyepiece.
    a) positive   b) negative
    c) single lens   d) modular

2) In Fraunhoffer diffraction, incident wavefront is _____.
    a) plane   b) spherical
    c) cylindrical   d) elliptical

3) In spontaneous emission of radiation, emission takes place by _____.
    a) external stimulus   b) forced stimulus
    c) without external stimulus   d) both (a) and (b)

4) The rays that are incident on lens near the edges of the lens are called _____.
    a) marginal   b) paraxial
    c) axial   d) coaxial

5) When a progressive wave gets reflected from the surface of a denser medium, its phase changes by _____.
    a) 90° b) 180°
    c) 270° d) 360°

6) He-Ne laser is _____ laser.
    a) liquid   b) gas
    c) solid   d) plasma

7) In case of plane diffraction grating, the incident as well as diffracted wavefronts is _____.
    a) spherical   b) cylindrical
    c) plane   d) non-planar

8) The material used or medium used in laser formation is called _____.
    a) dielectric medium   b) excitation medium
    c) passive medium   d) active medium

9) If diameter of circle of least confusion is 6 cm then lateral spherical aberration of the lens is _____.
    a) 2 cm   b) 3 cm
    c) 12 cm   d) 8 cm

10) The expression for radius of curvature of plano-convex lenses used in Newton's rings experiment _____.

a) $R = \frac{D_m - D_n}{4\lambda(m-n)}$

b) $R = \frac{D_m^2 - D_n^2}{4\lambda(m-n)}$

c) $R = \frac{D_m - D_n}{4\lambda(m-n)^2}$

d) $R = \frac{D_m^2 - D_n^2}{4\lambda(m-n)^2}$

11) The condition for achromatism of two lenses placed in contact is _____.

a) $\frac{\omega}{f} = \frac{\omega'}{f}$

b) $\omega f = -\omega' f'$

c) $\frac{\omega}{f} = -\frac{\omega'}{f'}$

d) $\omega f = \omega' f'$

12) In spectrometer, the eyepiece is mounted on _____.

a) Collimator
b) Telescope
c) turn table
d) Vernier

13) If focal length of eye lens in Huygen's eyepiece is 10 cm then equivalent focal length of Huygen's eyepiece is _____ cm.

a) 5
b) 10
c) 15
d) 20

14) Cross-wires can not be used in _____.

a) Gauss
b) Ramsden's
c) Faraday
d) Huygen's

Q.2 A) Answer the following questions. (Any Four)   **08**

1) Distinguish between prism spectra and grating spectra.
2) In Ramsden's eyepiece, two thin plano convex lenses are separated from each other by 3 cm. Calculate focal length of each lens and equivalent focal length.
3) What is stimulated emission of radiation?
4) The focal length of one of the lens in achromatic combination of two lenses in contact is 25 cm. If the dispersive power of two lenses is 0.024 and 0.036 respectively then find the focal length of another lens in the combination.
5) State any four applications of laser.

B) Write Notes. (Any Two)   **06**

1) Spherical aberration
2) Optical bench
3) Experimental set up to obtain Newton's rings

Q.3 A) Answer the following questions. (Any Two)   **08**

1) Derive an expression for longitudinal chromatic aberration of a lens.
2) A soap film of 2×10^{-5} cm thick is viewed at an angle of $30°$ to the normal. Find the maximum wavelength of the light for which the film appears dark due to the reflected light, $(\mu = 1.33)$
3) Describe experiment to determine wavelength of light by using a plane diffraction grating.

B) Answer the following questions. (Any One)   **06**

1) Explain the elementary theory of plane diffraction grating. Obtain the relation $d\sin\theta = n\lambda$ for principal maxima in the nth order.
2) Explain construction and working of Huygen's eyepiece.

Q.4 **A)** **Answer the following questions. (Any Two)** **10**

    1) Using Fermat's principle show that angle of incidence is equal to angle of reflection.

    2) What is plane diffraction grating? Calculate the grating element for a parallel beam of monochromatic light having wavelength 6250 A° inciding normally on a plane diffraction grating and second order spectral line is observed at 30°.

    3) Obtain equation for fringe width due to interference in thin wedge shaped film.

  B) **Answer the following questions. (Any One)** **04**

    1) Explain spontaneous and stimulated emission of radiation in laser.

    2) Write a note on Gauss eyepiece.

Q.5 **Answer the following questions. (Any Two)** **14**

  a) Describe construction and working of Ruby laser.

  b) Define chromatic aberration. Derive condition for achromatic combination of two lenses separated by finite distance.

  c) Derive an expression for optical path difference due to interference in thin parallel faced film due to reflected light.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Statistics (Paper - I)
DESCRIPTIVE STATISTICS - I

Day & Date: Thursday, 14-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below   **14**

1) The data can be measured by using non numeric notations or unordered symbols in _____.
   a) Interval Scale   b) Ratio Scale
   c) Nominal Scale   d) Ordinal Scale

2) The classes in which the lower limits or the upper limits are not specified is known as _____.
   a) Open classes   b) Close classes
   c) An open end classes   d) None of these

3) With the help of histogram, one can determine _____.
   a) Mean   b) Median
   c) Mode   d) Quartiles

4) Suppose a frequency distribution with median Rs. 75 and a mode Rs. 81. Which of the following is a possible value for the mean of distribution?
   a) 75   b) 90
   c) 84   d) 72

5) 75th percentile divides the data in the ratio _____.
   a) 3:1   b) 1:1
   c) 1:3   d) 2:1

6) In an individual series 25,17,9,11,5,4,13,7 are eight observations, then median is _____.
   a) 10   b) 12
   c) 13   d) None of these

7) For a set of 10 positive observations on a variable X, A.M., G.M., and H.M. are computed, then which of the following triplet for (A.M., G.M., H.M.) is possible?
   a) (50,45,40)   b) (40,50,45)
   c) (40,45,50)   d) (45, 40,50)

8) If C.V. of data is 80 suppose each observation is multiplied by 5 then C.V. of new observation.
   a) 80   b) 40
   c) 16   d) 56

9) Two subsets are of the same sizes and same means, but different Standard Deviations 6 and 4. Then their combined standard deviation is _____.
   a) 16   b) 4
   c) 26   d) 8

10) A value of standard deviation of data set containing negative values will be _____.
    a) zero   b) negative
    c) non-negative   d) none of these

11) The first order moment about mean of n observations is _____.
    a) 0
    b) First order central moment
    c) sum of deviation taken about mean /n
    d) all the above

12) If $\mu_r^|$ and μ_r denote r^{th} order raw and central moments and $\mu_1^| = 6$, $\mu_2 = 64$, then $\mu_2^|$ is _____.
    a) 36   b) 58
    c) 70   d) 100

13) With usual notations if the first four moments of the distribution are $\mu_1 = 0$ $\mu_2 = 3$, $\mu_3 = -7$ and $\mu_4 = 24$ then the distribution is _____.
    a) Negatively Skewed and leptokurtic
    b) Negatively Skewed and Platykurtic
    c) Positively Skewed and Leptokurtic
    d) Positively Skewed and Platykurtic

14) If Bowley's coefficient of skewness is +1 then the median is equal to _____.
    a) Q1   b) Q3
    c) Mode   d) Mean

Q.2 A) Answer the following questions. (Any Four)   **08**
     1) Define Midpoint and Class interval.
     2) Define Median and Mode.
     3) Define M.D. and Coefficient of M.D.
     4) Define Raw moment and Factorial moment.
     5) Define Bowley's coefficient of skewness.

B) Write Notes. (Any Two)   **06**
     1) Write a note on cumulative frequency.
     2) How mode is located graphically?
     3) Explain absolute measures of dispersion.

Q.3 A) Answer the following questions. (Any Two)   **08**
     1) The mean marks got by 300 students in a subject are 45. The mean of the top 100 of them was found to be 70 and the mean of last 100 was known to be 20. Compute the mean of the remaining 100 students.
     2) For any two observations a and b prove that $G.M. = \sqrt{A.M. \times H.M.}$
     3) The first two moments of a distribution about 3 are 1, 22. Find its mean and S.D.

    B) **Answer the following questions. (Any One)** 06
       1) What is histogram? Explain the method of its construction.
       2) If $\bar{X}_1$ and $\bar{X}_2$ are the means of two groups of sizes n_1 and n_2 respectively, derive the formula to obtain mean of $(n_1 + n_2)$ values pooled together.

Q.4 **A)** **Answer the following questions. (Any Two)** 10
       1) Show that sum of deviation taken from mean is zero.
       2) For two positive observations a and b show that S.D. is equal to M.D. about mean.
       3) Write a short notes kurtosis.

    B) **Answer the following questions. (Any One)** 04
       1) Find Mean and Variance of first n natural numbers.
       2) Given that AM = 160, Mode = 157, S.D. = 50. Find
          i) Karl Pearson's coefficient of skewness
          ii) Coefficient of Variation.

Q.5 **Answer the following questions. (Any Two)** 14
    a) For any two positive observations, prove that $A.M. \geq G.M. \geq H.M$
    b) Define Mean Square Deviation and state and prove its minimal property.
    c) Define moments about origin and about mean. Prove that –
$$\mu_3 = \mu_3^| - 3\mu_2^|\mu_1^| + 2\mu_1^{|^3}$$

Seat No.		**Set**	**P**

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Statistics (Paper- II)
PROBABILITY AND PROBABILITY DISTRIBUTION – I

Day & Date: Friday, 15-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figure to the right indicates full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Coin marked head on both sides is tossed 100 times. This experiment is _____.
   a) A random experiment
   b) Deterministic experiment
   c) Neither deterministic nor random
   d) None of the above

2) A ticket is drawn from 25 tickets numbered 1 to 25, define an event as: the number drawn is a prime number. Then number of elements in this event is _____.
   a) 9   b) 10
   c) 11   d) {1,2,3,……25}

3) Which of the following is the power set corresponding to sample space $\Omega = \{w_1, w_2\}$
   a) $\{\{\ \}, \Omega\}$ b) $\{\{w_1\}, \{w_2\}\}$
   c) $\{\{w_1\}, \{w_2\}, \{w_1, w_2\}\}$ d) $\{\{\ \}, \{w_1\}, \{w_2\}, \Omega\}$

4) If $P(A \cap B) = \frac{1}{2}, P(\bar{A} \cap \bar{B}) = \frac{1}{2}$ and $2P(A) = P(B) = p$, then the value of p is given by _____.
   a) $\frac{1}{4}$ b) $\frac{1}{2}$
   c) $\frac{1}{3}$ d) $\frac{2}{3}$

5) What is the probability that two persons have same Birth Month?
   a) 1   b) 1/12
   c) ½   d) 0

6) In a group of 10 men, 6 are graduates. A group of 3 men are selected at random, then probability that the group consist of all graduates is _____.
   a) 1/6   b) 0.1
   c) 0.2   d) None of these

7) Let $\Omega = \{e_1, e_2, e_3, e_4\}$ such that $P(e_1) = k, P(e_2) = 2k, P(e_3) = \frac{1}{2}k$ $P(e_4) = \frac{3}{2}k$, then the value of k is _____.
   a) 1/5   b) 5
   c) 1   d) None of these

8) Let P be the probability measure, define on the event of
$\Omega = \{w_1, w_2, w_3, w_4, w_5, w_6\}$ such that $P(w_i) = \frac{1}{6}$ $i = 1,2,3,4,5,6$ Set
$A = \{w_2, w_3\}, B = \{w_1, w_3, w_4\}$ then $P(A/B)$ is _____.
   a) 8/13   b) 1/3
   c) 2/3   d) None of these

9) Let A, B and C be any three events defined on Ω, , then $P(B \cup C / A)$ is
_____.
   a) $P\left(\frac{B}{A}\right) + P\left(\frac{C}{A}\right)$ b) $P\left(\frac{B}{A}\right) + P\left(\frac{C}{A}\right) - P\left(B \cap \frac{C}{A}\right)$
   c) $P\left(\frac{A}{B}\right) + P\left(\frac{A}{C}\right)$ d) $P\left(\frac{B}{A}\right) + P\left(\frac{C}{A}\right) + P\left(B \cup \frac{C}{A}\right)$

10) If A and B are independent events and $P(A) = \frac{1}{2} P(A \cap B) = \frac{1}{8}$ then $P(B)$
   is _____.
   a) $\frac{1}{4}$ b) $\frac{3}{4}$
   c) 1   d) $\frac{7}{8}$

11) A problem is given independently to 3 students A,B,C, whose chances of
solving it are $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}$ respectively, then probability that the problem is solved
at least one student is _____.
   a) $\frac{19}{10}$ b) $\frac{7}{10}$
   c) $\frac{1}{2}$ d) $\frac{3}{10}$

12) A random variable X has probability mass function (p.m.f) is given by _____.

X:	-10	-5	0	5	10
P(x):	$\frac{1}{4}$	$\frac{1}{8}$	k	$\frac{1}{8} - k$	$\frac{1}{2}$

   Possible value of k is
   a) 0   b) $\frac{1}{4}$
   c) $\frac{1}{8}$ d) None of these

13) Obtain P(X=1) if the distribution function of random variable x is given by ____.

X:	0	1	2
F(x):	$\frac{1}{6}$	$\frac{1}{2}$	1

   a) $\frac{2}{3}$ b) $\frac{1}{2}$
   c) $\frac{1}{3}$ d) 1

14) The distribution function of a discrete random variable X is given by
$$F(x) = \begin{cases} 0 & X < 0 \\ \frac{1}{3} & 0 \le X < 1 \\ \frac{1}{2} & 1 \le X < 2 \\ 1 & X \ge 2 \end{cases}$$
   Then the median of x is
   a) 1   b) any value in the interval (0,1]
   c) 2   d) any value in the interval [1,2)

Q.2 A) Answer the following questions. (Any Four) 08
1) Define Elementary event and compound event.
2) Show that $P(\varphi) = 0$.
3) If A is a subset of B, prove that $P(B/A) = 1$.
4) Define mutually independence of events.
5) Define median of random variable X.

B) Write notes. (any Two) 06
1) With usual notation, show that
$$P(A \cap \bar{B}) = P(A) - P(A \cap B)$$
2) Two dice one green and other red are thrown. Let A be the event that the sum of points on the faces shown is odd and B be the event that at least one of them is an ace (number 1). Write down sample space, event A and event B.
3) Explain the partition of sample space.

Q.3 A) Answer the following questions. (Any Two) 08
1) A box contains 3 white, 2 orange, 5 blue balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn, there is at least one ball of each colour.
2) If A and B are two events with $P(A) \neq 1$ then show that
$$P\left(B/\bar{A}\right) = \frac{P(B) - P(A \cap B)}{1 - P(A)}$$
3) Test whether
$P(X = x) = \frac{2x}{n(n+1)} X = 1,2,3,\dots n$ is the p.m.f. of random variable X
Find the probability distribution of X putting $n = 6$

B) Answer the following questions. (Any One) 06
1) Prove that apriori definition of probability leads to probability measure.
2) A man is equally likely to choose any one of the three routes R_1, R_2, R_3 from his house to the railway station. On a rainy day the chances of missing the train by routes R_1, R_2, R_3 are $\frac{1}{5}, \frac{1}{20}, \frac{1}{10}$ respectively. He sets out on a rainy day and misses the train. What is the probability that route chosen by him is R_3?

Q.4 A) Answer the following questions. (Any Two) 10
1) If $P(A) = 0.3$, $P(\bar{B}) = 0.22$, $P(A \cap B) = 0.16$ compute
   i) $P(A \cap \bar{B})$
   ii) $P(\bar{A} \cap \bar{B})$
2) If A and B are independent events, show that A and $\bar{B}$ independent.
3) A discrete random variable X has p.m.f.
$P(X = x) = \frac{x+1}{k}$ $X = 0,1,2,3,4$
Find
   i) k
   ii) $P(X \geq 2)$

B) Answer the following questions. (Any One) 04
1) If $P(A) = \frac{1}{3}, P(B) = \frac{1}{4}, and P(A \cap B) = \frac{1}{6}$.
Find
   i) $P(A \cup B)$
   ii) $P(\bar{A} \cup \bar{B})$
2) If A,B,C are mutually independent events, then show that $(A \cup B)$ and C are also independent.

Q.5 **Answer the following questions. (Any Two)** **14**

a) Prove that with usual notation

$$P\left(\frac{A \cup B}{C}\right) = P\left(\frac{A}{C}\right) + P\left(\frac{B}{C}\right) - P\left(\frac{A \cap B}{C}\right)$$

b) An unbiased coin is tossed 3 times and top face is observed. Let A_i be the event that head turns up in i^{th} toss ($i = 1,2,3$). Discuss the independence of A_1, A_2, A_3.

c) A random variable has following probability distribution

X:	1	2	3	4	5	6	7
P(x):	1/8	2/8	3/8	1/64	9/64	2/64	4/64

Find

i) $P(2 < X < 6)$
ii) $P(X \geq 5)$
iii) The distribution function of X
iv) median of X

Seat No.	

B.Sc. (Semester – I) (Old) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - I)
ALGEBRA

Day & Date: Saturday, 16-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing the correct alternatives given below.** **14**

1) The inverse of the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$ is _____.

   a) $\begin{bmatrix} -5 & 2 \\ 3 & -1 \end{bmatrix}$ b) $\begin{bmatrix} 5 & -2 \\ -3 & 1 \end{bmatrix}$

   c) $\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$ d) $\begin{bmatrix} 1 & -2 \\ -3 & 5 \end{bmatrix}$

2) A square matrix $A = [a_{ij}]$ is skew - symmetric iff _____

   a) $a_{ij} = -a_{ji}$ for all i and j b) $a_{ij} = -a_{ji}$ for some i and j

   c) $a_{ij} = -a_{ji}$ for $i \neq j$ d) $a_{ij} = a_{ji}$ for $i \neq j$

3) If A is a square matrix then the matrix $A - A'$ is _____.

   a) Lower Triangular   b) Symmetric

   c) Upper Triangular   d) Skew – symmetric

4) The rank of $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$ is _____.

   a) 1   b) 2

   c) 3   d) 0

5) The correct set of eigen values of $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 0 \\ 4 & 5 & 6 \end{bmatrix}$.

   a) 1, 2, 4   b) 1, 3, 6

   c) 0, 3, 5   d) 2, 5, 6

6) The system of equations $AX = B$ in n variables has infinite solution if _____.

   a) $\rho(A) = \rho[A:B] = n$ b) $\rho(A) = \rho[A:B] < n$

   c) $\rho(A) \neq \rho[A:B]$ d) $\rho(A) < \rho[A:B]$

7) Homogeneous system of linear equations are _____.

   a) always consistent   b) sometimes consistent

   c) always inconsistent   d) Both a and c are true

8) $\dfrac{(\cos 3\theta + i \sin 3\theta)^4 (\cos 4\theta - i \sin 4\theta)^5}{(\cos 4\theta + i \sin 4\theta)^3 (\cos \theta + i \sin \theta)^{-20}} =$ _____.

   a) 0   b) 1

   c) -1   d) $\cos \theta + i \sin \theta$

9) Polar form of $\sqrt{3} + i =$ _____.
   a) $z = 2\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)$
   b) $z = 2\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)$
   c) $z = 2\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$
   d) $z = 2\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)$

10) $\text{Arg}\left(\frac{1}{2} + \frac{i\sqrt{3}}{2}\right) =$ _____.
    a) $\frac{\pi}{2}$
    b) $\frac{\pi}{3}$
    c) $\frac{\pi}{4}$
    d) $\frac{\pi}{6}$

11) $(\cos n\pi + i\sin n\pi)^{1/n} =$ _____ where $n > 0$.
    a) 0
    b) 1
    c) -1
    d) 2

12) $\text{Im}(i^i) =$ _____.
    a) 0
    b) 1
    c) $\frac{1}{\sqrt{2}}$
    d) $e^{-\pi/2}$

13) The value of $\sinh\left(\frac{3\pi i}{2}\right) =$ _____.
    a) 0
    b) 1
    c) $\frac{1}{2}$
    d) $-i$

14) For any complex number z, $\tanh(iz) =$ _____.
    a) $-i\tan(iz)$
    b) $\tan iz$
    c) $i\tan z$
    d) $i\tan iz$

Q.2 A) Attempt any four of the following questions.　　　　　　　　　**08**
   1) Using Euler's formula, show that $\cos 2\theta = \cos^2\theta - \sin^2\theta$.
   2) Define symmetric and skew-symmetric matrices.
   3) Find the characteristics equation of matrix $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & \sqrt{2} \\ 0 & \sqrt{2} & 2 \end{bmatrix}$
   4) Find the two values of $\sqrt{i}$.
   5) Express the following matrix as the sum of symmetric and skew-symmetric matrices.
   $$A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{bmatrix}$$

B) Attempt any two of the following questions.　　　　　　　　　**06**
   1) Find the rank of the following matrix.
   $$A = \begin{bmatrix} 0 & 1 & 2 & 1 \\ 1 & 2 & 3 & 2 \\ 3 & 1 & 1 & 3 \end{bmatrix}$$
   2) Evaluate $\int \sin^4\theta \, d\theta$
   3) Solve: $x + 2y - 3z = 0$, $2x - 3y + z = 0$, $4x - y - 2z = 0$

Q.3 **A)** **Attempt any two of the following questions.** **08**

1) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

2) Reduce the following matrix to normal form and hence find its rank.
$$A = \begin{bmatrix} 1 & 0 & 2 & 1 \\ 2 & 1 & 3 & 2 \\ 1 & 3 & 1 & 3 \end{bmatrix}$$

3) If $z = 4e^{i\pi/4}$, find $\left| e^{iz} \right|$

B) **Attempt any one of the following questions.** **06**

1) If $A = \begin{bmatrix} 2 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & 0 & 1 \end{bmatrix}$ then prove that $A^3 - 6A^2 - 6A - 3I = 0$

2) Using De Moivre's theorem, prove that
$$-32 \sin^6 \theta = \cos 6\theta - 6 \cos 4\theta + 15 \cos 2\theta - 10$$

Q.4 **A)** **Attempt any two of the following questions.** **10**

1) If $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$, express $A^6 - 4A^5 + 8A^4 - 12A^3 + 14A^2$ as a linear polynomial in A.

2) Express using De Moivre's Theorem, $\sin 3\theta, \cos 3\theta$ in terms of powers of $\sin \theta, \cos \theta$ respectively.

3) Show that $\tan h^{-1} x = \sin h^{-1} \frac{x}{\sqrt{1-x^2}}$

B) **Attempt any one of the following questions.** **04**

1) Find the values of λ for which the following equation has a non zero solution $2x + 3y - 2z = 0, 3x - y + 3z = 0, 7x + \lambda y - z = 0$

2) If x is real then prove that: $\tan h^{-1} x = \frac{1}{2} \log \left(\frac{1+x}{1-x} \right)$

Q.5 **Attempt any two of the following questions.** **14**
a) State and prove De Moivre's theorem.
b) State and prove Cayley-Hamilton theorem.
c) Discuss for all values of k, the system of equations.
$$2x + 3ky + (3k + 4)z = 0$$
$$x + (k + 4)y + (4k + 2)z = 0$$
$$x + 2(k + 1)y + (3k + 4) = 0$$
have non-zero solutions

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper – II)
CALCULUS

Day & Date: Monday, 18-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) $\lim\limits_{x \to 0} \log_x \sin x = $ _____.
   a) 0   b) -1
   c) 1   d) 2

2) $\lim\limits_{x \to \infty} x^2 e^{-x} = $ _____.
   a) 0   b) 3
   c) $\frac{3}{2}$ d) e

3) $\lim\limits_{x \to \pi/2} \dfrac{\tan x}{\tan 3x} = $ _____.
   a) $\frac{1}{2}$ b) 11
   c) -2   d) 3

4) The expansion of $\log(1 - x)$ is _____.
   a) $-\left[x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \cdots\right]$ b) $x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \cdots$
   c) $1 + x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \cdots$ d) $1 - x + \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{4} - \cdots$

5) If $Y = (3x + 2)^9$ then $Y_{10} = $ _____.
   a) $9! \, 3^9$ b) $\frac{9!}{10!} 3^{10}(3x + 2)^{10}$
   c) $\frac{9!}{1!} 3^{10}(3x + 2)^0$ d) 0

6) If $f(x, y) = \dfrac{x^3 - y^3}{x^2 + y^2}, \; x^2 + y^2 \neq 0 \; and \; f(0,0) = 0$ then $f_4(0,0) = $ _____.
   a) 1   b) 2
   c) -1   d) does not exist

7) If $f(x, y) = |x| + |y|$ then _____.
   a) f is not continuous at (0,0)
   b) f is continuous and differentiable at (0,0)
   c) f is continuous but not differentiable at (0,0)
   d) f is neither continuous nor differentiable at (0,0)

8) If $f(x, y)$ is a Homogenous function of degree 'n' then
$\left\{\left(x\frac{\partial}{\partial x} + y\frac{\partial}{\partial y}\right)\left(x\frac{\partial}{\partial x} + y\frac{\partial}{\partial y}\right) \ldots m \; times\right\} f(x, y) = $ _____.
   a) $n^m f(x, y)$ b) $m^n f(x, y)$
   c) $(n + m) f(x, y)$ d) $n(n - 1) f(x, y)$

9) If $u = f\left(\frac{x}{y}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = $ _____.
   a) 2
   b) -1
   c) $\frac{1}{2}$
   d) 0

10) $\int_0^{\pi/2} \sin^4 x \cos^5 x \ dx$ = _____.
   a) $\frac{2}{35}$
   b) $\frac{3}{335}$
   c) $\frac{8}{315}$
   d) $\frac{2}{815}$

11) $\int_0^\infty \frac{dx}{(1+x^2)^5} = $ _____.
   a) $\frac{5\pi}{32}$
   b) $\frac{35}{256}\pi$
   c) $\frac{16}{35}$
   d) $\frac{8\pi}{35}$

12) If $\bar{a}$ is a constant vector and r and $\bar{r}$ have usual meanings, then $\nabla(\bar{a}.\bar{r})=$ _____.
   a) $-\frac{\bar{a}}{r}$
   b) $\frac{\bar{a}}{r^3}$
   c) $\bar{a}$
   d) r

13) If $\bar{f} = x^2 zi - 2y^3 z^2 j + xy^2 zk$ then curl $\bar{f}$ at (1,-1, 1) is _____.
   a) 0
   b) 7
   c) $-6i$
   d) $8i$

14) The directional derivative of a scalar point function ϕ is maximum in the direction of _____.
   a) $\nabla\phi$
   b) $\nabla.\phi$
   c) $\nabla \times \phi$
   d) Curl grad ϕ

Q.2 A) Attempt any four of the following question. 08
   1) Find y_5 of $y = \frac{\log x}{x}$.
   2) Evaluate $\lim_{x\to 0} \frac{3^x - 2^x}{x}$.
   3) Define the term limit of a two variables.
   4) Evaluate $\int_0^{\pi/2} \sin^8 x \cos^4 x \, dx$.
   5) If $\phi = x^3 + y^3 + z^3 - 3xyz$, find $\bar{r}.\nabla\phi$

B) Attempt any two of the following questions. 06
   1) State Taylor's and Maclaurin's series.
   2) Examine for continuity at (0,0) the function $f(x,y) = \frac{x^3+y^3}{x-y}$ if $(x,y) \neq (0,0)$
      $f(0,0) = 0$
   3) Find the directional derivative of $\phi(x,y,z) = xy^2 + yz^3$ at the point (2,-1, 1) in the direction of the vector $i + 2j + 2k$.

Q.3 A) Attempt any two of the following question. 08
   1) If $y = e^{ax}\cos(bx + c)$ then prove that
      $y_n = r^n e^{ax} \cos(bx + c + n\phi)$ where $r = \sqrt{a^2 + b^2}$ and $\phi = \tan^{-1}\frac{b}{a}$

2) If $z(x + y) = x^2 + y^2$ show that
$$\left(\frac{\partial z}{\partial x} - \frac{\partial z}{\partial y}\right)^2 = 4\left(1 - \frac{\partial z}{\partial x} - \frac{\partial z}{\partial y}\right)$$

3) Prove that $\nabla^2 f(r) = \frac{d^2 f}{dr^2} + \frac{2}{r}\frac{df}{dr}$

B) Attempt any one of the following questions. **06**
1) State and prove L' Hospital's rule.
2) Verify Euler's theorem for the function
$$u = \sin^{-1}\frac{\sqrt{x} - \sqrt{y}}{\sqrt{x} + \sqrt{y}}$$

Q.4 A) Attempt any two of the following questions. **10**
1) If $\bar{r}$ is the position vector of the point (x, y, z) and r is the modulus of $\bar{r}$ then prove that curl $r^n\bar{r} = \bar{0}$ and div $(r^n\bar{r}) = (n + 3)r^n$
2) If $In = \frac{d^n}{dx^n}(x^n \log x)$ prove that, $In = nI_{n-1} + (n - 1)!$ hence, deduce that
$$I_n = n!\left(\log x + 1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}\right)$$
3) Find the integral
$$\int_0^\pi x \sin^4 x \cos^6 x \, dx$$

B) Attempt any one of the following questions. **04**
1) If $x = r \cos\theta$, $y = r \sin\theta$, prove that
$$\frac{\partial^2\theta}{\partial x^2} + \frac{\partial^2\theta}{\partial y^2} = 0 \quad \text{for} \quad x \neq 0, y \neq 0$$

2) Prove that grad Q is a vector normal to the surface $Q(x, y, z) = C$

Q.5 Attempt any two of the following questions. **14**
a) State and prove Leibnitz's theorem.
b) If $Z = f(x, y)$ is a function possessing continuous first order partial derivatives and $x = h(t)$, $y = g(t)$ possessing continuous first order partical derivatives then prove that
$$\frac{dz}{dt} = \frac{\partial z}{\partial x}\cdot\frac{dx}{dt} + \frac{\partial z}{\partial y}\cdot\frac{dy}{dt}$$
c) 1) Evaluate the integral
$$\int_0^2 (4 - x^2)^{7/2}dx$$

2) If $\phi = x^2 + y^2 + z^2$, $\Psi = x^2 y^2 + y^2 z^2 + z^2 x^2$, find $\nabla[\nabla\phi.\nabla\Psi]$.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Electronics (Paper – I)
BASIC CIRCUIT THEORY AND NETWORK ANALYSIS

Day & Date: Tuesday, 19-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Use of scientific calculator is permissible.
　　　　　　　4) Draw neat labeled diagrams whenever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　14

1)　A resistor has color bands of Brown, Black, Green & Gold then its value is
　　＿＿＿＿.
　　a)　$100\ K\Omega \pm 5\%$　　　　　b)　$1\ M\Omega \pm 5\%$
　　c)　$10\ M\Omega \pm 5\%$　　　　　d)　$1K\Omega \pm 5\%$

2)　The unit of capacitive reactance is ＿＿＿＿.
　　a)　Ohm　　　　　　　　b)　Henry
　　c)　Farad　　　　　　　d)　Ampere

3)　A LCR series circuit is said to resistive if ＿＿＿＿.
　　a)　$V_L < V_C$　　　　　　b)　$V_L > V_C$
　　c)　$V_L = V_C$　　　　　　d)　$V_L \geq V_C$

4)　The T network is also called as ＿＿＿＿.
　　a)　delta　　　　　　　b)　star
　　c)　open　　　　　　　d)　all of these

5)　The admittance parameters are also called as ＿＿＿＿ parameters.
　　a)　Z　　　　　　　　b)　h
　　c)　Y　　　　　　　　d)　ABCD

6)　The working principle of transformer is based on ＿＿＿＿.
　　a)　self-induction　　　　　b)　conduction
　　c)　insulation　　　　　　d)　mutual induction

7)　The practical voltage source has ＿＿＿＿ internal resistance.
　　a)　infinite　　　　　　　b)　finite
　　c)　zero　　　　　　　　d)　all of these

8)　In series resonance circuit at resonance the current is ＿＿＿＿.
　　a)　minimum　　　　　　b)　zero
　　c)　equal to voltage　　　　d)　maximum

9)　The node point is a ＿＿＿＿ of the two or more branches.
　　a)　common point　　　　b)　earth point
　　c)　open point　　　　　d)　all of these

10)　The hybrid parameters h_{11} is called as ＿＿＿＿.
　　a)　output conductance　　　b)　reverse voltage gain
　　c)　input impedance　　　　d)　forward current gain

11) The main purpose of fuse is _____.
   a) to protect the circuit from the excessive temperature
   b) to protect the circuit against the excessive current
   c) to protect the circuit against the excessive voltage
   d) none of these

12) The unit of impedance is _____.
   a) Semen's   b) Farad
   c) Henry   d) Ohm

13) A sinusoidal signal has frequency of 20 Hz then its time period is _____.
   a) 50 m sec   b) 500 m sec
   c) 5 m sec   d) 0.5 m sec

14) In pure capacitive circuit the current is _____ with voltage.
   a) lagging   b) out of phase
   c) leading   d) in phase

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) State applications of capacitor.
   2) Define the terms
      i) In Phase
      ii) Out of Phase
   3) State Superposition theorem.
   4) Define inductance. State its practical unit.
   5) A series resonance circuit has bandwidth of 32 KHz and quality factor of 5. Calculate resonating frequency.

B) Write notes. (Any Two)   **06**
   1) Non-sinusoidal ac sources
   2) Relay
   3) Kirchhoff's laws

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Define passive and active components. Give the classifications of capacitors.
   2) Compare series and parallel resonance circuit.
   3) Convert the following π network into T network.
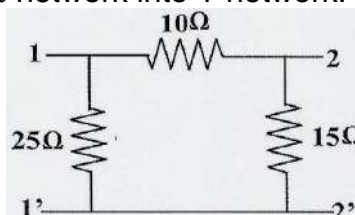
B) Answer the following questions. (Any One)   **06**
   1) With the help of two port model determine the impedance (Z) parameters.
   2) State and prove maximum power transfer theorem.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Find out current flowing through load resistance R_L of a following dc network using Thevenin's theorem.
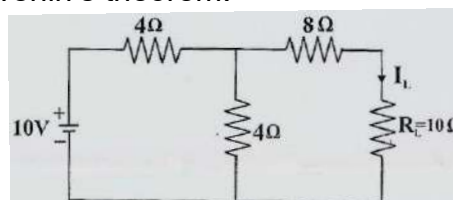
2) What are different de sources? Explain current source.
3) A series LCR circuit is connected to ac source having frequency of 50Hz. If $L = 10\,mH, C = 1000\mu F$ and $R = 100\,\Omega$. Calculate
   i) Inductive reactance
   ii) Capacitive reactance
   iii) Resonating frequency

B) **Answer the following questions. (Any One)**   **04**
   1) What are different types of transformers? Give its applications.
   2) A 50Hz sinusoidal ac signal has maximum value of 160 volts. Calculate
      i) Average value
      ii) RMS value
      iii) Peak to Peak value
      iv) Time period

Q.5 **Answer the following questions. (Any Two)**   **14**
   a) What is capacitance? State its unit. What are its types? Define any two specifications of capacitor.
   b) Define the term phase difference? Explain phase relationship of voltage and current in pure resistor and pure capacitor.
   c) Find out current flowing through each branch of the following de network using Node analysis.
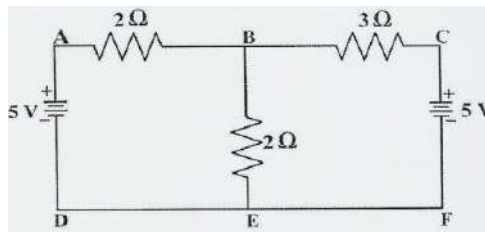
Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Electronics (Paper – II)
DIGITAL FUNDAMENTALS

Day & Date: Wednesday, 20-11-2019　　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Draw the figures wherever necessary.
　　　　　　　　4) Use of log table and calculator is allowed.
　　　　　　　　5) Q.1.should be written on page No.3 of answer booklet within 30 minutes.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) In sign-magnitude representation 101100 is equivalent to _____.
　　a) +28　　　　　　　　　　　b) -28
　　c) +12　　　　　　　　　　　d) -12

2) In K map _____ eliminates three variables.
　　a) pair　　　　　　　　　　　b) quad
　　c) octet　　　　　　　　　　　d) all of these

3) In Boolean algebra A+1 is _____.
　　a) A　　　　　　　　　　　　b) 1
　　c) 0　　　　　　　　　　　　d) Ā

4) _____ is alpha numeric code.
　　a) Parity　　　　　　　　　　b) Gray
　　c) ASCII　　　　　　　　　　d) Excess-3

5) 2's compliment of 1000 is _____.
　　a) 0111　　　　　　　　　　　b) 1001
　　c) 1000　　　　　　　　　　　d) 1011

6) Gray code of 1011 is _____.
　　a) 1110　　　　　　　　　　　b) 1010
　　c) 1100　　　　　　　　　　　d) 1101

7) _____ is the universal gate.
　　a) OR　　　　　　　　　　　b) XOR
　　c) NOR　　　　　　　　　　d) XNOR

8) _____ IC is exclusive OR gate.
　　a) 7400　　　　　　　　　　b) 7408
　　c) 7486　　　　　　　　　　d) 7432

9) Full adder adds _____ bits at a time.
　　a) 2　　　　　　　　　　　　b) 3
　　c) 4　　　　　　　　　　　　d) 8

10) The radix of Octal number system is _____.
　　a) 16　　　　　　　　　　　b) 2
　　c) 8　　　　　　　　　　　　d) 10

11) Excess 3 code of decimal 7 is _____.
   a) 1000   b) 1001
   c) 1010   d) 1011

12) In NAND gate _____.
   a) NOT gate follows AND gate   b) AND gate follows NOT gate
   c) AND gate follows OR gate   d) OR gate follows AND gate

13) Compliment of addition is provided by _____.
   a) OR gate   b) AND gate
   c) XOR gate   d) XNOR gate

14) Binary equivalent of decimal number (14_{10}) is_____.
   a) 1010   b) 1011
   c) 1101   d) 1110

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is Hexadecimal number system? What is its radix?
   2) Draw pin out diagram of IC 7432.
   3) List the applications of XOR gate.
   4) Draw the logic diagram of Y= (A+B) (A+C).
   5) Write 1's compliment of 100010_2.

B) Write Notes. (Any Two)   **06**
   1) Parity bit.
   2) Positive and negative logic.
   3) Universality of NAND gate.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Explain Binary number system.
   2) Prove that $A+\bar{A}B + \bar{A}C = A+B+C$.
   3) Explain Controlled inverter.

B) Answer the following questions. (Any One)   **06**
   1) State and prove De Morgans theorems.
   2) Explain K map for four variables.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain 8421 code.
   2) Explain AND gate along with its truth table.
   3) Explain half and full substractor.

B) Answer the following questions. (Any One)   **04**
   1) Explain rules and laws of Boolean algebra.
   2) Perform the following binary addition.
      i) 1000 + 0111
      ii) 0110 + 1001

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain with neat block diagram organization of digital computer.
   b) Explain parallel binary adder.
   c) Explain octal number system.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper - I)
FUNDAMENTAL OF COMPUTER

Day & Date: Friday, 08-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) Which electronic components are used in Third Generation Computers?
   a) Transistors   b) Integrated Circuits
   c) c. Vacuum Tubes   d) VLSI Microprocessor

2) Which of the following is system software?
   a) Operating system   b) Compiler
   c) Utilities   d) All of the above

3) The Basic Input Output System (BIOS) resides in _____.
   a) RAM   b) ROM
   c) The CPU   d) Memory Cache

4) Which of these is not the right version of MS-OFFICE _____.
   a) OFFICE XP   b) OFFICE VISTA
   c) OFFICE 2007   d) OFFICE 2010

5) MS-Office is _____.
   a) Application Software   b) System Software
   c) Operating System   d) All of Above

6) Which of these options is used to send a similar Letter to different people _____.
   a) macros   b) template
   c) mail merge   d) Auto send

7) FORTRAN stands for _____.
   a) For Translation   b) Format Transformation
   c) Fork Transformation   d) Formula Translation

8) The maximum row in a work sheet is _____.
   a) 256   b) 1024
   c) 65536   d) 32000

9) Which of the following is designed to control the operations of a computer?
   a) Application Software   b) System Software
   c) Utility Software   d) User

10) Which of the following operating system reads and reacts in actual time?
    a) Quick Response System   b) Real-Time System
    c) Time Sharing System   d) Batch Processing System

11) A device used for video games, flight simulators, training simulators and for controlling industrial robots _____.
    a) Mouse   b) Light pen
    c) Joystick   d) Keyboard

12) The primary purpose of an operating system is _____.
   a) To make the most efficient use of the computer hardware
   b) To allow people to use the computer
   c) To keep systems programmers employed
   d) To make computers easier to use

13) A Microsoft Windows is _____.
   a) Operating system   b) Graphics program
   c) Word Processing   d) Database program

14) ULSI Stands for _____.
   a) Ultra Large Storage Integration   b) Ultra Large Scale Integration
   c) Ultra Large Storage Integrator   d) Ultra Large Scale Integrator

Q.2 A) Answer the following question. (Any Four)   **08**
   1) What Is The Difference Between Save And Save As?
   2) What is computer ? List the types of computer.
   3) Differentiate between volatile and non volatile memory
   4) What is the purpose of ALU unit in CPU?
   5) What is operating system?

B) Answer the following question. (Any Two)   **06**
   1) What is the difference between moving and copying a file.
   2) What is MS Excel?
   3) List the different types of operating system.

Q.3 A) Answer the following question. (Any Two)   **08**
   1) What is multiprocessing operating system?
   2) Explain central processing unit.
   3) Differentiate between primary and secondary memory.

B) Answer the following question. (Any One)   **06**
   1) What is software? Explain types of software.
   2) What is memory? Explain the types of memory.

Q.4 A) Answer the following question. (Any Two)   **10**
   1) Draw block diagram of computer. Explain each part of computer in detail.
   2) Give the functions of operating system.
   3) Differentiate between android and symbian Operating System.

B) Answer the following question.(Any One)   **04**
   1) What is MS Word?
   2) Explain MS Excel in detail.

Q.5 Answer the following (Any two)   **14**
   a) How to Use Mail Merge in Microsoft Word?
   b) Write note on
   i) Pen drive
   ii) DVD
   c) Explain the generation of computer in detail.

Seat No.

Set | **P**

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper–II)
PROGRAMMING USING – C

Day & Date: Saturday, 09-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                         2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives.**   **14**

1) Which is correct with respect to the size of the data types?
   a) char > int > float   b) int > char > float
   c) char < int < double   d) double > char > int

2) The keyword 'break' cannot be simply used within _____.
   a) do-while   b) if-else
   c) for   d) while

3) Single line comment in C language begins with _____.
   a) :   b) //
   c) */   d) /*

4) Which of the following is odd one out?
   a) *   b) %
   c) /   d) =

5) The operator "&" is used for _____.
   a) Bitwise AND   b) Bitwise OR
   c) Logical AND   d) Logical OR

6) Identify the correct sequence of steps to run a program _____.
   a) Link, load, code, compile and execute
   b) Code, compile, link, execute, and load
   c) Code, compile, link, load and execute
   d) Compile, code, link, load and execute

7) Which among the following is NOT a logical or relational operator?
   a) !=   b) ==
   c) || d) =

8) What is the right way to initialize array?
   a) int num[3] = {10,20,30};   b) int num{} = {10,20,30};
   c) int num{3} = {10,20,30};   d) int num(6) = {10,20,30};

9) The expression x=4+2%-8 evaluates to _____.
   a) -6   b) 6
   c) 4   d) None of these

10) An array elements are always stored in _____ memory locations.
    a) Random   b) Sequential
    c) Sequential and Random   d) None of these

11) C programs are converted into machine language with the help of _____.
    a) An Editor   b) A Compiler
    c) Operating System   d) None of these

12) If the two strings are identical, then strcmp() function returns _____.
   a) 1
   b) 0
   c) -1
   d) none of these

13) Who is known as founder of C language?
   a) James Gosling
   b) Martin Richard
   c) Brian Kernighan
   d) Dennis Ritchie

14) What will be the output of the following C code?
```
#include <stdio.h>
 int main()
 {
   int i = 0;
   int j = i++ + i;
   printf("%d\n", j);
 }
```
   a) 0
   b) 1
   c) 2
   d) Compile time error

Q.2 A) Attempt any four of the following questions. 08
   1) What are the basic data types associated with C?
   2) What is a nested loop?
   3) What is an algorithm?
   4) Describe the difference between = and == symbols in C programming?
   5) What is an array?

B) Attempt any two of the following questions. 06
   1) Describe the header file and its usage in C programming?
   2) Explain difference between variables and constants.
   3) What are reserved words with a programming language?

Q.3 A) Attempt any two of the following question. 08
   1) Explain break and continue statements.
   2) Write a program to check whether a given number is even or odd.
   3) What is Pseudo code?

B) Attempt any one of the following question. 06
   1) What are the key features in C programming language?
   2) Describe newline escape sequence with a sample program?

Q.4 A) Attempt any two of the following question. 10
   1) Write a program to check a given number is prime or not.
   2) What are the characteristics of a good algorithm?
   3) What is String? Explain any two String handling function with example.

B) Attempt any one of the following question. 04
   1) What are the advantages and disadvantages of using array?
   2) Write a program to find out number of vowels in a given string.

Q.5 Attempt any two of the following question. 14
   a) What is a loop? Explain in detail with example.
   b) What is Flowchart? Explain different symbols used for flowcharting.
   c) Write a program for multiplication of two matrix.

Seat No.

Set **P**

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Physical Geography (Paper – I)
GEOMORPHOLOGY

Day & Date: Tuesday, 19-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Neat diagrams must be drawn wherever necessary.
           4) Use of map stencils is allowed.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Geomorphology is the branch of _____ geography.
    a) Human   b) Physical
    c) Economic   d) Social

2) The radius of the earth is _____ km.
    a) 6300   b) 6371
    c) 6471   d) 6360

3) The continental drift theory was put forward by Alfred Wegner in _____.
    a) 1912   b) 1920
    c) 1930   d) 1910

4) The second layer of earth interior is called as _____.
    a) Sima   b) Core
    c) Sial   d) Nife

5) The Himalaya mountain is _____ mountain.
    a) block   b) volcano
    c) old   d) folded

6) The average density of the earth is _____ gm/cm^3.
    a) 5.5   b) 5.4
    c) 5.9   d) 7.7

7) Basic and _____ are the two types of lava.
    a) hot   b) liquid
    c) solid   d) acid

8) _____ instrument are used to record the intensity of earthquakes.
    a) Barograph   b) Thermograph
    c) Seismograph   d) Pantograph

9) Binary star hypothesis was postulated by _____.
    a) Kant   b) Russel
    c) James and Jeans   d) Wegener

10) Rift valley are generally also called as _____.
    a) graben   b) river
    c) glacial   d) step faults

11) _____ discontinuity is found in between mantle and core.
   a) Moho   b) Conrad
   c) Guttenberg   d) None of these

12) The planetesimal theory about the earth's origin have postulated by _____.
   a) Norish Russell   b) Imanval Kant
   c) Jeans and Jeffery   d) Chamberlion and Moulten

13) _____ ocean is famous to fire ring of earthquakes and volcanism in world.
   a) Atlantic   b) Pacific
   c) Indian   d) Arctic

14) Fumaroles are related to _____ activity.
   a) Seismic   b) Weathering
   c) Vucuncity   d) Denudational

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define the term Geomorphology.
   2) Explain the characteristics of secondary waves.
   3) State any two landforms formed by volcanoes.
   4) Describe the term Lithosphere.
   5) Which types of materials ejected in volcanism?

B) Write Short Notes. (Any Two)   **06**
   1) The parameters of the earth crust
   2) The term SIAL
   3) Endogenetic forces

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe the scope of Geomorphology.
   2) Explain the effects of volcanoes.
   3) Describe the concept of plate tectonic theory.

B) Answer the following questions. (Any One)   **06**
   1) Describe the Wegeners continental drift theory.
   2) Explain the Earthquake Waves.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain the importance of geomorphology.
   2) Describe the temperature and density of 'Interior of the Earth'.
   3) Explain the various types of faults.

B) Answer the following questions. (Any One)   **04**
   1) Draw a neat and labeled diagram of the 'Interior of the Earth'
   2) State the Volcanoes belts on the earth surface.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Define Earthquake and explain its causes and effects.
   b) What is a folding? State its various types with schematic diagrams?
   c) Discuss the concept of Chamberlin Hypothesis.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Physics (Paper – I)
MECHANICS AND PROPERTIES OF MATTER

Day & Date: Monday, 11-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
                       2) Figures to the right indicate full marks.
                       3) Use of log table and calculator is allowed.

Q.1 Select the correct alternatives from the following and rewrite the sentence.   08

1) Moment of inertia of same size disc made up of iron and gold, about the same axis are _____.
    a) different
    b) same
    c) dependent on temperature
    d) dependent on amplitude of oscillations

2) A wire can sustain the weight of 20 kg before breaking. If the wire is cut into two equal parts each part can sustain a weight of _____.
    a) 10 kg   b) 20 kg
    c) 30kg   d) 40kg

3) The center of suspension & the center of oscillation of compound pendulum _____.
    a) cannot be inter changed   b) are interchangeable
    c) are not two different points   d) are the same points

4) Moment of inertia of a circular disc about its diameter is _____ times its moment of inertia about an axis passing through its centre and perpendicular to its plane.
    a) $\dfrac{1}{2}$ b) 2
    c) $\dfrac{1}{4}$ d) $\dfrac{1}{3}$

5) Moment of inertia of a circular disc about an axis passing through its centre and perpendicular to its plane is _____.
    a) $2MR^2$ b) $\dfrac{MR^2}{2}$
    c) $\dfrac{2}{3}MR^2$ d) $\dfrac{1}{3}MR^2$

6) At minimum time period of compound pendulum, length of equivalent simple pendulum is equal to _____.
    a) K   b) K^2
    c) K^3 d) 2K

7) A rigid body capable of oscillating freely about a horizontal axis passing through it is called a _____.
    a) simple pendulum   b) compound pendulum
    c) torsional pendulum   d) bifilar pendulum

8) Which of the following assumption is incorrect in case of streamline flow?
   a) In case of streamline flow the stream lines are parallel to the axis of the tube
   b) In case of streamline flow there is no slip between the liquid and the tube
   c) The liquid in contact with the inner surface of the tube is at rest
   d) For streamline flow the Reynolds number must exceed 6300

Q.2 Answer the following questions. (Any Four)   **08**
   1) Define modulus of rigidity and write its CGS unit.
   2) Draw schematic diagram of Torsional pendulum.
   3) State the relation between Y, K and η.
   4) What is strain? Why strain is unit less?
   5) What is compound pendulum?
   6) Define moment of inertia.

Q.3 Answer the following questions. (Any Two)   **08**
   1) Describe construction and working of Venturi meter.
   2) The M.I. of plane rectangular lamina about an axis passing through its centre and parallel to its breadth is 1.2×10^3 gm. cm^2 and length of lamina is 8 cm. Find the mass of lamina.
   3) How the Poisson's ratio of rubber is determined experimentally?

Q.4 Answer the following questions. (Any Two)   **08**
   1) Derive an expression for moment of inertia of a circular disc about an axis passing through its centre and perpendicular to its plane.
   2) State and explain the factors affecting surface tension of liquid.
   3) Obtain the condition for minimum time period of compound pendulum.

Q.5 Answer the following questions. (Any One)   **08**
   1) State and prove Bernoulli's theorem for the flow of liquids in pipes.
   2) Derive an expression for surface tension of liquid by Jaeger's method with a neat diagram.

Seat No.	

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Physical Geography (Paper – II)
GEOMORPHOLOGY

Day & Date: Wednesday, 20-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　 2) Figures to the right indicate full marks.
　　　　　　 3) Neat diagrams must be drawn wherever necessary.
　　　　　　 4) Use of map stencils is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Igneous rock are called as _____ rocks.
　　a) Secondary　　　　　　　　b) Primary
　　c) Quaterrary　　　　　　　　d) Tertiary

2)   The word _____ means rock sphere.
　　a) Hydrosphere　　　　　　　b) Atmosphere
　　c) Lithosphere　　　　　　　　d) Biosphere

3)   Brecia is a _____ types of rock.
　　a) Sedimentary　　　　　　　b) Volcanic
　　c) Igneous　　　　　　　　　d) Metamorphic

4)   Granite is an example of _____ rock.
　　a) Intrusive　　　　　　　　　b) Hypabyssal
　　c) Extrusive　　　　　　　　　d) Transported

5)   _____ weathering is carried on by vegetation and animal.
　　a) Chemical　　　　　　　　　b) Mechanical
　　c) Physical　　　　　　　　　　d) Biological

6)   _____ is an important process of chemical weathering.
　　a) Faulting　　　　　　　　　　b) Fracturing
　　c) Hydration　　　　　　　　　d) Block formation

7)   Variation in _____ are mainly responsible for physical weathering.
　　a) Volume　　　　　　　　　　b) Temperature
　　c) Mass　　　　　　　　　　　d) Velocity

8)   'V' shaped valley is a landform due to _____ erosion.
　　a) Wind　　　　　　　　　　　b) Glacier
　　c) River　　　　　　　　　　　d) Seawave

9)   Delta is formed due to the depositional work of _____.
　　a) River　　　　　　　　　　　b) Glacier
　　c) Wind　　　　　　　　　　　d) None of these

10) 'Yardang' are frequently found in _____ areas.
　　a) Polar　　　　　　　　　　　b) Dry
　　c) Equatorial　　　　　　　　　d) Monsoonal

11) The thar desert is located in the _____.
   a) Maharashtra
   b) Keral
   c) Rajasthan
   d) Assam

12) Coral is an example of _____ rock.
   a) Volcanic
   b) Sedimentary
   c) Metamorphic
   d) Igneous

13) _____ is formed by the depositional work of wind.
   a) Sand Dunes
   b) Mushroom rock
   c) Mesa
   d) None of these

14) Beaches are the depositional landforms made by _____.
   a) Wind
   b) River
   c) Oceanic wave
   d) Glacier

Q.2 A) Attempt any four of the following questions. 08
   1) State the example of sedimentary rock.
   2) Characteristics of igneous rock.
   3) What is erosion?
   4) What are the stages of cycle of river?
   5) Define the physical weathering.

B) Write Notes. (Any Two) 06
   1) Give the landform of the interor igneous rock.
   2) Give the erosional landforms of wind.
   3) Discuss the process of delta formation.

Q.3 A) Attempt any two of the following questions. 08
   1) Describe the types of sedimentary rocks.
   2) Write in detal the biological weathering.
   3) Describe the major landforms produced by sea waves.

B) Answer the following questions. (Any One) 06
   1) Discuss the types of chemical weathering.
   2) Describe the metamorphic rocks.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Describe the depositional work of sea waves.
   2) Describe the various landform produced by wind depositional.
   3) Give the depositional features made by Glacier.

B) Answer the following questions. (Any One) 04
   1) Draw the neat diagram of 'V' shaped valley.
   2) Draw the neat diagram of Barkhan.

Q.5 Answer the following questions. (Any Two) 14
   a) Describe major landform produced by river erosion.
   b) Describe major classification of rocks.
   c) Explain the concept cycle of erosion.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Zoology (Paper - I)
ANIMAL DIVERSITY- I

Day & Date: Thursday, 14-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                         2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives.   14
1) In Earthworm, the spermathecae are the organs of _____ system.
   a) male reproductive   b) female reproductive
   c) digestive   d) excretory

2) In Earthworm the locomotory organs are _____.
   a) setae   b) cilia
   c) tentacles   d) flagella

3) Secondary host of tapeworm is _____.
   a) man   b) rat
   c) pig   d) cat

4) In Earthworm gizzard is present is _____ segment.
   a) 13th b) 26th
   c) 12th d) 8th

5) The main function of contractile vacuole is _____.
   a) digestion   b) excretion
   c) respiration   d) osmoregulation

6) In Earthworm _____ pairs of spermathecae are present.
   a) two   b) three
   c) four   d) six

7) Tapeworm is _____ parasite.
   a) Ectoparasite   b) Obligatory
   c) Endoparasite   d) Facultative

8) In Hydra asexual reproduction occurs by _____.
   a) budding   b) conjugation
   c) grafting   d) cutting

9) Ascaris belongs to the _____ phylum.
   a) Nematoda   b) Porifera
   c) Coelenterata   d) Protista

10) In Earthworm, intestinal caeca are present in _____ segment.
    a) 16th b) 20th
    c) 24th d) 26th

11) In Sycon, water current exit the body through _____.
    a) spongocoel   b) ostia
    c) osculum   d) apopyle

12) Hydra belongs to class _____.
   a) Scyphozoa   b) Hydrozoa
   c) Calcarea   d) Ciliata

13) In Hydra function of nematocyst is _____.
   a) digestion   b) respiration
   c) excretion   d) protection

14) In Earthworm, the clitellar segments are in _____ segments.
   a) 12 to 14   b) 14 to 16
   c) 16 to 18   d) 18 to 20

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Salient features of phylum Annelida.
   2) Hexacanth larva of tapeworm.
   3) Spermathecae of earthworm.
   4) Metamerism in earthworm.
   5) Habits & Habitat of Earthworm.

B) Write note on (Any Two)   **06**
   1) Paramoecium
   2) Nerve ring of earthworm
   3) Function of spicules in Sycon

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe with neat labeled diagram Sycon type of canal system and its functions.
   2) Describe nutrition in Paramoecium.
   3) Describe contractile Vaccuole in Paramoecium.

B) Answer the following questions. (Any One)   **06**
   1) Discuss the coelom in earthworm.
   2) Describe digestive system of Earthworm.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe morphology of tapeworm.
   2) Describe conjugation in Paramoecium.
   3) Give salient features of Phylum Platyhelminthes.

B) Answer the following questions. (Any One)   **04**
   1) Body wall of earthworm.
   2) Cell types of sycon

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe with neat labeled diagram nervous system of earthworm.
   b) Describe parasitic adaptations in Tapeworm.
   c) Give salient features of phylum Porifera.

Seat No.

Set **P**

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Zoology (Paper – II)
CELL BIOLOGY AND GENETICS

Day & Date: Friday, 15-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.
                3) Draw neat labelled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternative given below.**   **14**

1) The only microscope which gives 3D images is _____.
    a) compound microscope   b) electron microscope
    c) fluorescent microscope   d) scanning electron microscope

2) Prokaryotic cells are characteristic of _____.
    a) animals   b) plants
    c) fungi   d) bacteria

3) Human red blood corpuscles are _____.
    a) mononucleated   b) non- nucleated
    c) polynucleated   d) binucleated

4) Fluid mosaic model of plasma membrane was proposed by_____.
    a) Singer and Nicolson   b) Robertson
    c) Land Steiner   d) Darson- Danielli

5) _____ are called as powerhouses of the cell.
    a) Mitochondria   b) Golgi complex
    c) Lamp brush   d) Nucleus

6) Ribsomes were discovered by _____.
    a) Golgi   b) De Robertis
    c) Benda   d) Palade

7) Balbiani rings are present in _____.
    a) mitochondrial   b) ribosomal
    c) lamp brush   d) polytene

8) Genotypes of pure dwarf plant is _____.
    a) TT   b) Tt
    c) tt   d) Tt Tt

9) Roan coat colour in cattles appear due to _____.
    a) co – dominance   b) incomplete dominance
    c) pleiortropy   d) multiple alleles

10) A person with _____ blood group is called as universal recipient.
    a) AB   b) O
    c) B   d) A

11) In rabbit genotypes for chinchilla coat colour is _____.
    a) cc   b) $C^{ch}C^{ch}$
    c) CC   d) C^hC^h

12) _____ is concerned with genetic disorder phenylketone uric imbecility (PKU).
   a) glucose
   b) amino acid
   c) fatty acid
   d) acetic acid

13) _____ is an example of environmental sex determination.
   a) Bonellia
   b) Honey bee
   c) Cockroach
   d) Butterfly

14) Sex determination in grasshopper is _____ type.
   a) ZZ- ZW
   b) XX-XY
   c) XX- XO
   d) XY-XX

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Give the principles of electron microscopy.
   2) Rh- Factor.
   3) Structure of lampbrush chromosome.
   4) Explain the law of dominance.
   5) XY method of sex determination.

B) Write Notes. (Any Two)   **06**
   1) Functions of Golgi complex.
   2) ABO blood group system.
   3) Functions of nucleus.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Give structure and function of ribosomes.
   2) Give an account of co- dominance with suitable example.
   3) What is sex determination? Describe ZZ-ZW method of sex determination.

B) Answer the following questions. (Any One)   **06**
   1) Describe the ultra structure of nucleus.
   2) Describe the Mendel's law of segregation.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain the functions of plasma membrane.
   2) Describe the ultra structure of prokaryotic cell.
   3) Describe the genetic disorder of phenyl ketone uric imbecility

B) Answer the following questions. (Any One)   **04**
   1) Give the functions of lysosomes.
   2) Describe the fluid mosaic model of plasma membrane.

Q.5 Answer the following questions. (Any Two)   **14**
   1) Explain multiple alleles with reference to coat colour in Rabbit.
   2) Explain the Mendelian law of independent assortment with suitable example.
   3) Describe the ultra structure and functions of mitochondria.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
BOTANY (Paper – I)
MICROBIOLOGY AND PHYCOLOGY

Day & Date: Saturday, 16-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
            2) Figures to the right indicate full marks.
            3) Draw neat labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) The division thallophyta includes _____.
   a) Bryophytes   b) Bacteria
   c) Algae   d) Virus

2) _____ crystallised and isolated Tobacco mosaic viruses for the first time.
   a) W. M. Stanely   b) F.C. Bawden
   c) K. M. Smith   d) D. Lvanowski

3) The reserved food material in the division phaeophyta is in the form of _____.
   a) Manitol   b) Laminarin
   c) Protein   d) Both a and b

4) _____ bacteria lack a cell wall.
   a) Cyanobacteria   b) Mycoplasma
   c) Bdellovibrios   d) Spirochetes

5) *Spirogyra* reproduces sexually by _____ method.
   a) Oogamous   b) Anisogamous
   c) Isogamous   d) All the above

6) Mycoplasmas are able to infect _____ tissue.
   a) Xylem   b) Phloem
   c) Sclerenchyma   d) Collenchyma

7) Agar-Agar is obtained from _____.
   a) *Gelidium*   b) *Polysiphonia*
   c) *Fucus*   d) *Laminaria*

8) Viruses are highly resistance to _____.
   a) Alkalies   b) Salt
   c) Acid   d) All the above

9) Harmogones are formed in _____ plants.
   a) *Nostoc*   b) *Spirogyra*
   c) *Sargassum*   d) *Ulothrix*

10) *Sargassum* is a _____.
   a) green algae   b) Brown algae
   c) Red algae   d) Blue green algae

11) Bacteria without flagella are known as _____.
   a) Atrichous   b) Peritrichous
   c) Lophotrichous   d) Monotrichous

12) Scalariform conjugation is found in _____.
    a) *Spirogyra*   b) *Nostoc*
    c) *Sargassum*   d) *Ulothix*

13) Ability to fix atmospheric nitrogen is found in _____.
    a) Leaves of some crop plants
    b) *Chlorella*
    c) Some marine red algae
    d) Some blue green algae

14) The cocci which mostly occur in pairs are called _____.
    a) Streptococci   b) Diplococci
    c) Tetracocci   d) None of these

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Sketch and label the cell structure of *Spirogyra.*
2) Define Microbiology.
3) Enlist types of viruses.
4) Give the names of nitrifying bacteria.
5) Define Phycology.

B) Write Notes. (Any Two)   **06**
1) Structure of heterocyst
2) Write a note on unicellular forms of algae
3) Trichous (Polar flagellum) of bacteria

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Describe Scalariform conjugation method in *Spirogyra.*
2) Discuss in brief T4 bacteriophage.
3) Describe transverse section (T.S.) of main axis of *Sargassum.*

B) Answer the following questions. (Any One)   **06**
1) Describe the role of algae in Industry.
2) Describe vegetative method of reproduction in algae.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Describe in brief the direct lateral conjugation in *Spirogyra.*
2) Describe general characters of cyanophyta.
3) Describe various types of bacteria on the basis of shapes.

B) Answer the following questions. (Any One)   **04**
1) Describe in brief significance of Mycoplasma.
2) Describe general characters of Viruses.

Q.5 Answer the following questions. (Any Two)   **14**
a) Describe general characters of algae.
b) Describe the useful activities (positive importance) of bacteria.
c) Describe sexual method of reproduction in *Sargassum.*

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Botany (Paper - II)
BIOMOLECULES AND CELL BIOLOGY

Day & Date: Monday, 18-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.
             3) Draw neat labelled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Sulphuric acid is formed by _____ bond.
    a) Anhydro   b) Vander-waals
    c) Co-ordinate   d) None of these

2) Reappearing of nucleolus is during _____ phase.
    a) Prophase   b) Metaphase
    c) Anaphase   d) Telophase

3) The term pH was proposed by ____.
    a) Sorenson   b) Hatch
    c) Slack   d) Watson

4) Double helical structure of DNA was proposed by _____.
    a) Robert Hook   b) Robert Brown
    c) Watson & Crick   d) Singer & Nicolson

5) The holoenzymes consist of _____ part.
    a) Protein   b) Lipid
    c) Nonprotein   d) Both a & c

6) In adinine and thymine _____ hydrogen bonds are present.
    a) 1   b) 2
    c) 3   d) 4

7) Enzymes are _____ in nature.
    a) Lipid   b) Carbohydrates
    c) Protein   d) Vitamins

8) The vacuole is surrounded by _____.
    a) Tonoplast   b) Cell membrane
    c) Cell wall   d) Palsmodesmata

9) Middle lamella is made up of _____ substances.
    a) Pectin   b) Microfibrils
    c) Cellulose   d) All of these

10) _____ enzyme facilitates transport across cell membrane.
    a) Ligase   b) Permease
    c) Lipase   d) Sterols

11) Microbodies were first discovered by _____.
    a) Hofmeister   b) Porter
    c) Rhodin   d) Smith

12) DNA synthesis occurs in _____ phase.
    a) G 1   b) S
    c) M   d) G 1 & G 2

13) Somatic cells divide by _____.
    a) Mitosis   b) Meiosis
    c) Both a & b   d) Amitosis

14) Buffer is the mixture of _____.
    a) weak acid and their salt of strong base
    b) weak acid and their salt of weak base
    c) strong acid and their salt of strong base
    d) all of the above

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Write any two properties of water.
    2) Define Ionic bond.
    3) What is the chemical nature of DNA?
    4) Sketch and label the prokaryotic cell.
    5) Describe anaphase of mitosis.

B) Write Notes. (Any Two)   **06**
    1) Chemical composition of plant cell wall
    2) Functions of glucose
    3) Functions of glyoxysomes

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Explain in brief clover leaf model of t-RNA.
    2) Describe in brief ultra structure of cell wall.
    3) Write significance of mitosis.

B) Answer the following questions. (Any One)   **06**
    1) Distinguish between prokaryotic and eukaryotic cell.
    2) Explain physical properties of carbohydrates.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) What are types of buffer? Give significance of buffer.
    2) What are polysaccharides? State the properties of starch.
    3) Describe the properties of enzymes.

B) Answer the following questions. (Any One)   **04**
    1) Describe lock and key hypothesis.
    2) Describe in brief fluid mosaic model of plasma membrane.

Q.5 Answer the following questions. (Any Two)   **14**
    a) Define mitosis and describe any two stages of mitosis.
    b) Describe structure and functions of peroxisomes.
    c) Define chemical bond and describe any two chemical bonds with examples.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Psychology (Paper - I)
GENERAL PSYCHOLOGY

Day & Date: Tuesday, 19-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                   2) Figures to the right indicate full marks of the question.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) Carl Rogers was _____ psychologist.
   a) behaviouristic   b) psychoanalytic
   c) humanistic   d) gestalt

2) The concept of 'Self actualization' belongs to _____ psychology.
   a) psychoanalytic   b) humanistic
   c) gestalt   d) behaviouristic

3) The _____ is called little brain.
   a) cerebral cortex   b) cerebellum
   c) thalamus   d) pons

4) Pavlov was a _____ physiologist.
   a) American   b) French
   c) Russian   d) German

5) The variable which is manipulated by the researcher is called _____ variable.
   a) independent   b) dependent
   c) extraneous   d) response

6) According to _____ theory, sleep is a product of evolution.
   a) restorative   b) adaptive
   c) constructive   d) none of the above

7) _____ developed theory of operant conditioning.
   a) Pavlov   b) Skinner
   c) Bandura   d) Hull

8) Gap between two neurons is called _____.
   a) dendrites   b) synapse
   c) axon   d) terminal buttons

9) There are _____ stages of sleep.
   a) 1   b) 2
   c) 3   d) 4

10) Law of effect was proposed by _____.
    a) Freud   b) Rogers
    c) Skinner   d) Thorndike

11) Reflex actions are controlled by _____.
    a) Brain   b) spinal cord
    c) Medulla   d) pons

12) The tendency to respond to a stimulus that is similar to the original conditioned stimulus is called _____.
   a) Stimulus discrimination
   b) Stimulus generalization
   c) Stimulus conditioning
   d) None of the above

13) Changes due to learning are relatively _____.
   a) Temporary
   b) permanant
   c) Flexible
   d) all of the above

14) _____ Perspective is called the third force in psychology.
   a) Psychoanalytic
   b) Behaviourism
   c) Humanistic
   d) Structuralism

Q.2 A) Answer the following questions. (Any Seven)   **14**
   1) What is insomnia?
   2) Define psychology.
   3) What is learning?
   4) What is survey?
   5) What is neuron?
   6) What is cognitive neuroscience?
   7) What is stimulus discrimination?
   8) What is behaviour?
   9) What is the long form of REM Sleep?

Q.3 A) Answer the following questions. (Any Two)   **10**
   1) Describe case study method.
   2) Describe different psychological professions.
   3) Explain Freud's interpretation of dream.

B) Describe stages of sleep.   **04**

Q.4 A) Answer the following questions. (Any Two)   **08**
   1) Explain the method of naturalistic observation.
   2) Describe goals of psychology.
   3) Explain the structure of central nervous system.

B) Describe modern perspectives in psychology.   **06**

Q.5 Answer the following questions. (Any Two)   **14**
   1) Explain sleep disorders.
   2) Describe on experiment of classical conditioning and discuss elements of classical conditioning.
   3) Explain structure of neuron with diagram.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Geology (Paper – I)
MINERALOGY AND PALEONTOLOGY

Day & Date: Tuesday, 19-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.
                3) Draw neat labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Micraster belongs to_____ class.
    a) lamellibranches   b) cephalopod
    c) trilobite   d) echinoid

2) Hypersthene is a member of _____Group.
    a) felspathoid   b) feldspar
    c) pyroxene   d) amphibole

3) The _____ is the best example of preservation of entire organism.
    a) woolly mammoth   b) fish skeleton
    c) coal   d) leaf impression

4) Asbestos shows _____ form.
    a) tabular   b) acicular
    c) nodular   d) fibrous

5) The exoskeleton of phylum mollusca, made up of hard, secreted, calcareous material is called as _____.
    a) umbob   b) lunulec
    c) shelld   d) hinge

6) The cryptocrystalline variety of quartz is _____.
    a) agate   b) flint
    c) chert   d) all of these

7) Mineral calcite shows _____.
    a) 3 sets cleavage and 6 hardness
    b) 3 sets cleavage and 3 hardness
    c) 2 sets cleavage and 3 hardness
    d) 2 sets cleavage and 4 hardness

8) Trace fossils indicate _____.
    a) coal formation   b) locomotion of animals
    c) plant impression   d) None of these

9) Turritela shell belongs to _____ class.
    a) cephalopod   b) gastropod
    c) brachiopod   d) lamellibranches

10) Na rich plagioclase is _____.
    a) anorthite   b) jadite
    c) albite   d) biotite

11) Secondary minerals having almond shapes in cavities show _____ form.
    a) amygdaloidal   b) acicular
    c) botryoidal   d) granular

12) Fossils of organisms with spines on their shells belong to _____ phylum.
    a) Echinodermata   b) Coelenterata
    c) Arthopoda   d) Brachiopoda

13) Concave or convex circular broken surfaces on minerals indicate _____ fracture.
    a) hackly   b) earthy
    c) conchoidal   d) even

14) A branch of geology deals with the systematic study of ancient life preserved in the rocks is called _____.
    a) petrology   b) paleontology
    c) petrography   d) physiography

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What is mineral?
2) Define fossils.
3) Give physical properties of orthoclase and microcline.
4) What is Umbo?
5) What is carbonization?

B) Write notes. (Any Two)   **06**
1) Streak of minerals
2) Suture linesin cephalopod
3) Thorax of Trilobites

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Describe physical properties and chemical composition of silica group minerals.
2) Explain any two geological uses of fossils.
3) Plagioclase series.

B) Answer the following questions. (Any One)   **06**
1) Explain morphology of hard parts of Cephalopods.
2) Describe crystallized, crystalline and amorphous forms in minerals.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Define Hardness. Write a note on Moh's scale of hardness.
2) Define luster. Describe any two types of lusters of the minerals with example.
3) Explain the conditions of preservation of fossils.

B) Answer the following questions. (Any One)   **04**
1) Describe – petrification.
2) Olivine group.

Q.5 Answer the following questions. (Any Two)   **14**
    a) Describe in detail physical, chemical properties of Mica group minerals with their occurrence.
    b) Describe morphology of hard parts of lamellibranches.
    c) Describe Forms of minerals - Bladed, Foliated and Radiating. Give examples.

Seat No.

B.Sc. (Semester – I) (Old) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper – I)
INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

Day & Date: Monday, 11-11-2019　　　　　　　　　　　　　Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　 2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing the correct alternatives given below:** **14**

1) _____ antibiotic was discovered by Alexander Fleming.
   a) Streptomycin　　　　　　　b) Penicillin
   c) Neomycin　　　　　　　　　d) Tetra cycline

2) The role of N_2 fixing bacteria was discovered by _____.
   a) Lister　　　　　　　　　　b) Tyndall
   c) Winogradsky　　　　　　　d) Robert Koch

3) The arrangement of coai in irregular bunches is called as _____.
   a) Staphylo　　　　　　　　　b) Strepto
   c) Diplo　　　　　　　　　　　d) Tetrad

4) A group of similar species is _____.
   a) order　　　　　　　　　　b) family
   c) division　　　　　　　　　d) genus

5) _____ type of ribosome is present in prokaryotic cell.
   a) 80 s　　　　　　　　　　　b) 60 s
   c) 70 s　　　　　　　　　　　d) 40 s

6) Mitochondria is absent in _____ cell.
   a) prokaryotic　　　　　　　b) eukaryotic
   c) plant　　　　　　　　　　d) animal

7) Percentage of pephdoglycan present in Gram positive bacteria is _____.
   a) 5-10%　　　　　　　　　　b) 10-20%
   c) 30-40%　　　　　　　　　　d) 70-90%

8) The chemical nature of capsule and slime layer is _____.
   a) protein　　　　　　　　　b) lipid
   c) porysauharide　　　　　　d) far

9) The structure of _____ is explained by fluid mosaic model.
   a) cell wall　　　　　　　　b) cell membrane
   c) flagelia　　　　　　　　　d) capsule

10) _____ includes example of methanogenic bacteria.
    a) Rickettsia　　　　　　　b) Fungi
    c) Archaebarteria　　　　　d) Protozoa

11) Amoebcid, flagellated, ciliated and sporozoans are found in _____ group of　01
    organism.
    a) Protozoa　　　　　　　　b) Fungi
    c) Actinomyetes　　　　　　d) Rickettsia

12) Antiphagocytic nature is shown by _____.
   a) Cell wall   b) Fiagells
   c) Capsule   d) Cell membrane

13) _____ organism contains DNA and RNA as a genetic material.
   a) Algae   b) Viruses
   c) Fungi   d) Protozoa

14) _____ is the example of harmful activity of micro organism.
   a) cheese formation   b) disease production
   c) N_2 fixation   d) decomposition.

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define fermentation.
   2) Define Biogenesis.
   3) What is colony?
   4) Give different arrangements of cocci shaped bacteria.
   5) List harmful activities of microorganism.

B) Write Notes. (Any Two)   **06**
   1) Koch's Postulates.
   2) Genen theory of disease.
   3) Functions of capsules.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Give beneficial activities of microorganisms.
   2) Describe character and economic importance of fungi.
   3) Explain general principles of bacterial nomenclature.

B) Answer the following questions. (Any One)   **06**
   1) Write an account of contributions of Louis Pasteur.
   2) Give an account of Rickettsia.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe structure and functions of flagella.
   2) Explain different branches of microbiology.
   3) Write general characters, structure and economic importance of viruses.

B) Answer the following questions. (Any One)   **04**
   1) Give an account of cultural characters used for bacterial classification.
   2) Explain contributions of Antomy von Leewenhock and Lister.

Q.5 Answer the following questions. (Any Two)   **14**
   1) Structure and functions of cell wall of Gram negative bacteria.
   2) Give an account of Archae bacteria.
   3) Differentiate between prokaryotes and Eucaryotes.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Psychology (Paper – II)
HUMAN DEVELOPMENT

Day & Date: Wednesday, 20-11-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) _____ Drugs produce a biological or psychological dependence leading users to increasingly crave them.
   a) Addictive b) Deductive
   c) Superpower d) None of these

2) A _____ cause may underline anorexia nervosa.
   a) Physiological b) Neurological
   c) Sociological d) Biological

3) Lack of _____ is a major culprit.
   a) Food b) Sleep
   c) Exercise d) None of these

4) Some of the changes of adolescence carry _____ weights.
   a) Economical b) Psychological
   c) Social d) None of these

5) The earlier start of puberty is an example of a significance of _____ trend.
   a) Secular b) Unsecular
   c) loosing d) none of these

6) Sex hormones in male is known as _____.
   a) Estrogens b) Androgens
   c) Neurons d) None of these

7) For Boy's Early maturation is largely a _____.
   a) Minus b) Plus
   c) Divisible d) None of these

8) Coping with the challenges of late maturation may actually help _____.
   a) Males b) Females
   c) Transgender d) None of these

9) _____ is spread mostly thought sexual contact.
   a) AIDS b) HIV
   c) Chalamydia d) Hepatitis B

10) Human pappiloma virus (HPV) produces genital warts & lead _____ cancer.
    a) Heats b) Brain
    c) Cervical d) None of these

11) _____ is psychological investment in a course of action or an ideology.
    a) Commitment b) Aliment
    c) Management d) None of the Above

12) _____ called the identity versus indent confusion stage.
   a) Freuid
   b) Sternberg
   c) Erikson
   d) Kohler

13) Exercise increases _____ fitness.
   a) Bone
   b) Cardiovascular
   c) Hair
   d) None of these

14) At the age of _____ illness and disease overtake accidents as leading cause of death.
   a) 25
   b) 35
   c) 40
   d) 50

Q.2 A) Answer the following questions. (Any Seven)   **14**
   1) Define Anorexia.
   2) What is obesity?
   3) What are the Secondary sex characteristics in girls?
   4) Long form of AIDS.
   5) What is Trichomoniasis?
   6) Define Metacognition.
   7) What is mean by crisis?
   8) What is the full form of STI?
   9) What adolescence should do for Physical fitness?

Q.3 A) Answer the following questions. (Any Two)   **10**
   1) Explain Puberty in Girls.
   2) What is Cyberspace in Adolescence?
   3) What is Identity achievement & Fore closure in Marica's approach?

B) Explain Early Maturation.   **04**

Q.4 A) Answer the following questions. (Any Two)   **08**
   1) What are the causes Students Dropping out of School?
   2) Explain Suicide in Adolescence.
   3) Explain Schaie's stages of Development.

B) Explain Late Maturation in Adolescence?   **06**

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain Puberty in Boys.
   b) Explain Piagatian Approaches to Cognitive Development.
   c) Explain Physical Fitness & Health in adolescence.

Seat No.

B.Sc. (Semester - I) (Old) (CBCS) Examination Oct/Nov-2019
Geology (Paper – II)
IGNEOUS, SEDIMENTARY AND METAMORPHIC PETROLOGY

Day & Date: Wednesday, 20-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Draw neat diagrams wherever needed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Hot and molten material bellow earth surface is called as _____.
   a) lava   b) magma
   c) sediments   d) none of these

2) Aggregate of minerals are called _____.
   a) fossil   b) minerals
   c) rock   d) all of these

3) Granite gneiss is _____ rock.
   a) Ligneous   b) Metamorphic
   c) Sedimentary   d) All of these

4) The concavo convex shaped igneous intrusion in folded region is called _____.
   a) Lopolith   b) sill
   c) phacolith   d) laccolith

5) Arenanceous sedimentary rock composed mostly of _____ grains.
   a) sand   b) clay and dust
   c) boulder   d) none of these

6) Dolerite is _____ igenous rock.
   a) plutonic   b) volcanic
   c) intermediate   d) all of these

7) shale is _____ rock.
   a) Sedimentary   b) Igneous
   c) Metamorphic   d) None of these

8) Concordant igneous intrusions are _____ to bedding plane.
   a) Parallel   b) oblique
   c) Vertical   d) None of these

9) _____ are typical argillaceous rock.
   a) Sandstone   b) Limestone
   c) Mudstone and shale   d) All of these

10) _____ is rudaceous sedimentary rock.
   a) Conglomerate   b) limestone
   c) Sandstone   d) Bauxite

11) Granulose structure is found in _____ metamorphism.
   a) Dinamothermal   b) Thermal
   c) Cataclastic   d) None of these

12) Cooling of magma or lava forms _____rock.
   a) Metamorphic
   b) Igneous
   c) Sedimentary
   d) None of these

13) Ooliths is present in _____rock.
   a) Sandstone
   b) limestone
   c) Conglomerate
   d) All of these

14) The parent rock of slate is _____.
   a) shale
   b) sandstone
   c) lava
   d) basalt

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Mud cracks.
   2) Define Essential and Accessary minerals.
   3) Difference between magma and lava.
   4) Formation of slate.
   5) What is secondary minerals?

B) Write Notes. (Any Two)   **06**
   1) Hypabyssal igneous rock.
   2) Chemical deposits of sedimentary rock.
   3) Agents of metamorphism.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe any two concordant forms of igneous rock.
   2) Explain process for sedimentary rock formation.
   3) Describe stress and antistress of minerals.

B) Answer the following questions. (Any One)   **06**
   1) Describe the dept zones of metamorphism.
   2) Describe the rock cycle.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe gneissose and schistose structure in metamorphic rock.
   2) Describe residual sedimentary rock.
   3) Describe extrusive igneous rock.

B) Answer the following questions. (Any One)   **04**
   1) Explain ropy and pillow structure.
   2) Describe major sub divisions of rock.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Define metamorphic rock? Describe any two types of metamorphism.
   b) Describe the rain print and Ripple mark structure in sedimentary rock.
   c) Explain any two discordant forms of igneous rock.

Seat No.

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Physics (Paper - II)
OPTICS AND LASER

Day & Date: Wednesday, 13-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Use of log table and calculator is allowed.

Q.1 **Select the correct alternatives from the following and rewrite the sentence.**   **08**

     1) In gauss eyepieces the cross –wire is kept at a distance of _____ infront of the field lens.
         a) $\frac{f}{4}$ b) $2f$
         c) $\frac{2f}{3}$ d) $\frac{1}{2}f$

     2) In He- Ne laser, the population inversion is achieved by _____.
         a) electrical pumping   b) optical pumping
         c) chemical pumping   d) thermo pumping

     3) Gauss eyepiece is modification of _____ eyepieces.
         a) Huygen's   b) Ramsden's
         c) Kellner's   d) Newton's

     4) In case of a lens producing spherical aberration _____ gives position of best possible image.
         a) Focus of paraxial rays   b) Circle of least confusion
         c) Focus of marginal rays   d) axial rays

     5) In Huygen's eye piece _____ are used.
         a) two plano convex lenses   b) two convex lenses
         c) two concave lenses   d) two plane glasses

     6) The condition of diffraction in plane diffraction grating is _____.
         a) $d \cos \theta = n\lambda$ b) $d \sin \theta = n\lambda$
         c) $2d \sin \theta = n\lambda$ d) $2nd \cos \theta = n\lambda$

     7) When a progressive wave gets reflected from the surface of a denser medium, its phase changes by _____.
         a) $\pi \ or \ 90°$ b) $2\pi \ or \ 360°$
         c) $\pi \ or \ 180°$ d) $\frac{\pi}{2} \ or \ 90°$

     8) In Ramsden's eye-piece the two plano convex lenses used have focal length in the ratio _____.
         a) 3 : 1   b) 1 : 1
         c) 2 : 3   d) 3 : 2

Q.2 **Answer the following questions. (Any Four)**   **08**
     1) What is schuster's method?
     2) State any four characteristics of laser
     3) Give methods to minimize spherical aberration.
     4) State any four application of laser.

5)   What is cavity resonator?
6)   Write the names of uprights in optical bench.

Q.3   Answer the following questions. (Any Two)   **08**
1)   How population inversion is achieved in laser?
2)   Give the laws of refraction
3)   Write a note on Gauss eyepiece.

Q.4   Answer the following questions. (Any Two)   **08**
1)   What is Geometrical optics? Give the assumptions of Geometrical optics.
2)   A parallel beam of monochromatic light is incident normally on a plane diffraction grating of 15000 lines per inch. If the angle of diffraction for the 1st order line of the light is 18°, calculate the wavelength of the light.
3)   Write the conclusions from the study of wedge shaped thin film?

Q.5   Answer the following questions. (Any One)   **08**
1)   Explain how Newton rings are formed .obtain an expression for wavelength of monochromatic light in terms of diameters of Newton rings of different orders produced by reflected light.
2)   Write the application of grating to determine wavelength of light. Compare grating & prism spectra. Calculate the grating element 'd' of plane diffraction grating of 6000 lines per centimeter.

Seat No.

B.Sc. (Semester – I) (Old) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper – II)
MICROBIAL TECHNIQUES

Day & Date: Wednesday, 13-11-2019
Time: 03:00 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw a neat labeled diagram wherever necessary.

Q.1 Fill in the blanks by choosing the correct alternatives given below. 14

1) The method of serial dilution was firstly discovered by _____.
   a) Robert Hook
   b) Joseph lister
   c) Louis Pasteur
   d) Francesco Reddi

2) _____ antiseptic agent used as preservative in eye drops.
   a) Silver nitrate
   b) Mercury chloride
   c) Silver sulphate
   d) Ethylene oxide

3) Electron microscope invented by _____.
   a) Van Boris & Ruska
   b) Watson & crick
   c) Wendell & Stanley
   d) Louis Pasteur

4) _____ used as decolorizing agent in gram staining.
   a) Alcohol
   b) ZNCF
   c) Crystal violet
   d) Iodine

5) Hot air oven makes use of _____ for sterilization.
   a) Moist heat
   b) Dry heat
   c) Neutral
   d) Radiation

6) The _____ lens magnifies the specimen and produces a real image.
   a) Eye piece
   b) Condenser
   c) Iris diaphragm
   d) Objective

7) _____ used as counter stain in the acid fast staining used for staining of mycobacterium.
   a) Malachite green
   b) Acid-Alcohol
   c) ZNCF
   d) Safranine

8) In Cell wall staining by chance's method _____ used as decolorizing agent.
   a) Congo red
   b) New fuchsine
   c) Alcohol
   d) Iodine

9) The process of reducing 90% population of microorganisms from inanimate objects is known as _____.
   a) Sterilization
   b) Disinfection
   c) Sanitization
   d) Antiseptic

10) In LTST method of pasteurization milk is pasteurized at _____.
    a) 121^0C for 20 Minute
    b) 62.8^0C ^0C for 30 Minute
    c) 71.6^0C for 20 Minute
    d) 140^0C for 10 second

11) Tissue culture media used for cultivation of _____.
   a) Bacteria
   b) Fungi
   c) Viruses
   d) Algae

12) The method which preserves the microorganism at -196 °C under vacuum is known as _____.
   a) Cryopreservation
   b) Lyophilization
   c) Freezing
   d) Thawing

13) The media which contain selective agent that permit growth of desired organism is called as _____ media.
   a) Living
   b) Empirical
   c) Selective
   d) Differential

14) _____ is used for sterilization of enzymes, protein as well as liquid and gases.
   a) Autoclaving
   b) Halogens
   c) Membrane filtration
   d) Tyndalization

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Explain heavy metal as sterilizing agent.
   2) What is Numerical aperture?
   3) Define differential media.
   4) Define sterilization by membrane filtration.
   5) Define disinfection.

B) Answer the following questions. (Any Two)   **06**
   1) What is cold sterilization? Discuss in brief sterilization by ultraviolet radiation.
   2) Discuss in brief principle and procedure of negative staining.
   3) Give a brief account on cultivation of viruses in Embryonated chicken egg.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe in brief synthetic, semi synthetic, enriched and tissue culture media with example.
   2) Discuss in detail methods of maintenance and preservation of microorganisms.
   3) Give a detailed account on principle and mechanism of cell wall staining.

B) Answer the following questions. (Any One)   **06**
   1) Define stain. Describe in detail the classification of stains with example.
   2) Discuss in brief principle and applications of electron microscope.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Discuss in detail principal, procedure and mechanism of Gram's staining.
   2) Describe in detail sterilization by temperature.
   3) Describe in detail serial dilution and streak plate method of pure culture techniques.

B) Answer the following questions. (Any One)   **04**
   1) Define antiseptics, germicide, sanitization and microbiostasis.
   2) What is acid fastness? Discuss in brief procedure of acid fast staining.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain in detail principle, ray diagram and working of compound microscope.
   b) Describe in detail sterilization by chemical agents such as halogens, phenol and gaseous sterilization agent.
   c) Describe in brief principles, procedure and mechanism of simple staining.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
English
GOLDEN PETAL

Day & Date: Saturday , 05-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
                2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) The school of _____ was set up by the priest Lorenzo Millani.
   a) Barcelona   b) Barbiana
   c) Balonia   d) Brabilano

2) Letter to a Teacher was published originally in _____.
   a) 1966   b) 1968
   c) 1967   d) 1965

3) My Duty to My Neighbour was taken from the book _____ of Sir Earnest Barker.
   a) Life Importance   b) Importance of Life
   c) Essential of Life   d) Values of Life

4) Sir Earnest Barker was elected as a member of _____ party in the year 1936.
   a) Loyalist   b) Liberal
   c) Legal   d) Labour

5) Tigers are troubled by _____ and do not lie long in one position.
   a) people   b) animals
   c) files   d) leaves

6) Jim Corbett was born in _____.
   a) 1875   b) 1885
   c) 1895   d) 1850

7) Sarojini Naidu was known as _____ of India.
   a) Maina   b) Nightingale
   c) Bulbul   d) Sparrow

8) Weavers were making the clothes of _____ at break of day.
   a) new born baby   b) brides
   c) farmers   d) bridegrooms

9) Maya Angelou was born in _____.
   a) 1922   b) 1928
   c) 1925   d) 1920

10) _____ becomes my close companion, and anger follows in its wake.
   a) My father   b) My friend
   c) Disbelief   d) My mother

11) The _____ of Taj Mahal is very touchy to everyone.
   a) Syte   b) Cite
   c) Sighte   d) Site

12) There are so many _____ are going on television.
    a) Cereals   b) Serials
    c) Cerials   d) Syrials

13) The India's victory over Australia, the team spirit had _____.
    a) a lion's share   b) up and moves
    c) bitter to swallow   d) a goat's share

14) The custom of having two wives is _____.
    a) polygamy   b) bigamy
    c) bygamy   d) beygamy

Q.2 Attempt any four of the following questions.   **16**
  1) How does the student writer proves that his teachers knows very little about actual life?
  2) How is the school different from the student's home?
  3) Why does the author feel he has been a bad townsman?
  4) Why is there an element of patronage in the idea of social service?
  5) How was the narrator able to cough in the presence of a tiger?
  6) Why did Jim Corbett feel guilty after killing the tiger?

Q.3 Attempt any two of the following questions.   **12**
  1) What do you learn about the work of weavers from the poem 'Indian Weavers'?
  2) What is the country of no return?
  3) What are the benefits of blogs?
  4) What is an email? What are the principles of email writing?

Q.4 Attempt any one of the following question.   **14**
  a) Write the script of an interview for the post of a clerk in Eureka Borbes Company.

<div align="center">**OR**</div>

  b) Write the script of group discussion on the topic – Importance of Cleanliness involving various participants.

Q.5 You are the secretary of an NGO - Global Society. You have arranged annual meeting of all members. Draft an agenda and minutes of the meeting held on 25 January 2019.   **14**

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Chemistry (Paper – III)
ORGANIC CHEMISTRY

Day & Date: Monday,07-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.
             3) Draw neat diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Which of the following is not a nucleophile?
   a) BF_3 b) H_2O
   c) CH_3OH d) NH_3

2) Dehydration of alcohol is an example of _____ reaction.
   a) substitution   b) addition
   c) elimination   d) rearrangement

3) In acetylene the bond length between adjacent carbon atoms is _____ Å.
   a) 1.54   b) 1.20
   c) 1.34   d) 1.09

4) The average bond energy of C-H bond in methane is _____ kcal/mol.
   a) 397   b) 104
   c) 99.3   d) 81

5) _____ effect occurs in methyl chloride.
   a) Inductive   b) resonance
   c) steric   d) none of these

6) Wurtz reaction is suitable for the preparation of hydrocarbon containing _____.
   a) even number of carbon atoms   b) cyclic structure
   c) odd number of carbon atoms   d) all of the above

7) C_nH_{2n} is the general molecular formula of _____.
   a) alkene   b) cycloalkane
   c) alkane   d) both a) and b)

8) Anti-Markonikoff's addition of HBr is not observed in _____.
   a) Propene   b) 1-Butene
   c) 2-Butene   d) 2-Pentene

9) Baeyer's reagent is _____ solution.
   a) alk. $KMnO_4$ b) acidic $KMnO_4$
   c) neutral $KMnO_4$ d) all of the above

10) The ease of dehydrohalogenation of alkyl halide follows the order _____.
   a) $1^0 > 2^0 > 3^0$ b) $3^0 > 1^0 > 2^0$
   c) $3^0 > 2^0 > 1^0$ d) $1^0 > 3^0 > 2^0$

11) Which compound shows Cis-Trans isomerism?
   a) 1- Pentene   b) 1-Butene
   c) 2-Butene   d) Propene

12) Which of the following is a non benzenoid aromatic compound?
    a) Naphthalene
    b) Benzene
    c) Phenol
    d) Pyridine

13) In benzene all carbon atoms are in _____ hybridized state.
    a) sp^3
    b) sp
    c) sp^2
    d) sp^3d

14) The function of $AlCl_3$ in Friedel-Craft reaction is _____.
    a) to produce water
    b) to absorb HCl
    c) to produce electrophile
    d) To absorb water

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Draw the resonating structures of phenol.
    2) Define steric effect. Explain it w.r.t. mesitoic acid.
    3) Define cycloalkane. Write structure of 1, 3-dimethyl cyclohexane.
    4) Write physical properties of alkanes.
    5) What are dienes? Write their types.

B) Write note on (Any Two)   **06**
    1) Types of reagents in organic reactions
    2) Ozonolysis of Propene
    3) Enantiomer

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Define hybridization and explain hybridization in acetylene molecule in detail.
    2) How 2-butene is formed by dehydration of 2-butanol? Explain with mechanism.
    3) Explain aromaticity in Benzene and Naphthalene on the basis of Huckel's rule.

B) Answer the following question. (Any One)   **06**
    1) Explain steps involved in nitration of benzene.
    2) Describe the action of (a) Cl_2/ light (b) Conc. HBr (c) H_2/ Ni on cyclopropane.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Define Bond length, bond angle and bond energy. How these properties are affected by type of hybridization?
    2) Describe optical isomerism in tartaric acid.
    3) What is Friedel-Craft's reaction? Explain Friedel-Craft's alkylation of benzene.

B) Answer the following questions. (Any One)   **04**
    1) Draw different types of arrows used in reaction mechanism with their significance.
    2) Explain free radical chlorination of methane with mechanism.

Q.5 Answer the following questions. (Any Two)   **14**
    a) What do you mean by carbocation? Give three methods of formation and two chemical reactions of carbocation.
    b) Explain molecular orbital picture and resonance in 1, 3-butadiene.
    c) Define chiral center. Give conditions for optical activity and describe plane of symmetry and center of symmetry.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
CHEMISTRY (Paper – IV)
ANALYTICAL CHEMISTRY

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
                 2) Figures to the right indicate full marks.
                 3) All questions carry equal marks.
                 4) Draw the neat labeled diagrams wherever necessary.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The chief component of natural gas is _____.
   a) Ethylene   b) Methane
   c) Propane   d) Ethyne

2) The process of reforming involves _____.
   a) Cyclization   b) Isomerization
   c) Aromatization   d) All the above

3) Sodium nitropruside when added to an alkaline solution of sulphide ion produces _____.
   a) Purple colouration   b) Green colouration
   c) Black colouration   d) Red colouration

4) In lassaigne's test, an organic compound is fused with _____.
   a) CuO b) $CuSO_4$
   c) Na d) $FeSO_4$

5) An empirical formula of compound gives _____.
   a) Molecular weight   b) Octane number
   c) Equivalent weight   d) Smallest ratio of different atoms

6) _____ is a physical method for sterilization of water.
   a) Chlorination   b) Boiling
   c) Fluoridation   d) None of these

7) _____ process removes all ions from water.
   a) Zeolite   b) Ion exchange
   c) Soda ash   d) None of these

8) Sedimentation is a _____ process.
   a) Chemical   b) Biological
   c) Coagulation   d) Settling

9) _____ oxide of nitrogen is not pollutant.
   a) N_2O b) NO
   c) NO_2 d) N_2O_5

10) Aerosol can be formed by combination of _____ with water.
   a) SO_2 b) S
   c) SO_3 d) All the above

11) Optical activity is _____ property.
   a) an additive   b) a constitutive
   c) colligative   d) none of these

12) Synthetic rubber is prepared from _____.
   a) ethylene oxide   b) benzene
   c) toluene   d) styrene

13) CO_2 has zero dipole moment hence its structure should be _____.
   a) cyclic   b) non-linear
   c) linear   d) none of these

14) Stalagmometer is used for determination of _____.
   a) surface tension   b) viscosity
   c) dipole moment   d) refractive index

Q.2 A) Answer the following (Any Four)   **08**
   1) Define additive and constitutive properties of liquid with example.
   2) Explain why CO_2 has zero dipole moment.
   3) Define parachor.
   4) Define hard water.
   5) Give any two examples of anti-knocking compounds.

B) Write Notes on (Any Two)   **06**
   1) Parameters of potable water
   2) Draw CO_2 cycle in nature
   3) Draw neat labeled diagram of Ostwald's Viscometer

Q.3 A) Answer the following (Any two)   **08**
   1) Explain in detail process of water distillation.
   2) Write note on chlorination and ozonisation.
   3) How will you detect chlorine, bromine and iodine by Lassaigne's test.

B) Answer the following (Any One)   **06**
   1) What is petroleum? How is Petroleum formed? Give its constituents.
   2) Explain experimental determination of surface tension by drop weight method.

Q.4 A) Answer the following (Any Two)   **10**
   1) Discuss in detail classification of air pollutants.
   2) Write principle and procedure of combustion method for detection of carbon and hydrogen.
   3) Give synthesis of Paracetamol and Ethylene oxide.

B) Answer the following (Any One)   **04**
   1) What is refraction of light? Explain with suitable diagram.
   2) Give sources and health hazards of SO_2.

Q.5 Answer the following (Any two)   **14**
   a) Describe the construction, working and advantages of Abbe's refractometer.
   b) What is meant by sewage? Discuss activated sludge process in detail.
   c) An organic compound contains 58.55 % carbon, 4.05 % hydrogen and 11.36 % nitrogen. If its molecular weight is 123 find its molecular formula.

Seat No.

Set **P**

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Physics (Paper - III)
HEAT AND THERMODYNAMICS

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.
4) Use of log table or calculator is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) The zeroth law of thermodynamics leads to definition of the term _____.
   a) pressure   b) volume
   c) entropy   d) temperature

2) The efficiency of reversible Carnot's engine working between temperatures
   $T1$ and $T2$ $(T_1 > T_2)$ is _____.
   a) $\frac{T_2}{T_1}$ b) $\frac{T_1}{T_2}$
   c) $\left(1 - \frac{T_2}{T_1}\right)$ d) $\left(\frac{T_1}{T_2} - 1\right)$

3) The mean free path of gas molecules is inversely proportional to _____.
   a) square of the diameter of the molecule
   b) square root of the diameter of the molecule.
   c) molecular diameter
   d) fourth power of the molecular diameter

4) In an adiabatic expansion, internal energy _____.
   a) increases   b) decreases
   c) remains constant   d) becomes equal to zero

5) The gas has thermal conductivity of 0.5 J/ms°K and coefficient of viscosity
   2×10^{-5} Ns/m², its specific heat at constant volume is _____.
   a) 2×10^{-5} J/kg°K   b) 2.5×10^{4} J/kg°K
   c) 2×10^{5} J/kg°K   d) None of the above

6) Any device which converts heat into mechanical work is called _____.
   a) heat engine   b) refrigerator
   c) auto generator   d) cycle

7) The adiabatic compression ratio in Diesel engine is in the range _____.
   a) 0-5   b) 5-10
   c) 10-15   d) 15-20

8) Transport of _____ gives rise to the phenomenon of thermal conductivity of
   a gas.
   a) mass   b) momentum
   c) energy   d) charge

9) As the temperature of the gas increases, mean free path of gas
   molecules _____.
   a) decreases   b) remains constant
   c) increases   d) becomes equal to zero

10) In adiabatic demagnetization cooling method, the magnetic salt used is
_____.
   a) Paramagnetic salt
   b) Ferromagnetic salt
   c) Diamagnetic salt
   d) non magnetic salt

11) The coefficient of performance of a refrigerator is _____.
   a) greater than one
   b) less than one
   c) equal to one
   d) Zero

12) All natural processes are _____.
   a) reversible
   b) irreversible
   c) isothermal
   d) isobaric

13) In refrigeration system, Carnot's cycle is considered as _____ Carnot's cycle.
   a) forward
   b) reverse
   c) fast
   d) slow

14) In Joule Thomson porous plug experiment, all the gases showd cooling effect except _____.
   a) hydrogen
   b) nitrogen
   c) oxygen
   d) carbon dioxide

Q.2 A) Answer the following questions. (Any Four) 08
   1) State first law of thermodynamics.
   2) Calculate coefficient of viscosity of a gas having average velocity of 900 m/s. (Density of gas = 1.5 kg/m^3 and mean free path $= 8 \times 10^{-6}\ m$)
   3) What is Joule-Thomson effect?
   4) Distinguish between Otto engine and Diesel engine.
   5) State any four applications of air conditioning system.

B) Write Notes (Any Two) 06
   1) Transport Phenomena
   2) Properties of liquid helium
   3) Reversible process

Q.3 A) Answer the following questions. (Any Two) 08
   1) Find the efficiency of Carnot's engine working between 127^{0}C and 27 ^{0}C. It absorbs 80 cals of heat. How much heat is rejected?
   2) Derive an expression for work done in isothermal process.
   3) Give general principle of refrigerator. What is coefficient of performance?

B) Answer the following questions. (Any One) 06
   1) With a neat labeled diagram explain working of vapour compression refrigeration system.
   2) What is magneto-caloric effect? Describe experimental set up for adiabatic demagnetization of paramagnetic substance.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Describe Linde's air liquefier.
   2) Calculate the rise in temperature of a gas initially at 27^{0}C, if its pressure is suddenly doubled, ($\gamma = 1.4$)
   3) Draw Otto cycle. Explain different operations of Otto cycle.

    B)   **Answer the following questions. (Any One)**   **04**
        1)   Explain change in entropy in free expansion of gas.
        2)   Obtain Clausius expression for mean free path.

Q.5 **Answer the following questions. (Any Two)**   **14**
    a)   What is diesel cycle? Obtain an expression for efficiency of Diesel engine.
    b)   Show that $PV^{\gamma} = \text{constant}$ for adiabatic process.
    c)   Obtain an expression for coefficient of thermal conductivity of a gas. What is the effect of temperature and pressure on it?

Seat No.

B.Sc. (Semester – II) (CBCS) Examination Oct/Nov-2019
Physics (Paper – IV)
ELECTRICITY, MAGNETISM AND BASIC ELECTRONICS

Day & Date: Friday, 11-10-2019　　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Use of logarithmic table or nonprogrammable calculator is allowed.
　　　　　　　4) Neat diagrams must be drawn, wherever necessary.
　　　　　　　5) Answer to every new question must be written on new page.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) With increase of time, charging current flowing in RC circuit _____.
   a) increases exponentially 　　b) decreases exponentially
   c) increases linearly 　　　　d) decreases linearly

2) For growth of current in LR circuit, at $t = \frac{L}{R}$ current flowing in the circuit is equal to _____.
   a) 100% of saturation current 　　b) 70.7% of saturation current
   c) 63.2% of saturation current 　　d) 36.8% of saturation current

3) With increase of frequency of a. c. voltage source across capacitor, the susceptance of capacitor _____.
   a) Increases
   b) Decreases
   c) remain constant
   d) remains constant above resonance frequency.

4) At resonance frequency, impedance of series LCR circuit is _____.
   a) Extremum 　　　　b) Optimum
   c) Maximum 　　　　d) Minimum

5) Magnitude of magnetic induction along the perpendicular to axis of current carrying coil is _____.
   a) Zero 　　　　b) One
   c) Finite 　　　　d) Infinite

6) Magnetic induction due to an element of current carrying conductor at a point which is at distance 'r' measured from centre of an element is ____.
   a) directly proportional to r 　　b) directly proportional to r^2
   c) inversely proportional to r 　　d) inversely proportional to r^2

7) In forward bias mode, PN junction diode offer _____.
   a) high resistance 　　　　b) low resistance
   c) infinite resistance 　　　d) finite resistance

8) N_1, N_2 be number of turns in primary and secondary coils of a transformer, for step-down transformer _____.
   a) $N_1 > N_2$ 　　　　b) $N_1 < N_2$
   c) $N_1 = N_2$ 　　　　d) $N_1 = \frac{N_2}{2}$

9) Gate, Source and Drain are the three terminals of a semiconductor device
_____.
  a) BJT   b) UJT
  c) SCR   d) FET

10) When with increase of voltage across collector and emitter, collector current almost remain constant then transistor is said to be operated in _____.
  a) Break down region   b) Active region
  c) Saturation region   d) Cut off region

11) For a transistor connected in common emitter configuration, current gain β is equal to _____.
  a) $\frac{\Delta I_C}{\Delta I_B}$ b) $\frac{\Delta I_C}{\Delta I_E}$
  c) $\frac{\Delta I_E}{\Delta I_B}$ d) $\frac{\Delta I_E}{\Delta I_C}$

12) For a transistor connected in common base configuration, graph of emitter current I_E on y-axis and voltage across emitter and base V_{EB} on x- axis is called _____.
  a) Reverse bias characteristic   b) Input characteristic
  c) Output characteristic   d) Transfer characteristic

13) When R=10$K\Omega$, $C = 1000\mu F$. Time constant of RC circuit is _____.
  a) 0.01 sec   b) 0.1 sec
  c) 1 sec   d) 10 sec.

14) Figure of merit of a Ballistic Galvanometer is $2 \times 10^{-7}\mu A/mm$. Current sensitivity of a Ballistic Galvanometer is _____.
  a) $5 \times 10^6 mm/\mu A$ b) $5 \times 10^5 mm/\mu A$
  c) $5 \times 10^4 mm/\mu A$ d) $5 \times 10^3 mm/\mu A$

Q.2 A) Answer the following questions. (Any Four)   **08**
  1) Define the term: Reactance of Inductor.
  2) Draw the circuit diagram of: Positive Clipper.
  3) For a transistor connected in CB configuration define input and output resistance.
  4) Write the relation between: current gain 'α' and current gain β.
  5) Calculator the magnetic induction at centre of a circular coil of single turn having radius 3.14 cm. Carrying 5 Ampere current.(Given $\mu o = 4\pi \times 10^{-7} wb/Am$).

B) Answer the following questions. (Any Two)   **06**
  1) Draw the circuit diagram and frequency response curve for parallel resonant circuit.
  2) Explain the application of a Zener Diode as – Voltage regulator.
  3) When current sensitivity is $5 \times 10^6 \ mm/\mu A$ and coil resistance is 500Ω of Ballistic Galvanometer then calculate voltage sensitivity. If time period of oscillations is 10 sec, calculate charge sensitivity.

Q.3 A) Answer the following questions. (Any Two)   **08**
  1) Describe the working of: Bridge rectifier with Pie-filter circuit.
  2) Explain input and output characteristics of transistor connected in CE configuration.
  3) A condenser of capacitance $1\mu F$ is discharged through a high resistance. The time taken for half the initial charge on condenser to leak was 10 sec. Calculator the value of high resistance.

B) **Answer the following questions. (Any One)** 06
1) Explain construction and working of: Ballistic Galvanometer.
2) Describe Owen's Bridge and derive the balancing conditions.

Q.4 A) **Answer the following questions. (Any Two)** 10
1) Derive an expression for instantaneous current flowing in LR circuit for decay mode.
2) What are clamper circuits? Explain the working of Positive Clamper.
3) Describe the circuit of a common emitter transistor amplifier.

B) **Answer the following questions. (Any One)** 04
1) Explain the constructions of n-p-n and p-n-p types of transistor and draw the circuit symbols of them.
2) In the circuit of Zener Diode Voltage Regulator: Unregulated input Voltage = 10 V, Zener diode breakdown voltage =5.1 v, series resistance = 100Ω and load resistance =$1k\Omega$.
   Calculate – Current flowing through: load resistance and Zener diode.

Q.5 **Answer the following questions. (Any Two)** 14
1) Describe the charging of a condenser through pure inductance and derive an expression for oscillatory charge.
2) For series LCR circuit derive an expression for: Band width $\Delta f = \frac{f_0}{Q_0}$
3) Derive an expression for magnetic induction at a point on the axis of infinitely long current carrying solenoid.

Seat No.		Set	P

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Statistics (Paper - III)
DESCRIPTIVE STATISTICS - II

Day & Date: Saturday, 12-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) If $r(X, Y) = 0.9$, then $r(2X + 1, Y + 3)$ is _____.
   a) 0.9   b)   -0.9
   c) 1.9   d)   -1.9

2) The points of a scatter diagram are on a vertical line, the coefficient of correlation is _____.
   a) 0   b)   -1
   c) +1   d)   None of these

3) The value of $\text{Cov}(X, Y)$ _____.
   a) May be negative
   b) Is equal to $\text{Cov}(X, Y)$
   c) Is equal zero when all Y's are constant
   d) All of the above.

4) The limits of Spearman's rank correlation (R) is _____.
   a) 0 to 1   b) 0 to ∞
   c) -1 to 1   d)   none of these

5) Arithmetic mean of regression coefficients is _____.
   a) $\geq r$ b) $\leq r$
   c) $\neq r$ d)   None of these

6) If $\sigma_x = \sigma_y$ and $r = \sqrt{2} - 1$, then the acute angle between the two regression lines is _____.
   a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$
   c) $\frac{\pi}{3}$ d) $\frac{\pi}{6}$

7) The two regression lines are perpendicular to each other angle between two regression lines is _____.
   a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$
   c) $\frac{\pi}{6}$ d) π

8) Attribute is _____.
   a) a qualitative characteristics   b)   a measurable characteristics
   c) a quantitative characteristics   d)   None of these

9) In usual notations, attributes A and B are independent if _____.
   a) $(AB) = (A)(B)$ b) $(AB) = \frac{(A)(B)}{N}$
   c) $(AB) = (A)$ d) $(AB) = (B)$

10) The total number of class frequencies of three attributes is _____.
   a) 3
   b) 9
   c) 27
   d) 12

11) Which of the following is not an example of quantitative characteristics?
   a) Height
   b) Weight
   c) Wages
   d) Blood group

12) The index number for base year is always taken as _____.
   a) 100
   b) 1000
   c) 10000
   d) None of these

13) The weights used in Paasche's formula belong to _____.
   a) The base period
   b) Arbitrary chosen period
   c) The given period
   d) None of these

14) The best average in the construction of index number is _____.
   a) A.M.
   b) G.M.
   c) H.M.
   d) None of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define positive correlation and negative correlation.
   2) Prove that $\text{Corr}(X, X) = 1$.
   3) The regression equations are $X - 4Y - 5 = 0$ & $X - 16Y - 64 = 0$. Find $corr(X, Y)$.
   4) Define Fisher's quantity index number.
   5) Define fundamental set of frequency.

B) Write short notes (Any Two)   **06**
   1) In dichotomy with n attributes, show that the total number of classes of all orders is 3^n
   2) If X, Y and Z are three uncorrelated variables with equal variances, then find correlation coefficient between $X + Y$ and $Y + Z$
   3) If the two attributes are independent then prove that $\delta = 0$

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What is the effect of change of origin and scale on covariance?
   2) Explain the term association and disassociation with examples.
   3) Write a short note index number.

B) Answer the following questions. (Any One)   **06**
   1) What is the effect of change of origin and scale on correlation coefficient?
   2) For consistent data, with usual notations show that
   $$(ABC) \geq (A) + (B) + (C) - N$$

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Spearman's rank correlation coefficient between X and Y is 2/3. If the sum of square of difference between ranks is 55, then assuming that no rank is repeated, find the number of pairs in the series.
   2) State important uses of index number.
   3) If two attributes A and B are independent, show that
      i)   A and β are independent
      ii) α and B are independent

   B)   **Answer the following questions. (Any One)**   **04**

      1)   What is factor reversal test of consistency? Verify the same for Fisher's index number.

      2)   Interpret the following cases:
         i) $r = +1$
         ii) $r = -1$

Q.5   **Answer the following questions. (Any Two)**   **14**

  a)   With usual notation, prove that,

$$R = 1 - \frac{6\sum d_i^2}{n^3 - n}$$

  b)   Derive the conditions of consistency in case of three attributes A, B and C.

  c)   What is time reversal test of consistency? Verify the same for Paasche's index number.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Statistics (Paper - IV)
PROBABILITY AND PROBABILITY DISTRIBUTION - II

Day & Date: Monday, 14-10-2019　　　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　 2) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　For a discrete random variable X, the second moment about mean is called as second _____ moment.
　　a)　raw　　　　　　　　　　　b)　factorial
　　c)　central　　　　　　　　　　d)　none of these

2)　If X is random variable with mean μ, then $E(X - \mu) = $ _____.
　　a)　μ　　　　　　　　　　　b)　2μ
　　c)　0　　　　　　　　　　　　d)　$X - \mu$

3)　If X is a discrete random variable with p. m. f. $p(x)$, then $E\left(\frac{1}{X}\right)$ given by _____.
　　a)　$\sum \frac{x}{p(x)}$　　　　　　　　b)　$\sum \frac{p(x)}{x}$
　　c)　$\frac{1}{\sum xp(x)}$　　　　　　　　d)　$\sum xp(xp)$

4)　If X is discrete random variable with mean m and variance S^2 then $E\left(\frac{X-m}{s}\right)$ = _____.
　　a)　0　　　　　　　　　　　　b)　m
　　c)　1　　　　　　　　　　　　d)　none of these

5)　In usual notations probability generating function (p.g.f) of a discrete random variable X is _____.
　　a)　$\sum X^s p(x)$　　　　　　　　b)　$\sum xp(x)$
　　c)　$\sum s\, p(x)$　　　　　　　　d)　$\sum s^x p(x)$

6)　If X and Y are two independent r.v.s then $v(x - y) = $ _____.
　　a)　$v(x) + v(y) - 2\,\mathrm{cov}(x,y)$　　b)　$v(x) + v(y) + 2\,\mathrm{cov}(x,y)$
　　c)　$v(x) + v(y)$　　　　　　　　d)　$v(x) - v(y)$

7)　Probability generating function of a sum of independent random variable is _____.
　　a)　Sum of p.g.f.s of random variable
　　b)　Product of p.g.f.s of random variable
　　c)　Zero
　　d)　None of these

8)　Let (X, Y) be a bivariate random vector with joint distribution function F(x,y) it lies within the Limits _____.
　　a)　$-\infty\, \&\, 0$　　　　　　　　b)　$-1\, \&\, 0$
　　c)　$-1\, \&\, 1$　　　　　　　　d)　$0\, \&\, 1$

9) The variance of one point distribution is always _____.
   a) zero
   b) one
   c) Constant K
   d) none of these

10) A random variable takes two values x_1 and x_2 with probabilities p and q, then mean of r. v. X is _____.
   a) $x_1p + x_2q$
   b) $x_1p^2 + x_2q^2$
   c) $x_1q + x_2p$
   d) $x_1p + x_2p$

11) A box contains 5 balls numbered 1, 2, 3, 4, 5 one ball is selected at random and X denotes the number on selected ball, then expected value of X is _____.
   a) 4
   b) 2
   c) 3
   d) 1

12) If X follows Bernoulli distribution with variance = 0.25 and mean = 0.5, then value of second order moment about origin is _____.
   a) 0.25
   b) 1
   c) 0.5
   d) 0.75

13) Given mean = 4 and variance = 2 for Binomial random variable X, then values of n and p are _____.
   a) 4 & ½
   b) 2 & ½
   c) 6 & ½
   d) 8 & ½

14) Suppose a box contain 4 white and 6 black balls. Three balls are drawn randomly without replacement. A r.v. X is defined as number of white balls obtained. Then probability distribution of r.v. X is identical to _____ distribution.
   a) Bernoulli
   b) binomial
   c) hypergeometric
   d) none of these

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define raw moments.
   2) Prove that $E(C) = C$.
   3) Define correlation Coefficient in bivariate probability distribution.
   4) Define binomial distribution.
   5) Define discrete uniform distribution.

B) Write Notes. (Any Two)   **06**
   1) The p. m. f. of random variable X is given by
   $$P(x) = \frac{1}{10} \quad X = 1,2,3, \dots \dots \dots 10$$
   Find $E(X), E(3X + 5)$.
   2) Show that probability generating function of sum of two independent random variables is equal to product of their probability generating function.
   3) Obtain mean of uniform distribution.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) If the p.g.f. of discrete r. v. is $P_x(S) = \frac{1}{8}(1 + 3s + 3s^2 + s^3)$ then find $E(X)$ and $V(X)$.
   2) If X follows binomial distribution with parameter n and p such that $p = 0.6, E(X) = 6$ Find n and $V(X)$.
   3) Define joint p. m. f. and joint distribution function.

B) **Answer the following questions. (Any One)** 06

1) The joint probability distribution of r. v. (X, Y) is

X \ Y	1	2	3
1	0	$\frac{1}{3}$	0
2	$\frac{1}{3}$	0	$\frac{1}{3}$

Find

i) Marginal probability distribution of X and Y.

ii) E(X+Y)

2) Find p.g.f. of binomial distribution. Hence find its mean and variance.

Q.4 **A)** **Answer the following questions. (Any Two)** 10

1) State and prove additive property of bivariate expectation.

2) A r. v. X has following probability distribution.

X: 0 1 2 3

P(x): $\frac{1}{6}$ $\frac{1}{2}$ $\frac{3}{10}$ $\frac{1}{30}$

Find $E(X)$ and $V(X)$.

3) The joint pmf of r. v. (X, Y) is
$P(x, y) = \frac{1}{4}$ $x = 1,2; y = 1,2$
$= 0$ otherwise
Discuss the independence of X and Y.

B) **Answer the following questions. (Any One)** 04

1) State and prove multiplication theorem on expectation.

2) Define conditional mean and conditional variance.

Q.5 **Answer the following questions. (Any Two)** 14

a) The joint p.m.f. of (X,Y) is given by:

X \ Y	0	1	2	3
0	C	2C	3C	4C
1	2C	4C	6C	8C
2	3C	6C	9C	12C

Find:

i)   C

ii) Conditional distribution of X given $Y = 2$

iii) $E(X / Y = 2)$

b) Define:

i)   A two dimensional discrete r. v.

ii) Marginal probability distribution of X and

iii) Conditional probability distribution of Y given $X = x$

c) Define two point distributions and find its mean and variance.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - III)
GEOMETRY

Day & Date: Tuesday, 15-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
      2) Figures to the right indicate full marks.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The polar equation of $\frac{x^2}{9} - \frac{y^2}{4} = 1$ is _____.
   a) $4\cos^2\theta - 9\sin^2\theta = \frac{36}{r}$ b) $4\cos^2\theta + 9\sin^2\theta = \frac{36}{r^2}$
   c) $\cos^2\theta - \sin^2\theta = \frac{36}{r}$ d) $9\cos^2\theta + 4\sin^2\theta = \frac{r^2}{36}$

2) The equation $x^2 + 2xy + y^2 - 2x - 1 = 0$ represents _____.
   a) a circle   b) an ellipse
   c) parabola   d) hyperbola

3) The general second degree equation represent parabola if and only if _____.
   a) $\Delta \neq 0,\ h^2 - ab = 0$ b) $\Delta = 0,\ h^2 - ab \neq 0$
   c) $\Delta = 0,\ h^2 - ab = 0$ $\Delta \neq 0,\ h^2 - ab < 0$

4) The polar co-ordinate of the point are $\left(-4, \frac{\pi}{3}\right)$ then its Cartesian co-ordinates are _____.
   a) $(6,\ 2\sqrt{3})$ b) $(2,\ 2\sqrt{3})$
   c) $(-2,\ -2\sqrt{3})$ d) $(3,\ 3\sqrt{3})$

5) If by rotation of axes through an angle θ, the expression $3x^2 + 2xy + 3y^2 - 18x - 22y + 50 = 0$ does not contain cross product term xy then $\theta = $ _____.
   a) $\frac{\pi}{3}$ b) $\frac{\pi}{2}$
   c) $\frac{\pi}{6}$ d) $\frac{\pi}{4}$

6) The direction cosines of the normal to the plane $2x - 3y + 6z = 7$ is _____
   a) $\left(\frac{2}{7}, \frac{-3}{7}, \frac{6}{7}\right)$ b) $(2, -3, 6)$
   c) $\left(\frac{1}{7}, \frac{-1}{7}, \frac{2}{7}\right)$ d) None of these

7) The distance between the parallel planes $2x - 2y + z + 1 = 0$ and $4x - 4y + 2z + 3 = 0$ is _____.
   a) $\frac{1}{2}$ b) $\frac{1}{6}$
   c) $\frac{1}{3}$ d) 0

8) The equation of the plane $x - 2y + 2z - 9 = 0$ in normal from is _____.
   a) $\frac{1}{3}x - \frac{2}{3}y + \frac{2}{3}z = 3$ b) $x - 2y + 2z = 1$
   c) $x - 2y + 2z = 9$ d) $\frac{2}{3}x - \frac{1}{3}y + \frac{2}{3}z = 3$

9) The number of arbitrary constant in the equation $Ax + By + Cz + D = 0$ is _____.
   a) 4
   b) 3
   c) 2
   d) 1

10) The centre and radius of the sphere is $x^2 + y^2 + z^2 - 2x + 4y - 6z - 11 = 0$ are _____.
   a) (1, -2, 3) and 5
   b) (-1, 2 ,3) and 5
   c) (1, 2, -3) and -5
   d) None of these

11) Intersection of two sphere is _____.
   a) Straight line
   b) Circle
   c) Plane
   d) None of these

12) The equation of tangent plane at $P(x_1, y_1, z_1)$ to the sphere $x^2 + y^2 + z^2 = a^2$ is _____.
   a) $xx_1 + yy_1 + zz_1 = a^2$
   b) $xx_1 - yy_1 - zz_1 = a^2$
   c) $xx_1 + yy_1 - zz_1 = a^2$
   d) $xx_1 - yy_1 - zz_1 = -a^2$

13) The equation of sphere passing through the origin and making intercepts (2, 1, -3) on the x, y, z axis is _____.
   a) $x^2 + y^2 + z^2 + 2x + y + 3z = 0$
   b) $x^2 + y^2 + z^2 + 2x - y - 3z = 0$
   c) $x^2 + y^2 + z^2 - 2x - y + 3z = 0$
   d) None of these

14) The equation of sphere whose centre is at $C(2, 3, -4)$ and radius 5 is _____.
   a) $x^2 + y^2 + z^2 - 4x - 6y + 8z - 14 = 0$
   b) $x^2 + y^2 + z^2 + 4x + 6y - 8z - 4 = 0$
   c) $x^2 + y^2 + z^2 - 4x - 6y + 8z + 4 = 0$
   d) None of these

Q.2 A) Answer the following questions. (Any Four)   08
   1) Transform the equation $2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0$ to parallel axes through the point (-2, 3).
   2) Identify the conic given by the equation $x^2 + xy + y^2 + x + y - 1 = 0$
   3) Show that the points A (1, -2, 3) B (2, 3, -4) and C (0, -7, 10) are collinear.
   4) Find the equation of sphere described on (2, -3, 1) and (3, -1, 2) as extremities of a diameter.
   5) Find the centre and radius of the sphere.
      $2x^2 + 2y^2 + 2z^2 - 2x + 4y + 2z + 3 = 0$

B) Answer the following questions. (Any Two)   06
   1) Change the following Cartesian equation to the polar form
      i) $x^2 + y^2 = 2ax$
      ii) $(x^2 + y^2)^2 = a^2(x^2 - y^2)$
   2) Find the intercept form of the equation of the plane.
   3) Find the equation of the tangent plane to the sphere,
      $x^2 + y^2 + z^2 - 2x + 4y + 6z - 16 = 0$ which are parallel to the plane $x + 5y + 2z - 1 = 0$

Q.3 A) Answer the following questions. (Any Two)   08
   1) Transform the equation $4x^2 + 2\sqrt{3}xy + 2y^2 = 2a^2$ when axes are rotated through 30°
   2) Find the angle between planes $2x - y + z = 6$ and $x + 2y + 2z = 7$
   3) Show that the second degree equation $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ represent a sphere with centre $(-u, -v, -w)$ and radius $\sqrt{u^2 + v^2 + w^2 - d}$

B) **Answer the following questions. (Any One)** **06**

1) If axes are rotated through an angle θ, the equation $ax^2 + 2hxy + by^2$ transform into $a'x'^2 + b'y'^2$ then prove that $\theta = \frac{1}{2}\tan^{-1}\left(\frac{2h}{a-b}\right)$

2) Obtain the equation of the plane through the point (-1, 3, 2) and perpendicular to the two planes $x + 2y + 2z = 5$ and $3x + 3y + 2z = 8$

Q.4 **A)** **Answer the following questions. (Any Two)** **10**

1) Show that the equation of plane tangent to sphere
$x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ at point $(x_1, y_{1,}z_1)$ is
$xx_1 + yy_1 + zz_1 + u(x + x_1) + v(y + y_1) + w(z + z_1) + d = 0$

2) Find the equation of the plane which is perpendicular to the plane $5x + 3y + 6z + 8 = 0$ and which contains the line of intersection of the planes $x + 2y + 3z - 4 = 0$ and $2x + y - z + 5 = 0$

3) If by rotation of axes, the expression $\alpha x + \beta y$ changes to $\alpha'x' + \beta'y'$ then prove that $\alpha^2 + \beta^2$ is invariant.

B) **Answer the following questions. (Any One)** **04**

1) Find the equation of the sphere through the circle
$x^2 + y^2 + z^2 + 2x + 3y + 6 = 0$, $x - 2y + 4z - 9 = 0$ and the centre of the sphere $x^2 + y^2 + z^2 - 2x + 4y - 6z + 5 = 0$

2) Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6) and perpendicular to the plane $2x + 6y + 6z = 9$

Q.5 **Answer the following questions. (Any Two)** **14**

a) If by rotation of axes the expression $ax^2 + 2hxy + by^2$ becomes $a'x'^2 + 2h'x'y' + b'y'^2$ then prove that $a + b$ and $ab - h^2$ are invariants.

b) Show that the plane $2x - 2y + z + 12 = 0$ touches the sphere $x^2 + y^2 + z^2 - 2x + 4y + z - 3 = 0$. Find the point the point of the contact.

c) Show that the equation of the plane whose normal from the origin has the direction cosines l, m, n and the length p is $lx + my + nz = p$

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - IV)
DIFFERENTIAL EQUATIONS

Day & Date: Wednesday, 16-10-2019　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　The solution of $\frac{dy}{dx} = 5^{x+y}$ is _____.
　　a)　$5^x + 5^y = 2$　　　　　　　　b)　$5^x + 5^{-y} = 2$
　　c)　$5^{-x} + 5^{-y} = 2$　　　　　　d)　$5^{-x} + 5^y = 2$

2)　The particular solution of $x\,dy + y\,dx = 0$ when $x = y = 1$ is _____.
　　a)　$x + y = 2$　　　　　　　　　b)　$x^2 + y^2 = 1$
　　c)　$xy = 1$　　　　　　　　　　d)　$xy = 2$

3)　The equation $\frac{dy}{dx} = \frac{ax+by+c}{a'x+b'y+c'}$ is called _____ differential equation.
　　a)　homogeneous　　　　　　　b)　non-homogeneous
　　c)　exact　　　　　　　　　　　d)　variable separable

4)　The solution of the differential equation $\sqrt{1-x^2}\,dy + \sqrt{1-y^2}\,dx = 0$ is _____.
　　a)　$\sin^{-1}x + \cos^{-1}x = c$　　b)　$\sin^{-1}x + \sin^{-1}y = c$
　　c)　$\cos^{-1}x + \sin^{-1}y = c$　　d)　$(1-x^2)(1-y^2) = c$

5)　In the differential equation $Mdx + Ndy = 0$ if $\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N} = f(x)$ then corresponding I.F. is _____.
　　a)　$e^{\int f(x)dy}$　　　　　　　　b)　$e^{\int f(x)dx}$
　　c)　$e^{\int f(y)dx}$　　　　　　　　d)　$e^{\int f(y)dy}$

6)　The integrating factor of the equation $\cos^2 x\,\frac{dy}{dx} + y = \tan x$ is _____.
　　a)　e^x　　　　　　　　　　　　b)　$e^{-\cos x}$
　　c)　$e^{\tan x}$　　　　　　　　　d)　$e^{\sin x}$

7)　Which of the following is Bernoulli's equation?
　　a)　$\frac{dy}{dx} = \sin(x+y)$　　　　b)　$\cos^2 x\,\frac{dy}{dx} + \frac{y}{x} = \frac{1}{e^x}$
　　c)　$(x^2 + y^2)dx - 2xydy = 0$　d)　$\frac{dy}{dx} + xy = x^3 y^3$

8)　The general solution of $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} = 0$ is _____.
　　a)　$y = c_1 x + c_2 x^2 + c_3 x^3$　　b)　$y = c_1 + c_2 x + c_3 e^x$
　　c)　$y = c_1 + c_2 x + c_3 e^{-x}$　　d)　$y = c_1 + c_2 x^2 + c_3 e^{-x}$

9)　If the root m_1 is repeated thrice then the part of the complimentary function is _____.
　　a)　$(c_1 x + c_2 x^2 + c_3 x^3)e^{m_1 x}$　　b)　$(c_1 + c_2 x + c_3 x^2)e^{m_1 x}$
　　c)　$(c_1 + c_2 x + c_3 x^2)e^{-m_1 x}$　　d)　$(c_1 x + c_2 x^2 + c_3 x^3)e^{-m_1 x}$

10) $\frac{1}{D^2}(\sin 2x) = $ _____.
   a) $\frac{-\sin 2x}{4}$
   b) $\frac{\cos 2x}{4}$
   c) $4\sin 2x$
   d) $\frac{\cosec^2 2x}{4}$

11) The particular integral of $\frac{1}{(D-1)(D-2)} \times \left(\frac{17}{2}\right)$ is _____.
   a) $\frac{17}{2}$
   b) $\frac{17}{4}$
   c) 17
   d) $17e^x$

12) The solution of $(D^2 + 7)y = 0$ is _____.
   a) $y = c_1 e^{-\sqrt{7}x} + c_2 e^{\sqrt{7}x}$
   b) $y = (c_1 + c_2 x)e^{-\sqrt{7}x}$
   c) $y = c_1 \cos\sqrt{7}x + c_2 \sin\sqrt{7}x$
   d) $y = c_1 \cos 7x + c_2 \sin 7x$

13) The particular integral of $(D-1)y = \sin hx$ is _____.
   a) $\frac{1}{2}\left[xe^x + \frac{1}{2}e^{-x}\right]$
   b) $xe^x - \frac{e^{-x}}{2}$
   c) $x\sin hx$
   d) xe^x

14) The P.I. of $(D^3 + 3D^2 + 3D + 1)y = x^3 e^{-x}$ is _____.
   a) $\frac{x^6 e^{-x}}{120}$
   b) $\frac{x^3 e^{-x}}{120}$
   c) $\frac{x^6 e^{-x}}{20}$
   d) $\frac{x^5 e^{-x}}{120}$

Q.2 A) Answer the following questions. (Any Four) 08
   1) Solve $\log\frac{dy}{dx} = 2x + 3y$
   2) Solve $y\,dx - x\,dy = 0$
   3) Explain any two rules for finding integrating factors.
   4) Evaluate $y = \frac{1}{D-a}X$
   5) Solve for P.I. $\frac{1}{(D-2)(D-3)}e^{4x}$

B) Answer the following questions. (Any Two) 06
   1) Explain the method of solving linear differential equation.
   2) Solve $(y - 2x^2)\,dx - x(1 - xy)\,dy = 0$
   3) Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$

Q.3 A) Answer the following questions. (Any Two) 08
   1) Solve $(D^3 + 3D^2 + 2D)y = x^2$
   2) Solve $\frac{dy}{dx} - \frac{\tan y}{1+x} = (1+x)e^2 \sec y$
   3) Solve $\frac{dy}{dx} = (4x + 3y - 1)^2$

B) Answer the following questions. (Any One) 06
   1) Solve $(y^2 + 2xy)dx + (2x^2 + 3xy)dy = 0$
   2) Solve $\frac{d^2y}{dx^2} + 4y = x^2 \sin x$

Q.4 A) Answer the following questions. (Any Two) 10
   1) Solve $(1 + y^2)\,dx + \left(x - e^{-\tan^{-1}y}\right)dy = 0$
   2) Explain the method of finding the solution of the equation $f(D)y = 0$ when the roots of the equation are real & repeated.
   3) Solve $\frac{dy}{dx} = \sin(x + y) + \cos(x + y)$

B) Answer the following questions. (Any One) 04
   1) Explain the method of solving Bernoulli's equation.
   2) Solve $(D^4 - 5D^3 + 5D^2 + 5D - 6)y = 0$

Q.5 **Answer the following questions. (Any Two)** **14**

a) State and prove the necessary and sufficient condition for the differential equation $Mdx + Ndy = 0$ to be exact.

b) Solve $(2x + 3y + 1)dx + (3x + 4y - 1)dy = 0$

c) Solve $\dfrac{d^2y}{dx^2} + \dfrac{2dy}{dx} + 3y = \cos x + x^2$

Seat No.	

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Paper - I)
DESCRIPTIVE STATISTICS-I

Day & Date: Thursday, 14-11-2019　　　　　　　　　　　　Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1　Select the correct alternatives from the following and rewrite the sentence.　08

1) Among all mean deviations, mean deviation about _____ is minimum.
   a) Mode　　　　　　　　　　　　b) Mean
   c) Median　　　　　　　　　　　d) First quartile

2) If each observation of a set is doubled, then the mean of new set is _____.
   a) half of original mean　　　　b) remained the same
   c) twice of original mean　　　d) decreased by 2

3) Which of the following is suitable measure of central tendency for the data 0, 2, 3,-4, 6, 2?
   a) G.M.　　　　　　　　　　　　b) H.M
   c) both G.M and H.M.　　　　　d) A.M.

4) Sum of deviations of observations measured from arithmetic mean is always _____.
   a) Minimum　　　　　　　　　　b) Maximum
   c) Zero　　　　　　　　　　　　d) One

5) If the smallest value in a set is $>$ and its range is 85, then the largest value in the set is :
   a) 78　　　　　　　　　　　　　b) 92
   c) 102　　　　　　　　　　　　d) 95

6) Which of the following measure of dispersion depends on all the observations?
   a) Range　　　　　　　　　　　b) Quartile Deviation
   c) Coefficient of Range　　　　d) Mean Deviation

7) If a constant value 30 is subtracted from each observation of a set, the mean of the set is _____.
   a) Decreased by 30　　　　　　b) Increased by 30
   c) Decreased by 60　　　　　　d) Increased by 90

8) The G.M. of the two numbers 4 and 9 is _____.
   a) 6.5　　　　　　　　　　　　b) 4
   c) 6　　　　　　　　　　　　　d) 9

Q.2　Answer the following questions. (Any Four)　08

1) If Coefficient of variation and mean of a data are 12% and 3 respectively, then find variance.
2) Define Geometric Mean.
3) Find mode of the following data:
   2,4,6,3,2,4,5,7,4,6,6,4,5.
4) Define frequency and cumulative frequency.

5) Define Range and coefficient of Range.

6) For a distribution the difference between the two quartiles is 15 and their sum is 35 and median is 20. Find coefficient of skewness.

Q.3 Answer the following questions. (Any Two)   **08**

1) Prove that Bowley's coefficient of skewness lies between -1 and +1

2) State and prove Minimal property of Mean square Deviation.

3) A distribution has mean 30, coefficient of variation is 20% and coefficient of skewness is 0.3. Find its mode.

Q.4 Answer the following questions. (Any Two)   **08**

1) State and prove effect of change of origin and scale on standard deviation.

2) Explain discrete frequency distribution.

3) What is effect of change of origin and scale on raw moments?

Q.5 Answer the following questions. (Any One)   **08**

1) Explain the construction of frequency polygon.

2) Derive Mode formula for grouped frequency distribution.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Electronics (Paper - III)
SEMICONDUCTOR DEVICES

Day & Date: Thursday, 17-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.
         3) Neat and labeled diagrams must be drawn wherever necessary.
         4) Use of calculator and log table is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) When pure semiconductor is heated, its resistance _____.
   a) Increases   b) Decreases
   c) Remains same   d) None of these

2) In PN junction, the depletion region contains _____.
   a) Electrons   b) Holes
   c) Immobile ions   d) All of these

3) A Zener diode is normally used as _____.
   a) an amplifier   b) an oscillator
   c) Rectifier   d) voltage regulator

4) A pentavalent impurity has _____ valence electrons.
   a) 2   b) 3
   c) 4   d) 5

5) In transistor symbol, the direction of arrow head on emitter shows _____.
   a) Conventional emitter current   b) Electron movement in emitter
   c) Reverse current   d) None of these

6) A JFET is a _____ controlled device.
   a) Voltage   b) Current
   c) Both voltage and current   d) None of these

7) A PN-junction that radiates energy as light instead of heat is called a ____.
   a) LED   b) Photodiode
   c) Zener diode   d) Photocell

8) A TRIAC can pass a portion of _____ half-cycle through the load.
   a) Only positive   b) Only negative
   c) Both positive and negative   d) None of these

9) Capacitance of Varactor diode _____ with increase in reverse voltage.
   a) Increases   b) Decreases
   c) remains constant   d) Unpredictable

10) The forward voltage drop across silicon diode is about _____.
   a) 7V   b) 0.3V
   c) 3V   d) 0.7V

11) The base of a transistor is _____ doped.
   a) Lightly   b) Heavily
   c) Moderately   d) None of these

12) A tunnel diode is _____.
    a) used with reverse bias
    b) a slow switching device
    c) a high resistivity PN junction diode
    d) a very heavily doped PN junction

13) A SCR is a semiconductor device having _____.
    a) Three terminal   b) Four layer
    c) Three junctions   d) All of these

14) The germanium atoms are held together by sharing of its valence electrons is known as _____.
    a) ionic bond   b) valence bond
    c) covalent bond   d) intrinsic bond

Q.2 Attempt any seven of the following: **14**
    1) Draw symbols of NPN Transistor and JFET with labels.
    2) What is an intrinsic semiconductor?
    3) Compare semiconductor diode and Zener diode.
    4) For a typical diode, the forward current and voltages are 14 mA at 0.6 V, 24 mA at 0.7 V. Calculate dynamic resistance of a diode.
    5) A transistor has $\alpha = 0.99$. Calculate β.
    6) State any two acceptor impurity and any two donor impurity.
    7) Define h parameters for CE configuration.
    8) State any four applications of MOSFET.
    9) Draw IV characteristics of a DIAC.

Q.3 A) Attempt any two of the following: **10**
    1) What is meant by extrinsic semiconductor? Explain n-type semiconductor.
    2) Explain basic operation of NPN transistor.
    3) Define drain resistance (rd), trans-conductance (gm) and amplification factor (μ). Derive the relation between them.

B) Explain construction and working of Photodiode.   **04**

Q.4 Attempt any two of the following: **14**
    1) Explain the formation PN junction and barrier potential in it.
    2) Explain construction and working of SCR.
    3) Explain construction & I-V characteristics of D-MOSFET.

Q.5 Attempt any two of the following: **14**
    1) Explain construction and working of TRIAC.
    2) Explain input and output characteristics of a transistor in CB configuration.
    3) Write a note on UJT.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
ELECTRONICS (Paper – IV)
DIGITAL ELECTRONICS

Day & Date: Friday, 18-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory and carry equal marks
                2) Figures to the right indicate full marks.
                3) Use of calculator is permissible.
                4) Draw neat labeled diagram wherever necessary.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1)   SIPO shift register means _____.
    a) Serial input peripheral output   b) Standard input peripheral output
    c) Standard input parallel output   d) Serial Input parallel output

2)   If clock frequency input is 400 Hz for divide by two counter then output frequency will be _____ Hz.
    a) 200   b) 400
    c) 800   d) 600

3)   In _____ output is connected back to input.
    a) Ring counter   b) Johnson counter
    c) Both ring and Johnson counter   d) None of these

4)   Mod 10 counter requires minimum _____ flip-flops.
    a) Five   b) Four
    c) Three   d) Two

5)   _____ number of control lines used in 8:1 multiplexer.
    a) 0   b) 1
    c) 2   d) 3

6)   IC 7447 is _____ Seven Segment Decoder driver.
    a) Common Anode   b) Common Cathode
    c) Both a & b   d) None of these

7)   T flip-flop is a _____ Flip-flop.
    a) Toggle   b) Triggered
    c) Timed   d) None of these

8)   J-K flip-flop operates in toggle mode when _____.
    a) J=K=1   b) J=K=0
    c) J= 1, K=0   d) J=0, K=1

9)   The Decade counter IC is _____.
    a) 7447   b) 7490
    c) 74147   d) 74153

10)   TTL stands for _____.
    a) Transistor Transformer Logic   b) Transistor Transistor Logic
    c) Transformer Transformer Logic   d) Transceiver Transistor Logic

11)   _____ is Priority encoder IC.
    a) 7447   b) 74147
    c) 7490   d) 7495

12) _____ can be constructed using shift register IC 7495.
   a) Ring counter
   b) Johnson Counter
   c) Decade Counter
   d) Both a and b

13) The IC 7495 has _____ number of flip-flop.
   a) one
   b) two
   c) three
   d) four

14) IC 7400 is used as TTL _____ gate.
   a) AND
   b) OR
   c) NAND
   d) None of these

Q.2 A) Answer the following questions. (Any Four)   08
   1) Define Propagation delay in TTL.
   2) Draw block diagram of Multiplexer.
   3) Draw logic diagram of JK flip flop.
   4) What is combination counter?
   5) Enlist the types of Shift register.

B) Write Notes on. (Any Two)   06
   1) D flip flop
   2) Priority encoder IC 74147
   3) T flip-flop

Q.3 A) Answer the following questions. (Any Two)   08
   1) Write a note on 1:4 Demultiplexer.
   2) Explain working of RS flip flop using NOR gate.
   3) Draw diagram and explain 4 bit SIPO shift register.

B) Answer the following questions. (Any One)   06
   1) Write a note on IC 7490 as a divided by 10 counter.
   2) Explain 4 bit synchronous counter.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Explain 8 to 1 multiplexer and write truth table.
   2) Explain JK flip flop.
   3) Write a note on decimal to BCD encoder.

B) Answer the following questions. (Any One)   04
   1) Explain Johnson counter.
   2) Explain 2 to 4 decoder.

Q.5 Answer the following questions. (Any Two)   14
   a) Draw diagram and explain TTL NAND gate.
   b) Explain BCD to Seven segments Decoder.
   c) Explain Right Shift Register and Ring counter.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper – III)
INTRODUCTION TO WEB DESIGNING

Day & Date: Monday, 07-10-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) HTML stands for?
   a) Hyper Text Markup Language
   b) High Text Markup Language
   c) Hyper Tabular Markup Language
   d) None of these

2) How do I add scrolling text to my page?
   a) < scroll> b) <marquee>
   c) <circular> d) <tab>

3) Choose the correct HTML tag for the largest heading.
   a) <h6> b) <heading>
   c) <head> d) <h1>

4) Which is the correct CSS syntax?
   a) body:color=black b) {body;color:black}
   c) {body:color=black(body} d) body {color: black}

5) The common element which describes the web page, is _____.
   a) heading b) paragraph
   c) list d) all of these

6) Long form of SVG.
   a) Scalable Vector Graphics b) Segmented Variable Graphics
   c) Scalable Variable Graphics d) None of these

7) In HTML, hyperlinks are defined by tag.
   a) <define> b) <para>
   c) <body> d) <a>

8) What are the two method attributes that are used while submitting the forms?
   a) GET b) POST
   c) SUBMIT d) Both A & B

9) Javascript is _____ language.
   a) Scripting b) Application
   c) Programming d) None of these

10) Which HTML tag is used to define a client - side script such as the Javascript?
    a) <script> b) <unscript>
    c) Both A & B d) None of the above

11) What are the methods used to specify colors in HTML?
    a) RGB colors b) Color names
    c) Hexadecimal colors d) All of the above

12) Which of these tags are all <table> tags?
   a) <table><head><tfoot>   b) <table><tr><td>
   c) <table><tr><tt>   d) <thead><body><tr>

13) Which CSS property is used for controlling the layout?'
   a) header   b) display
   c) footer   d) none of the above

14) For paragraph, defined HTML tags are of _____.
   a) <p>   b) <para>
   c) <define>   d) <def>

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) CSS and HTML stand for.
   2) Explain Singular and paired tag.
   3) Explain use of CSS.
   4) What are the selectors used in CSS.
   5) Define Internet.

B) Write the short notes on (Any Two)   **06**
   1) List tag in HTML
   2) Data types in JavaScript
   3) Need of HTML5

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Explain structure of HTML.
   2) Explain Input tag of HTML5.
   3) Explain built in functions in JavaScript.

B) Answer the following question. (Any One)   **06**
   1) Explain CSS Text properties.
   2) Explain Graphics in HTML5.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain Network topology.
   2) Explain control structure in JavaScript
   3) Explain Background CSS Properties.

B) Answer the following question. (Any One)   **04**
   1) Explain DOM.
   2) Explain Operators in JavaScript.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain Text formatting tags in HTML
   b) Explain types of CSS.
   c) Write a JavaScript program to check given number is Prime or not.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper – IV)
INTRODUCTION TO PROGRAMMING USING C - II

Day & Date: Wednesday, 09-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
  2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) User-defined data type can be derived by _____.
   a) struct
   b) enum
   c) typedef
   d) all of the mentioned

2) Which of the following is not possible under any scenario?
   a) $s1 = \&s2$
   b) $s1 = s2$
   c) $(*s1).number = 10$
   d) None of the above

3) Which of the following operation is illegal in structures?
   a) Typecasting of structure
   b) Pointer to a variable of same structure
   c) Dynamic allocation of memory for structure
   d) All of the above

4) The size of a union is determined by the size of the _____.
   a) First member in the union
   b) Last member in the union
   c) Biggest member in the union
   d) Sum of the sizes of all members

5) Members of a union are accessed as _____.
   a) union-name.member
   b) union-pointer->member
   c) both union-name.member& union-pointer->member
   d) None of the above

6) Which of the following share a similarity in syntax?
   1) Union   2) Structure   3) Arrays   4) Pointers
   a) 3 and 4
   b) 1 and 2
   c) 1 and 3
   d) 1, 3 and 4

7) Which of the following can never be sent by call-by-value?
   a) Variable
   b) Structures
   c) Array
   d) Both Array and Structures

8) Which type of variables can have same name in different function?
   a) global variables
   b) static variables
   c) Function arguments
   d) Both static variables and Function arguments

9) What is the maximum number of arguments that can be passed in a single function?
   a) 127
   b) 253
   c) 361
   d) No limits in number of arguments

10) Within main, return expr statement is equivalent to _____.
   a) abort(expr)
   b) exit(expr)
   c) ferror(expr)
   d) none of the mentioned

11) Why to use fflush() library function?
   a) To flush all streams and specified streams
   b) To flush only specified streams
   c) To flush input/output buffer
   d) None of the above

12) Can function definition be present in header files?
   a) Yes
   b) No
   c) Depends on the compiler
   d) Depends on the standard

13) What is the advantage of #define over const?
   a) Data type is flexible
   b) Can have a pointer
   c) Reduction in the size of the program
   d) None of the mentioned

14) #include statement must be written _____.
   a) Before main()
   b) Before any scanf/printf
   c) After main()
   d) None of the above

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is an Array?
   2) Define Union.
   3) What is a pointer?
   4) What do you mean by structure?
   5) Define recursion.

B) Write Notes on (Any Two)   **06**
   1) File Handling
   2) Dynamic memory allocation
   3) Nested structure

Q.3 A) Answer the following questions. (Any two)   **08**
   1) What are the differences between structures and union?
   2) In header files whether functions are declared or defined? Explain.
   3) What are macros? What are its advantages and disadvantages?

B) Answer the following questions. (Any One)   **06**
   1) In C, why is the void pointer useful? When would you use it?
   2) What is a pre-processor? What are the advantages of pre-processor?

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Write a program in C to show the basic declaration of pointer.
   2) Explain in detail Error handling.
   3) Write a program in C to find the square of any number using the function.

B) Answer the following question: (Any One)   **04**
   1) Write a program in C to print Fibonacci series using recursion.
   2) Write a program in C to check a given number is even or odd using the function.

Q.5 **Answer the following: (Any two)** **14**
    a) Write the difference between structure, union and array.
    b) How call by value and call by reference is implemented? Explain with example.
    c) Write a C program to create a file and write contents, save and close the file.

Seat No.

B.Sc.(Semester - II) (CBCS) Examination Oct/Nov-2019
Physical Geography (Paper - III)
CLIMATOLOGY

Day & Date: Thursday, 17-10-2019   Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat and labeled diagrams must be drawn wherever necessary.
4) Use of map stencils is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) _____ is the that seeks to describe and explain the nature of climate.
   a) Climatology   b) Geology
   c) Geomorphology   d) Bio-geography

2) The value of solar constant is _____ cal/cm^2/min.
   a) 2   b) 3
   c) 4   d) 5

3) According to Ferrell's law the winds in the north hemisphere deflect towards their _____ side.
   a) left   b) right
   c) top   d) bottom

4) The proportion of carbon- di-oxide in the atmosphere is _____%.
   a) 20.96   b) 70.80
   c) 0.003   d) trace

5) The heat received from sun and reaches on the earth surface is known as _____.
   a) insolation   b) insulation
   c) radiation   d) none of them

6) _____ is the lowest layer of the atmosphere.
   a) Ionosphere   b) Troposphere
   c) Stratosphere   d) Exosphere

7) Equatorial clam belt is called as _____.
   a) Horse latitude   b) Doldrum
   c) sub polar belt   d) Polar belt

8) _____ hemisphere is called as water hemisphere.
   a) North   b) South
   c) East   d) West

9) The most efficient absorber of ultra violet radiation is _____.
   a) Xenon   b) Ozone
   c) Methane   d) Argon

10) Westerlies blowing along 50° south latitudes is known as _____.
   a) Roaring Forties   b) Furious fifties
   c) Shrinking sixties   d) None of these

11) The lines joining the places of equal atmospheric temperature are called
    as _____
    a) isohyets   b) isotherms
    c) isobars   d) isoclines

12) In the albedo of earth about _____ % of incoming short wave radiation is
    reflected from top layer of atmosphere and not reaches upto earth surface.
    a) 25   b) 35
    c) 51   d) 19

13) The gravitational force is maximum at _____ region on the earth surface.
    a) polar   b) equatorial
    c) mid-latitude   d) None of them

14) _____ zone lies in between 66½ and pole in both hemisphere.
    a) Tropical   b) Temperate
    c) Frigid   d) Subtropical

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Name of all different gases in atmosphere.
    2) Difference between weather and climate.
    3) State solar constant.
    4) Importance of Ozonosphere.
    5) State the normal lapse rate.

B) Write short notes (Any Two)   **06**
    1) Composition of atmosphere
    2) Stratosphere
    3) Nature and scope of Climatology

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Define weather and state its various elements.
    2) Define climatology and state its importance.
    3) Heat budget of the earth.

B) Answer the following questions. (Any One)   **06**
    1) What is mean by inversion of temperature? State its favourable
       condition.
    2) Importance of atmosphere.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Describe the structure of atmosphere.
    2) Explain Indian monsoon with suitable diagram.
    3) State the various factors affecting on the distribution of temperature on
       earth surface.

B) Answer the following questions. (Any One)   **04**
    1) State the vertical distribution of temperature on the earth surface.
    2) Importance of water vapours in atmosphere.

Q.5 Answer the following questions. (Any Two)   **14**
    1) What is mean by insolation? State various factors affected on the distribution
       of insolation on the earth surface.
    2) Describe planetary winds with diagrams.
    3) Describe the pressure belts on the earth surface with schematic diagram.

Seat No.

B.Sc. (Semester – II) (CBCS) Examination Oct/Nov-2019
Physical Geography (Paper - IV)
OCEANOGRAPHY

Day & Date: Friday, 18-10-2019　　　　　　　　　　　　Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Neat diagrams must be drawn wherever necessary.
　　　　　　　4) Use of maps stencils is allowed.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) Oceanography is the branch of _____ geography.
　　a) Human　　　　　　　　　　b) Economics
　　c) Physical　　　　　　　　　d) Population

2) The average depth of the continental shelf is about _____ fathoms.
　　a) 100　　　　　　　　　　　b) 200
　　c) 300　　　　　　　　　　　d) 400

3) _____ is the largest ocean in the world.
　　a) Indian　　　　　　　　　　b) Pacific
　　c) Atlantic　　　　　　　　　d) Arctic

4) South hemisphere is called as _____ hemisphere.
　　a) Land　　　　　　　　　　b) Water
　　c) Continental　　　　　　　d) Lithosphere

5) Mariyana trench is found in ____ ocean.
　　a) Pacific　　　　　　　　　b) Indian
　　c) Atlantic　　　　　　　　d) Arctic

6) _____ is the largest coral reef system in the world.
　　a) Great barrier reef　　　　b) Newyork reef
　　c) Hamilton reef　　　　　　d) Maldiv Barrier reef

7) Glacial control theory of coral formation postulated by _____.
　　a) Daly　　　　　　　　　　b) Murray
　　c) Darwin　　　　　　　　　d) Davis

8) _____ warm current flows along the eastern coast of North America.
　　a) Peru　　　　　　　　　　b) Benguela
　　c) Brazil　　　　　　　　　d) Gulf

9) _____ is a continuous directed movement of sea water parallel to shore.
　　a) Tide　　　　　　　　　　b) Current
　　c) Tusnami　　　　　　　　d) Wave

10) Dead sea is having _____ % salinity.
　　a) 100　　　　　　　　　　b) 140
　　c) 240　　　　　　　　　　d) 40

11) Temperature of ocean water is _____ from equator towards poles.
　　a) Increases　　　　　　　　b) Decreases
　　c) Constant　　　　　　　　d) None of them

12) The ocean deep sea plains covers about _____ % area of ocean.
    a) 50   b) 66
    c) 76   d) 45

13) During the _____ phase the neap tides are produced.
    a) New moon   b) Full moon
    c) Day- night   d) Quadrature

14) _____ salt is maximum in the ocean water.
    a) $CaCl_2$ b) $NaCl$
    c) $MgCl_2$ d) $BrCl_2$

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Write the name of major ocean on world.
    2) What is ocean current?
    3) Define Oceanography.
    4) State the types of coral reefs.
    5) Give name of two warm currents of Pacific Ocean.

B) Write Notes. (Any Two)   **06**
    1) Continental shelf
    2) Ocean deposits
    3) Types of calcareous oozes

Q.3 A) Answer the following questions. (Any Two)   **08**
    1) Describe the ideal conditions for growth of coral reefs.
    2) Vertical distribution of ocean temperature.
    3) Nature of Oceanography.

B) Answer the following questions. (Any One)   **06**
    1) Explain factor affecting on ocean salinity.
    2) What is tides? Types of tide.

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Describe subsidence theory of coral formation.
    2) Describe the Atlantic ocean currents.
    3) Explain factor affecting on ocean temperature.

B) Answer the following questions. (Any One)   **04**
    1) Explain continental slope.
    2) State importance of oceanography.

Q.5 Answer the following questions. (Any Two)   **14**
    a) State the ocean deposits and classify it.
    b) Describe the ocean currents in Pacific ocean with schematic diagram.
    c) Define coral reefs and describe its types.

Seat No.

Set **P**

B.Sc. (Semester – II) (CBCS) Examination Oct/Nov-2019
Zoology (Paper – III)
ANIMAL DIVERSITY - II

Day & Date: Saturday,12-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat and labeled diagrams must be drawn wherever necessary.

Q.1 **Fill in the blanks choosing by correct alternative given below.**   **14**
1) Urochordata and Cephalochordata are collectively called as _____.
   a) Protochordata   b) Hemichordata
   c) Non- chordate   d) Invertebrate

2) Petromyzon is common example of _____.
   a) Vertebrata   b) Craniata
   c) Cyclostomata   d) Gnathostomata

3) Body of fish is _____.
   a) Streamlined   b) Massive
   c) Weightless   d) Huge

4) Ammocoetus is the larva of _____.
   a) Frog   b) Fish
   c) Petromyzon   d) Toad

5) Cycloid scales are found in _____.
   a) Myxine   b) Salamander
   c) Scoliodon   d) Labeo

6) Acidic paste of food in stomach is termed as _____.
   a) Chyme   b) Spawn
   c) Chyle   d) Waste

7) Lines of growth are found on _____ Scales.
   a) Placoid   b) Ctenoid
   c) Ganoid   d) Cycloid

8) Gills in Labeo are termed as _____.
   a) Holobranch   b) Incomplete gills
   c) Demibranch   d) Half gills

9) To protects from extreme cold condition frog takes _____.
   a) Summer sleep   b) Hibernation
   c) Aestivation   d) Gestation

10) Frog is _____ animal.
    a) Uriotelic   b) Aminotelic
    c) Uricotelic   d) Hydrotelic

11) Left auricle of frog contains _____ blood.
    a) Impure   b) Pure
    c) Deoxygenated   d) Venous

12) A pair of ureters in male frog are termed as _____.
    a) Urinogenital   b) Ovi
    c) Sperm   d) Follopian

13) Neotany is observed in _____.
    a) Fishes   b) Reptile
    c) Amphibians   d) Birds

14) Structural and functional unit of kidney is _____ tubule.
    a) Seminiferous   b) Semimicro
    c) Micro   d) Uriniferous

Q.2 A) Answer the following (Any Four)   **08**
1) Salient features of Urochordata
2) Neotany
3) Sexual dimorphism in frog
4) Auricles of frog
5) Placoid scales

B) Write Notes. (Any Two)   **06**
1) Functions of fins in fishes
2) Sinus venosus of frog
3) Gill of Labeo

Q.3 A) Answer the following (Any Two)   **08**
1) Cutaneous respiration in frog
2) Testes of frog
3) Structure of egg of frog

B) Answer the following (Any One)   **06**
1) Gills in Cartilagenous fishes
2) Internal structure of heart of frog

Q.4 A) Answer the following (Any Two)   **10**
1) Functions of Brain
2) Uriniferous tubules in frog
3) Functions of blood

B) Answer the following (Any One)   **04**
1) Ammocoetus larva
2) Coagulation of blood

Q.5 Answer the following (Any Two)   **14**
    a) Describe the digestive system of frog.
    b) Describe the arterial system of frog.
    c) Give general characters of Cyclostomata.

Seat No.

Set **P**

B.Sc. (Semester – II) (CBCS) Examination Oct/Nov-2019
ZOOLOGY (Paper–IV)
ECOLOGY, ETHOLOGY, EVOLUTION AND APPLIED ZOOLOGY

Day & Date: Monday, 14-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Draw neat labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Process of community change is called as _____.
   a) ecological regression   b) ecological succession
   c) ecological stagnation   d) ecological revolution

2) The network of food chain in the tropical level is called _____.
   a) food chain   b) food link
   c) food web   d) food net

3) The cryptic colorations which disguise the animals in a suitable
   background and protect them from their enemies is called _____.
   a) predation   b) parasitism
   c) camouflage   d) evolution

4) Organisms living on the body of other organisms are called _____.
   a) epiphytes   b) endoparasite
   c) host   d) ectoparasite

5) The culture of silkworms with technical procedure for production of silk is
   called _____.
   a) silviculture   b) biotechnology
   c) vermitechnology   d) sericulture

6) _____ is an abiotic factor of an ecosystem.
   a) Water   b) Protozo
   c) Bacteria   d) Fish

7) The main source of energy for any ecosystem is obtained from _____.
   a) solar radiation   b) phytoplanktons
   c) Bacteria   d) crop energy

8) The domestication of milk producing animals are called _____.
   a) dairy science   b) goat farming
   c) piggery   d) vermiculture

9) _____ are the preserved remains or prints of ancient life.
   a) coacervates   b) finches
   c) species   d) fossils

10) By Process _____ the original bee colony splits into two.
   a) absconding   b) nuptial flight
   c) swarming   d) emerging

11) When a perfectly harmless animal resemble it colour and shape with a well protected species, the phenomenon is called as _____.
   a) predation   b) parasitism
   c) camouflage   d) mimicry

12) A gaseous mental that envelops the earth surface is _____.
   a) tragosphere   b) atmosphere
   c) lithospehre   d) hydrosphere

13) _____ are groups of interbreeding natural populations that are reproductively isolated from other group.
   a) Species   b) Community
   c) Parasites   d) Carnivores

14) In _____ associations both organisms receive benefit.
   a) Cannibalism   b) Mutualism
   c) Predation   d) Antagonism

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define ecology
   2) Workers honey bees
   3) Niche
   4) Biomass
   5) Lac culture

B) Answer the following questions. (Any Two)   **06**
   1) Discuss groupism in animals.
   2) What is fishery science?
   3) Cannibalism

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Write note on symbiosis
   2) Pyramid of numbers
   3) What is food web?

B) Answer the following question. (Any One)   **06**
   1) Explain mimicry in butterfly.
   2) Discuss scope of poultry farming.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe trophic levels of ecosystem.
   2) Explain water as an ecological factor.
   3) Describe courtship behavior in bird with suitable example.

B) Answer the following question. (Any One)   **04**
   1) Describe effects of temperature on plants and animals.
   2) Write scope of apiculture.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Describe grass land ecosystem.
   b) Describe types of interspecific associations.
   c) Explain camouflage in chameleon.

Seat
No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Botany (Paper - III)
MYCOLOGY AND PHYTOPATHOLOGY

Day & Date: Tuesday, 15-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　 2) Figures to the right indicate full marks.
　　　　　　　 3) Draw neat and labeled diagrams wherever necessary.
　　　　　　　 4) Figures to the right indicate full marks.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1)   Study of fungi is called as _____.
　　 a) mycology　　　　　　　　　b) zoology
　　 c) geology　　　　　　　　　　d) polynology

2)   In _____ Ainsworth studied the fungi.
　　 a) 1974　　　　　　　　　　　b) 1973
　　 c) 1975　　　　　　　　　　　d) 1976

3)   When two sex organs are come together is known as _____.
　　 a) meiosis　　　　　　　　　　b) karyogamy
　　 c) plasmogamy　　　　　　　　d) all of these

4)   The _____ is rigid structures present outsides the cell membrane.
　　 a) golgi bodies　　　　　　　　b) vacuoles
　　 c) ribosomes　　　　　　　　　d) cell wall

5)   The fungi grow in or on the living body of plant or animal is called as _____.
　　 a) symbiotic　　　　　　　　　b) parasite
　　 c) saprophyte　　　　　　　　　d) none of these

6)   _____ classified fungi into two division based on presence or absence of plasmodium or pseudoplasmodium.
　　 a) Ainsworth　　　　　　　　　b) Smith
　　 c) Nanir　　　　　　　　　　　d) Singh

7)   In *Mucor* asexual reproduction takes place by _____.
　　 a) Ascospore　　　　　　　　　b) Basidiospore
　　 c) Sporangiospore　　　　　　　d) Oospore

8)   In Yeast vegetative reproduction takes place by _____.
　　 a) budding　　　　　　　　　　b) fission
　　 c) fragmentation　　　　　　　　d) both a and b

9)   Genus *Albugo* is represented by _____ species throughout the world.
　　 a) 570　　　　　　　　　　　　b) 580
　　 c) 590　　　　　　　　　　　　d) 560

10) Fungal component is known as _____.
　　 a) mycobiont　　　　　　　　　b) phycobiont
　　 c) both a and b　　　　　　　　d) none of these

11) Forming an external sheath of mycelium around the root tips is called as _____.
   a) ectoendomycorrhizae   b) ectomycorrhizae
   c) endomycorrhizae   d) all of these

12) The pathogenic _____ used for the control of pests are called as mycopesticides.
   a) Pteridophyte   b) Algae
   c) Gymnosperms   d) Fungi

13) It is an abnormal increase in the size of the cell which is called _____.
   a) hypertrophy   b) hyperplasia
   c) pathogen   d) hypoplasia

14) The little leaf of brinjal is caused by _____.
   a) *Xanthomonas citri*   b) *Sphacelotheca sorghi*
   c) *Mycoplasma* like organism d) *Hibiscus virus-I*

Q.2 A) Answer the following questions. (Any Four)   08
   1) What is fungi?
   2) Define saprophyte.
   3) What is phycobiont?
   4) Define phytopathology.
   5) What is symptoms?

B) Write Notes. (Any Two)   06
   1) Symptoms of citrus canker.
   2) Occurrence of *Mucor.*
   3) Thallus structure of *Albugo.*

Q.3 A) Answer the following questions. (Any Two)   08
   1) Explain the mode of nutrition of fungi.
   2) Describe the type of lichens.
   3) Explain the symptoms and control measures of little leaf of brinjal.

B) Answer the following questions. (Any One)   06
   1) Explain the classification of fungi.
   2) Describe the role of fungi in biotechnology.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Write the economic importance of lichens.
   2) Describe the ectomycorrhizae and endomycorrhizae.
   3) Explain the asexual reproduction of *Mucor.*

B) Answer the following questions. (Any One)   04
   1) Explain the classification of Yeast.
   2) Describe the asexual reproduction of *Albugo.*

Q.5 Answer the following (Any Two)   14
   a) Explain the symptoms, causal organism, disease cycle and control measures of Yellow Vein Mosaic of Bhendi.
   b) Describe the sexual reproduction of *Albugo.*
   c) Write the classification of plant diseases based on mode of transmission.

Seat No.

Set **P**

B.Sc.(Semester - II) (CBCS) Examination Oct/Nov-2019
Botany (Paper - IV)
ARCHEGONIATE BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERM

Day & Date: Wednesday, 16-10-2019　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Neat and labeled diagrams must be drawn wherever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　In archegoniate, the female sex organ is _____.
　　a)　Antheridium　　　　　　　b)　Archegonium
　　c)　Microspore　　　　　　　 d)　Megaspore

2)　The archegoniate is group of _____, Pteridophytes and Gymnosperms.
　　a)　Algae　　　　　　　　　　b)　Fungi
　　c)　Bryophytes　　　　　　　 d)　Angiosperms

3)　The _____ moss acts as pollution indicator by accumulating heavy metals.
　　a)　*Sphagnum*　　　　　　　 b)　*Riccia*
　　c)　*Polytrichum*　　　　　　　d)　*Anthoceros*

4)　_____ are dependent on water for fertilization.
　　a)　Bryophytes　　　　　　　 b)　Gymnosperms
　　c)　Algae　　　　　　　　　　d)　Angiosperms

5)　In *Riccia,* sexual reproduction is _____ type.
　　a)　isogamous　　　　　　　　b)　anisogamous
　　c)　oogamous　　　　　　　　 d)　parthenocarpic

6)　The antherozoids of *Riccia* are _____.
　　a)　uniflagellated　　　　　　　b)　biflagellated
　　c)　quadriflagellated　　　　　 d)　multiflagellated

7)　In pteridophytes, the leaves bearing sporangia are known as _____.
　　a)　ligule　　　　　　　　　　 b)　glossopodium
　　c)　sporophylls　　　　　　　　d)　strobilus

8)　_____ fern is used as a biofertilizer.
　　a)　*Azolla*　　　　　　　　　 b)　*Nephrolepis*
　　c)　*Adiantum*　　　　　　　　d)　*Pteris*

9)　*Selaginella* belongs to the division _____.
　　a)　Pterophyta　　　　　　　　b)　Calamophyta
　　c)　Psilophyta　　　　　　　　 d)　Lepidophyta

10)　In *Selaginella,* each megasporangium produces _____ megaspores.
　　a)　7　　　　　　　　　　　　 b)　6
　　c)　4　　　　　　　　　　　　 d)　5

11)　The _____ type of pollination is present in gymnosperms.
　　a)　entomophilous　　　　　　 b)　anemophilous
　　c)　hydrophilous　　　　　　　 d)　malcophilous

12) The recent system of classification accepted in gymnosperms is proposed by _____.
   a) Seward
   b) Arnold
   c) Sporne
   d) Chamberlain

13) The mounting medium Canada balsam is obtained from _____.
   a) *Abies balsamea*
   b) *Araucariasps*
   c) *Cycas circinalis*
   d) *Pinus* sps

14) The coralloid roots are present in _____.
   a) *Pinus*
   b) *Ephedra*
   c) *Araucaria*
   d) *Cycas*

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Enlist types of vegetative reproduction in *Riccia.*
2) Write the outline of classification of pteridophytes according to Smith.
3) State the function of ligule.
4) Classify *Cycas* according to sporne.
5) What is sporophyll?

B) Write short notes. (Any Two)   **06**
1) L. S. of *Cycas* ovule
2) Sporophyte of *Selaginella*
3) State any three uses of Bryophytes.

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Write in brief the anatomy of corolloid root of *Cycas.*
2) Describe the sporophyte of *Riccia.*
3) Write a note on strobilus of *Selaginella.*

B) Answer the following questions. (Any One)   **06**
1) Describe vegetative reproduction in *Cycas.*
2) State the general characters of Pteridophyta.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Define Archegoniates and state the unifying characters of Archegoniates.
2) State the economic importance of pteridophytes.
3) Describe vegetative reproduction *in Selaginella.*

B) Answer the following questions. (Any One)   **04**
1) Describe the sex organs of *Riccia.*
2) Explain in brief anatomy of *Selaginella* stem.

Q.5 Answer the following questions. (Any Two)   **14**
1) Write in brief the leaflet anatomy of <u>*Cycas*</u>.
2) State the general characters of Bryophytes.
3) State the economic importance of Gymnosperms.

Seat No.	

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Paper – II)
PROBABILITY AND PROBABILITY DISTRIBUTIONS - I

Day & Date: Friday, 15-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.

Q.1   Select the correct alternatives from the following rewrite the sentence.   08

1) An important property of distribution function $F_x(x) = P(X \leq x)$ of discrete random variable X is
   a) $F_x(x)$ is an increasing function
   b) A decreasing function
   c) $F_x(x)$ is a decreasing function
   d) $F_x(x)$ is a non-decreasing function

2) If A and B are two events defined o sample space Ω, such that P(A) = 0.25 P(A|B) = 0.25 and P(B|A)=0.5 and P(B|A) then $P(\bar{A}/\bar{B}) = $ _____.
   a) $\frac{2}{3}$ b) $\frac{1}{3}$
   c) $\frac{1}{2}$ d) $\frac{3}{4}$

3) Let A_1, A_2, A_3 be three events such that $P(A_i \cap A_j) = 0$ for $i \neq$ j then $P(A_1 \cup A_2 \cup A_3)$ is
   a) Exactly equal to one
   b) Exactly equal to $P(A_1) + P(A_2) + P(A_3)$
   c) less than $P(A_1) + P(A_2) + P(A_3)$
   d) None of these

4) A number is selected at random from the set of numbers {11,12,13……99}. What is the probability that selected number contais the digit 9?
   a) $\frac{19}{89}$ b) $\frac{18}{89}$
   c) $\frac{1}{10}$ d) $\frac{11}{100}$

5) The probability of occurrence of all possible outcomes of a random experiment is always equal to _____.
   a) 0   b) 1
   c) 0.5   d) None of these

6) The p.m.f. of an r.v.X is given by P(x) = (ax+b) ; x = 0,1,2 and a = 1/3. Then mode of X is
   a) 0   b) 1
   c) 2   d) None of these

7) If X be a discrete random variable with distribution function F(x) then which of the following is the false statements?
   a) Value of F(x) lies between 0 and 1
   b) F(x) is a non-decreasing function of x
   c) Using F(x) mediann can be determined
   d) None of these

8) Given the p.m.f of r.v. X is

X	2	4	6	8	10
P(x)	1/12	1/6	1/4	1/3	1/6

Then Median of r.v. X is
a) 4
b) 6
c) 8
d) ¼

Q.2 **Answer the following questions. (Any Four)** **08**

1) If A and B are independent event with $P(A) = \frac{1}{2}, P(B) = \frac{2}{3}$. Find $P(A \cap \bar{B})$.

2) A bag contains 10 balls two of which are blue, three red and five black. Three balls are drawn at random from the bag. What is the probability that the three balls of different colour?

3) If $P(A) = 0.6, P(B) = 0.5$ $P(A \cap B) = 0.3$ Compute $P(\bar{A} \cap \bar{B})$.

4) If $P(A) = 0.4, P(B) = 0.3$ $P(A \cap B) = 0$. Find $P\left(\bar{A}/_B\right)$

5) 3 books are picked up at random from a shelf containing 5 novels, 3 books of poem and a book of dictionary. Find the probability that 2 novels are selected.

6) If A and B are two events defined on Ω with $(A) = 0.4, P(A \cup B) = 0.7$ and $P(B) = K$. Find the value K if A and B are mutually exclusive.

Q.3 **Answer the following questions. (Any Two)** **08**

1) If A and B are independent events. Then prove that
   i) A and B^c are independent
   ii) A^c and B are independent

2) Verify whether the following function can be considered as p.m.f. Further find P(X=1 or 3)
   $P(X = x) = \frac{x^2+1}{18}$ $x = 0,1,2,3$

3) Four persons are chosen at random from a group containing 3 men, 2 women and 4 children. Find the probability that exactly 2 of them will be children.

Q.4 **Answer the following questions. (Any Two)** **08**

1) If $P(X = x) = \frac{2x+1}{16}, x = 01,2,3$ Verify whether this function is p.m.f. If yes find mode of X

2) In a group of equal number of men and women 10% men and 45% women are umemployed. What is the probability that a person selected at random will be employed?

3) Write down the sample space for the following experiments. Also state the type of the sample space.
   i) A coin is tossed until 'head appears for the first time.
   ii) Life of an electric tube produced by a company is measured.

Q.5 **Answer the following questions. (Any One)** **08**

1) Explain the following terms with suitable example:
   i) Sample space   ii) Exhaustive events
   iii) complementary Events   iv) Mutually exclusive event

2) A fair coin is tossed twice and the events are defined as follows
   A : Head on first toss
   B : Head on second toss
   C : Same face on both tosses
   Discuss pair wise and mutual independence of A, B and C.

Seat No.

Set **P**

B.Sc.(Semester - II) (CBCS) Examination Oct/Nov-2019
Psychology (Paper - III)
GENERAL PSYCHOLOGY

Day & Date: Thursday, 17-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Short-term memories are held for up to _____ seconds.
    a) 30   b) 40
    c) 50   d) 60

2) The term _____ memory is another way of referring to short term memory.
    a) implicit   b) non declarative
    c) working   d) semantic

3) _____ created several lists of nonsense syllabus.
    a) Sperling   b) Miller
    c) Peterson   d) Ebbinghaus

4) _____ proposed two factor theory of intelligence.
    a) Sternberg   b) Spearman
    c) Gardner   d) Cattell

5) Ego works on _____ principle.
    a) conscience   b) pleasure
    c) reality   d) unconscious

6) Sigmund Freud proposed _____ perspective.
    a) psychosocial   b) psychoanalysis
    c) behavioral   d) structural

7) _____ proposed cognitive arousal theory of emotions.
    a) James-Lange   b) Cannon-Bard
    c) Schachter-Singer   d) Peterson- Peterson

8) Rorschach inkblot test was developed in _____.
    a) 1920   b) 1921
    c) 1922   d) 1923

9) The MMPI - 2 consists _____ statements.
    a) 550   b) 557
    c) 567   d) 575

10) Sternberg developed _____ theory of intelligence.
    a) Multiple intelligence   b) Two factor
    c) Triarchic   d) SOI

11) _____ refers to emotional instability.
    a) Neuroticism   b) Psychotism
    c) Extraversion   d) None of the above

12) Iconic memory was studied in several classic experiments by _____.
   a) Miller
   b) Peterson
   c) Ebbinghaus
   d) Sperling

13) _____ intelligence refers to the ability to break problems down into component parts or analysis for problem solving.
   a) Creative
   b) Analytical
   c) Practical
   d) Spatial

14) Thematic Apperception Test (TAT) consist _____ carts.
   a) 10
   b) 15
   c) 20
   d) 25

Q.2 Answer the following questions. (Any Seven)   **14**
   1) What is Procedural memory?
   2) What is personality?
   3) State divisions of mind.
   4) What is intrapersonal intelligence?
   5) What is retrieval?
   6) Who proposed hierarchy of needs?
   7) Which factors are included in Spearman's theory of intelligence?
   8) What is Sensory memory?
   9) State personality measurement tests.

Q.3 A) Answer the following questions. (Any Two)   **10**
   1) Explain Cannon-Bard theory of emotions.
   2) Explain memory stages.
   3) Explain Projective tests.

   B) Explain Sternberg's theory of intelligence.   **04**

Q.4 A) Answer the following questions. (Any Two)   **08**
   1) Discuss Ebbinghaus' work on forgetting.
   2) Explain drive-reduction approach of motivation.
   3) Explain emotional intelligence.

   B) Explain five factor model of personality.   **06**

Q.5 Answer the following questions. (Any Two)   **14**
   1) Explain process of memory.
   2) Explain causes of forgetting.
   3) Explain Gardner's theory of intelligence.

Seat No.

B.Sc.(Semester - II) (CBCS) Examination Oct/Nov-2019
Geology (Paper - III)
INTRODUCTION TO GENERAL GEOLOGY

Day & Date: Thursday, 17-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Neat and labeled diagrams must be drawn wherever necessary.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) The Asteroids are also called as _____.
   a) Minor planets   b) Giant planets
   c) Terrestrial planets   d) none of these

2) _____ is the fourth planet from the sun.
   a) Earth   b) Mars
   c) Venus   d) Jupiter

3) Average radius of planet earth is _____ Km.
   a) 6471   b) 6871
   c) 6371   d) 7371

4) The shooting star is also called as _____.
   a) Planets   b) Asteroids
   c) Meteorite   d) None of these

5) Planet Earth has _____ natural satellites.
   a) 2   b) 1
   c) 4   d) 15

6) On _____ day and night will be equal in duration.
   a) Eclipse   b) Solstices
   c) Equinox   d) None of these

7) The Planetismal theory of Earth origin put forward by _____.
   a) Chamberlin   b) Kant
   c) Kant and Lapels   d) Chamberlin and Moulton

8) _____ discontinuity separate mantel from core.
   a) Movorovisic   b) Gutenberg
   c) Moho   d) None of these

9) Earthquake wave is also called as _____ wave.
   a) Seismic   b) Sound
   c) Light   d) None of these

10) _____ is the second order continental feature.
   a) Continent   b) Stable platform
   c) Island arc   d) Ocean basin

11) The Deccan trap is example of _____ type volcanic eruption.
   a) Central   b) Fissure
   c) Composite   d) All the above

12) The most abundant gas relies from volcano is _____.
    a) CO_2 b) Water vapor
    c) Sulfur   d) None of these

13) The core of galaxy is _____.
    a) Corona   b) Gas nebula
    c) Black hole   d) All of these

14) _____ is the point where earthquake is generated.
    a) Focus   b) seismic line
    c) Epicenter   d) None of these

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Equinox
2) Revolution of Earth
3) Epicenter
4) Volcanic belt
5) Conrad discontinuity

B) Answer the following questions. (Any Two)   **06**
1) Describe scale of earthquake.
2) What is hypsographic curve?
3) Describe fold mountains as geomorphic feature.

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Describe Galaxy.
2) The solar system.
3) Describe hydrosphere.

B) Answer the following questions. (Any One)   **06**
1) Describe Seismograph.
2) Describe the Planetary laws.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Describe the internal structure of earth.
2) Describe the product of volcano.
3) Describe first order relief features.

B) Answer the following questions. (Any One)   **04**
1) Describe the biosphere.
2) Explain the prediction of earthquake.

Q.5 Answer the following questions. (Any Two)   **14**
1) Describe nebular hypothesis of earth origin.
2) Explain the effect of earthquake.
3) Describe the universe.

Seat No.

Set **P**

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Microbiology (Paper - III)
MICROBIAL BIOCHEMISTRY AND PHYSIOLOGY

Day & Date: Thursday, 10-10-2019　　　　　　　　　　　Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Draw well labeled diagrams wherever necessary.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) The monomer or building blocks of nucleic acids are _____.
　　a)　Nucleosides　　　　　　　b)　nucleotides
　　c)　amino acids　　　　　　　d)　nitrogenous bases

2) _____ is an example of disaccharide.
　　a)　Lactose　　　　　　　　　b)　Glucose
　　c)　Starch　　　　　　　　　　d)　Cellulose

3) Transformation of information from DNA to RNA is called as _____.
　　a)　translation　　　　　　　　b)　transcription
　　c)　copying　　　　　　　　　　d)　transduction

4) Bromothymol blue is _____ in colour at alkaline pH.
　　a)　orange　　　　　　　　　　b)　yellow
　　c)　blue　　　　　　　　　　　d)　red

5) Glucokinase catalyses transfer of _____ group from ATP to glucose.
　　a)　amino　　　　　　　　　　b)　phosphate
　　c)　hydrogen　　　　　　　　　d)　nitrogen

6) _____ Phase is the period of equilibrium.
　　a)　Logarithmic　　　　　　　b)　death
　　c)　lag　　　　　　　　　　　　d)　stationary

7) Microorganisms which require carbon dioxide as a principle carbon source and light as energy source are called as _____.
　　a)　chemoautotrophs　　　　　b)　photoautotrophs
　　c)　chemohetrotrophs　　　　　d)　photoheterotrophs

8) Andrade's indicator is used for detection of _____ in sugar fermentation test.
　　a)　Alkali　　　　　　　　　　b)　acid
　　c)　gas　　　　　　　　　　　　d)　ammonia

9) _____ is solidifying agent.
　　a)　Peptone　　　　　　　　　b)　Agar-agar
　　c)　Milk　　　　　　　　　　　d)　meat extract

10) Two strands of DNA are held together by _____ bonds.
　　a)　disulphide　　　　　　　　b)　hydrogen
　　c)　ionic　　　　　　　　　　　d)　nitrogen

11) _____ are hydrolytic enzymes.
　　a)　Synthatases　　　　　　　b)　Proteases
　　c)　Oxidoreductases　　　　　d)　Transferases

12) Peptide bonds are found in _____.
    a) lipids   b) proteins
    c) polysaccharides   d) nuceic acid

13) _____ is absent in RNA.
    a) Adenine   b) Uracil
    c) Gaunine   d) Thymine

14) _____ agar is used for detection of amylase activity.
    a) Nutrient   b) Starch
    c) Milk   d) Blood

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Metabolism
2) Active site
3) Transitional period
4) Generation time
5) Autotrophs

B) Write Notes. (Any Two)   **06**
1) Induced enzymes
2) Blood agar
3) Hydrolases

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Carbohydrates
2) Oxidoreductases
3) RNA

B) Answer the following question. (Any One)   **06**
1) Factors affecting enzyme activity
2) Glycolysis

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Induced fit hypothesis.
2) Indicators in laboratory media.
3) Coenzymes and cofactors.

B) Answer the following question. (Any One)   **04**
1) Proteins
2) Lock and key mechanism

Q.5 Answer the following questions. (Any Two)   **14**
a) Describe growth phases.
b) Types of enzymes
c) Nutritional categories of organisms on the basis of carbon and energy

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Psychology (Paper - IV)
HUMAN DEVELOPMENT

Day & Date: Friday, 18-10-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) _____ percent of American get married at their lives in early adulthood.
   a) 90 b) 95
   c) 80 d) 70

2) Middle age as the years between age _____.
   a) 35 to 65 b) 20 to 35
   c) 40 to 65 d) 70 to 80

3) _____ sensitivity begins to decline at about age 50.
   a) Vision b) Taste
   c) Audition d) Any other

4) _____ is major health problem in mid-life.
   a) Obesity b) Hypertension
   c) Blood pressure d) Any other

5) _____ people need more medical care than younger ones.
   a) Middle aged b) Older
   c) Elder d) Child

6) Basically _____ types of marriages exist in the World.
   a) 4 b) 5
   c) 6 d) 8

7) Marriage in which there are one husband and one wife.
   a) Polygamy b) Polyadry
   c) Monogamy d) Other

8) Women sense of identity is seen by Miller and Gilligan as developing within _____.
   a) Relationship b) Friendship
   c) Biopsychological Education d) Any other

9) The eye begins to change physically at the age of _____.
   a) 40 b) 50
   c) 60 d) 70

10) Retirement _____ different for female than male.
    a) More b) Less
    c) Middle d) Any other

11) Lewins Terman began has study of the development of intelligence in the _____.
    a) 1920 b) 1950
    c) 1970 d) 1980

12) Sense at taste is closely trial to our sense of _____.
   a) Hearing   b) Smell
   c) Eat   d) Touch

13) Health also plays an important in the sexual feeling and behavior of _____ adults.
   a) Middle age   b) Adult age
   c) Childhood   d) Other

14) _____ theory of adult development is the notion of life course.
   a) Levinson   b) Likert
   c) Cowan   d) Freud

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Who firstly studies on the subject of terminal drop in 1964?
2) Which therapy can be used to after relief to woman in relation to menopause?
3) Which is the main problem of middle aged adult women?
4) What are types of marriage?
5) What is approximate age of middle adulthood?

B) Write Notes. (Any Two)   **06**
1) Death of spouse in older people
2) Intelligence in older people
3) Stability & change in the big five personality traits

Q.3 A) Answer the following questions. (Any Two)   **08**
1) How to the physical of middle affect sexually? Explain.
2) Explain elder abuse.
3) Describe physical change in old age.

B) Answer the following questions. (Any One)   **06**
1) Explain Retirement in late adulthood.
                    OR
2) Explain the cognitive development in late adulthood.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain the pattern of work in middle adulthood.
2) Discuss physical development in middle adulthood.
3) Explain Erikson stages of generatively vs stagnation.

B) Answer the following questions. (Any One)   **04**
1) Describe the Levinson change in personality during late adulthood.
                    OR
2) Describe the four types of Death.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Discuss the marriage and family relations in middle adulthood.
   b) Explain various view of personality development in middle adulthood?
   c) Explain physical development of late adulthood in health.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Geology (Paper - IV)
INTRODUCTION TO PHYSICAL GEOLOGY

Day & Date: Friday, 18-10-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat-labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) The final product of physical and chemical weathering of rocks is _____.
   a) murum b) tors
   c) soil d) playas

2) How many high tides are there in a day?
   a) 3 b) 12
   c) 2 d) 4

3) Swirling action of water creates _____.
   a) potholes b) rapids
   c) beach d) natural levees

4) U' shaped valley is a erosional feature formed by _____.
   a) wind b) glacier
   c) river d) ocean

5) Formation of soil depends upon _____ factor.
   a) type of parent rock b) climate
   c) time d) all

6) Sand bars are formed _____ to beach.
   a) perpendicular b) bisecting
   c) on d) parallel

7) Which of the following mineral is most unstable to weathering?
   a) quartz b) olivine
   c) augite d) muscovite

8) Gravitational force causes ocean _____.
   a) currents b) waves
   c) tides d) None of these

9) Sea caves are common in _____.
   a) granites b) slate
   c) basalt d) limestones

10) Which of the following is a feature not formed by wind?
    a) delta b) yardangs
    c) sand dunes d) ventifacts

11) In alluvial cone deposits, the angle of repose may be _____.
    a) gentle b) steep
    c) vertical d) none of these

12) The stones with smooth, polished surfaces having sharp edges are called _____.
   a) ventifacts
   b) yardangs
   c) desert pavements
   d) oasis

13) Wind is active agent in _____ region.
   a) polar
   b) mountainous
   c) warm & humid
   d) dry & arid

14) The surface/level on the earth surface above which snow is present permanently throughout year, called as _____.
   a) snowline
   b) snowcap
   c) snow sheet
   d) piedmont

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is drumlin?
   2) Define glacier.
   3) Give any four names of products of weathering.
   4) What is desert?
   5) Define oxidation

B) Write Notes. (Any Two)   **06**
   1) Moraines
   2) Alluvial fan
   3) Delta

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe different factors controlling weathering process.
   2) Explain formation of Meander & ox-bow lake.
   3) Write a note on watershed.

B) Answer the following questions. (Any One)   **06**
   1) Explain two types of sand dunes.
   2) Describe Hanging valley.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe exogenous and endogenous processes.
   2) Describe ocean waves and ocean tides.
   3) Explain any two erosional features of ocean.

B) Answer the following questions. (Any One)   **04**
   1) Describe a process of Spheroidal Weathering.
   2) Describe Soil profile.

Q.5 Answer the following questions. (Any Two)   **14**
   a) Define weathering. Describe two processes of physical weathering.
   b) Describe any three erosional features of wind.
   c) Define river. Add a note on waterfall and river capture.

Seat No.

B.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
MICROBIOLOGY (Paper - IV)
APPLIED MICROBIOLOGY

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) Enteric diseases are mainly transmitted by _____.
   a) Blood   b) Contact
   c) Air   d) Water

2) _____ test is used to determine the efficiency of pasteurization of milk.
   a) MPN   b) Phosphatse
   c) MBRT   d) IMVIC

3) _____ is main sugar present in milk.
   a) Glucose   b) Lactose
   c) Maltose   d) Fructose

4) Occurrence of disease in a large population throughout the world is known as _____.
   a) Pandemic   b) Endemic
   c) Epidemic   d) Sporadic

5) EMB agar is used for _____ test.
   a) Confirmed   b) Presumptive
   c) Completed   d) MPN

6) Disease causing ability of organism is known as _____.
   a) Immunity   b) Virulence
   c) Prophylaxis   d) Pathogenecity

7) _____ is used for physical treatment of sewage.
   a) Imhoff's tank   b) Trickling filter
   c) Chlorination   d) Activated sludge process

8) In LTH method of pasteurization milk is heated at _____ for 30 min.
   a) 62.8°C   b) 71.7°C
   c) 100°C   d) 140°C

9) _____ test is used for determination of organic matter in sewage.
   a) MPN   b) SPC
   c) MBRT   d) BOD

10) _____ is an example of air borne disease.
    a) Cholera   b) Typhoid
    c) Tuberculosis   d) Rabies

11) _____ medium is used for indole production test.
    a) Peptone water   b) GPB
    c) EMB agar   d) Endo agar

12) The film of organisms formed on the trickling filter bed is known as ____ film.
   a) Phytogloel
   b) Mesogloel
   c) Zoogleol
   d) Paragloel

13) MBRT test is used for determination of microbiological quality of _____.
   a) Water
   b) Sewage
   c) Milk
   d) Air

14) Vogas Proskauer test is used for detection of _____.
   a) Indole
   b) Acid
   c) Acetoin
   d) Citrate

Q.2 A) Answer the following questions. (Any Four)   08
   1) Define BOD.
   2) What is virulence?
   3) Define Pasteurization.
   4) Give the four examples of coliforms.
   5) Define immunity.

B) Write notes on. (Any Two)   06
   1) Composition of milk.
   2) Types of sewage.
   3) Abnormal flora of water.

Q.3 A) Answer the following questions. (Any Two)   08
   1) Types of diseases.
   2) MPN Test.
   3) Chemical treatment of sewage.

B) Answer the following questions. (Any One)   06
   1) Describe the Pasteurization and its types.
   2) Describe the IMVic test.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Prevention of diseases by immunoprophylaxis.
   2) Describe the purification of Municipal Water.
   3) Describe the sources of contamination of milk.

B) Answer the following question. (Any One)   04
   1) Describe the physical treatment of sewage.
   2) Describe the concept of laboratory diagnosis.

Q.5 Answer the following questions. (Any Two)   14
   1) Describe the biological treatment of sewage.
   2) Explain the methods of transmission of diseases.
   3) Describe the various tests for microbiological examination of milk.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Chemistry – Paper V
ORGANIC CHEMISTRY

Day & Date: Saturday, 05-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given bellow.**   **14**

1) Which type of electronic transition requires least energy?
    a) $\sigma \to \sigma^*$ b) $\pi \to \pi^*$
    c) $n \to \sigma^*$ d) $n \to \pi^*$

2) Auxochrome must contain an atom having _____.
    a) only σ electrons   b) only π electrons
    c) non-bonding electrons   d) none of these

3) Shift of absorption maxima (λ_{max}) to a longer wavelength is known as ____.
    a) bathochromic shift   b) hypsochromic shift
    c) hyperchromic shift   d) hypochromic shift

4) In Beckman transformation the product obtained is _____.
    a) an oxime   b) N-substituted amide
    c) an aldehyde   d) a ketone

5) The eclipsed conformation of ethane possesses _____ energy.
    a) minimum   b) zero
    c) maximum   d) None of these

6) In R and S system of nomenclature of configuration, the priority order of groups attached to chiral carbon is determined on the basis of _____.
    a) atomic number   b) atomic mass
    c) molecular weight   d) equivalent weight

7) Which of the following is used as an antifreeze?
    a) methanol   b) water
    c) ethanol   d) glycerol

8) Phenols are _____ in nature.
    a) neutral   b) basic
    c) acidic   d) amphoteric

9)
$$CH_2\text{-}OH$$
$$|$$
$$CH\text{-}OH \quad + \; K\,HSO_4 \longrightarrow \; ?$$
$$|$$
$$CH_2\text{-}OH$$

    a) formaldehyde   b) acrolein
    c) oxalic acid   d) citric acid

10) The carboxyl carbon in aldehydes and ketones is _____ hybridized.
    a) SP^3 b) SP^2
    c) SP d) SP^4

11) Aldol condensation is shown by aldehydes _____.
   a) having no 'H' atom on α – carbon
   b) at least one 'H' atom on α – carbon
   c) having 2 'H' atom on β – carbon
   d) having 1 'H' atom on β – carbon

12) 'Benzyl alcohol is obtained from benzaldehyde by _____.
   a) Perkin   b) Cannizzaro's
   c) Wolf-Kishner reduction   d) Clemmenson reduction

13) Diazomethane is the best reagent to prepare _____ ethers.
   a) phenoxy   b) methoxy
   c) ethoxy   d) All these

14) Unsaturated carboxylic acids are known as _____.
   a) alkanoic acids   b) alkenoic acids
   c) alkynoic acids   d) α, β – unsaturated acids

Q.2 A) Attempt any four of the following questions.   **08**
   1) How will you prepare benzene diazonium chloride?
   2) How will you convert pathalic acid into benzene and pathalimide.
   3) Name the following ether :

$$\bigcirc\!\!-CH_2\!-\!CH_2\!-\!O\!-\!CH_3$$

   How will you prepare dimethly ether using Williamson's method.
   4) Give IUPAC names of the following.
      i) Crotonaldehyde
      ii) Isopropyl ethyl ketone
   5) What are dihydric alcohols? Give two examples.

B) Write the short notes (Any Two)   **06**
   1) Reimer - Tieman reaction
   2) Effect of conjugation on λ_{max} value
   3) Stability of conformation of ethane

Q.3 A) Attempt any two of the following questions.   **08**
   1) What are dihydric alcohols? Give any two methods for the preparation of ethylene glycol. What is action of HCl on ethylene glycol at 200°C.
   2) In Ziesel's method 2.63×10^{-5} kg of organic compound having molecular weight 123 gave 5.025×10^{-5} kg of silver iodide. Calculate the percentage and number of $- OCH_3$ groups present in the organic compound.
   3) What is diazotization process? What is the action of following reagents on benzene diazonium chloride?
      i) $SnCl_2$ / HCl, NaOH
      ii) KI
      iii) Cu Br / D

B) Attempt any one of the following questions.   **06**
   1) What is basic principle of UV spectroscopy? Explain different types of electronic transitions in UV spectroscopy. Calculate λ_{max} value for

   a)   b)

   2) What are dicarboxylic acids? Describe the methods for the synthesis of succinic acid and phthalic acid. What is the action of heat on phthalic acid.

Q.4 A) Attempt any two of the following questions.   **10**

1) Assign R and S configuration to following compounds using sequence rule.

a) $HOOC - \overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle OH}{|}}{C}} - CH_2 - CH_3$ b) $NC - \overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_2 - CH_3}{|}}{C}} - OH$

2) State Knoevenagel condensation. Give mechanism for the following reaction.

$$\text{C}_6\text{H}_5-\text{CHO} + \text{CH}_2\overset{\displaystyle \diagup COOC_2H_5}{\underset{\displaystyle \diagdown COOC_2H_5}{}} \xrightarrow[\triangle]{\text{Pyridine}} \text{C}_6\text{H}_5-CH = CH - COOH$$

3) Give synthesis and uses of methyl orange.

B) Attempt any one of the following questions.   **04**

1) Discuss application of UV spectroscopy with reference to stereochemistry.

2) How will you obtain malic acid from
    i) Maleic acid and
    ii) $\alpha -$ bromo succinic acid

Q.5 Attempt any two of the following questions.   **14**

a) What is difference between conformation and configuration? Explain conformational analysis of n - butane. Explain order of stability of conformations of n - butane.

b) Discuss the acid and base catalyzed ring opening of ethylene oxide. What is the action of following reagents of ethylene oxide?
    i) C_2H_5OH / H^+
    ii) HBr
    iii) NH_3

c) Explain the formation of pinacol. Discuss the mechanism of pinacol-pinacolone rearrangement.

| Seat No. | | | | **Set** | **P** |

<div align="center">

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
CHEMISTRY (Paper–VI)
INORGANIC CHEMISTRY

</div>

Day & Date: Monday, 07-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.
               3) Draw neat and labeled diagrams.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) According to Werner, every metal is characterized by two types of valences _____.
   a) primary and secondary   b) primary and principle
   c) primary and ionisable   d) secondary and non-ionisable

2) Geometrical isomerism is not possible for co-ordinate compound having _____ geometry.
   a) octahedral   b) square planer
   c) tetrahedral   d) cubic

3) For any complex to show optical activity, they must contain _____.
   a) axis of symmetry   b) centre symmetry
   c) plane of symmetry   d) asymmetry centre

4) While naming bromide as ligand its name is changed to _____.
   a) bromine   b) bromo
   c) bromated   d) bromide

5) DMG is specific and selective reagent for _____.
   a) Ca & Mg   b) Fe
   c) Ni   d) CO

6) EDTA contains _____ acidic and _____ basic donar groups respectively.
   a) 4, 4   b) 4, 3
   c) 2, 4   d) 4, 2

7) Chelating agents are always _____ ligands.
   a) Monodentate   b) Polydentate
   c) Ambidentate   d) Bridging

8) _____ is the strongest Lewis acid .
   a) H^+ b) Ag^+
   c) Fe^{2+} d) Cd^{2+}

9) The interaction of hard acid with hard base can form _____ compound.
   a) covalent   b) ionic
   c) co-ordinate covalent   d) non-polar

10) _____ is the softest base.
   a) F^- b) Br^-
   c) I^- d) Cl^-

11) In 3d - transition elements _____ atom shows highest oxidation state.
   a) Fe   b) Mn
   c) Cu   d) Cr

12) The colour of d-block element is due to _____ transition of electron.
   a) s - s
   b) s - p
   c) p - p
   d) d - d

13) General electronic configuration of 3rd series is _____.
   a) $3d^{1-10}\ 4s^{1-2}$
   b) $3d^{1-10}\ 4s^2$
   c) $4d^{1-10}\ 5s^{1-2}$
   d) $4f^{14}\ 5d^{1-10}\ 6s^{0-2}$

14) Paramagnetism is associated with _____.
   a) absence of electrons
   b) neither paired nor unpaired electrons
   c) paired electrons
   d) Unpaired electrons

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Give the limitations of Werner's theory.
   2) Define the terms – Hybridization ad optical isomerism.
   3) What are primary and secondary valences?
   4) What are demerits of Lewis concept?
   5) Draw the structure of $[Mg\ (edta)]^{2-}$ metal chelate.

B) Write Notes on (Any Two)   **06**
   1) What is effective atomic number?
   2) What are Lewis acids? How they can be classified?
   3) Give the position of d-block elements in the periodic table.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What is geometrical isomerism? Discuss it for complexes with CN = 4?
   2) Discuss the applications of HSAB concept.
   3) What are causes of colouration in transition metal compounds?

B) Answer the following question. (Any One)   **06**
   1) What are transition elements? Explain the oxidation state of first transition series elements.
   2) What is chelation? Explain the role of DMG as chelating agent.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) What is chelating agent? Explain the structural requirement of chelate formation.
   2) Explain the magnetic behaviour of first transition series elements.
   3) On the basis of Werner's theory, explain the formation of $COCl_3.\ 3\ NH_3$ and $COCl_3.5\ NH_3$ molecules.

B) Answer the following question. (Any One)   **04**
   1) Give the name, symbol and electronic configuration of 5d transition series.
   2) Discuss the classification of bases as per Pearson's concept.

Q.5 Answer the following questions. (Any two)   **14**
   a) Explain the following of Ni^{2+} complexes with Cl^- & CN^- ligands CN = 4
   b) What is simple salt? Distinguish between double salt and complex salt.
   c) Distinguish between first and second transition series elements w.r.t. electronic configuration, reactivity and stability oxidation states.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Physics (Paper – V)
GENERAL PHYSICS, HEAT AND SOUND

Day & Date: Wednesday, 09-10-2019　　　　　　　　　　Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　　3) Neat diagrams must be drawn wherever necessary.
　　　　　　　　4) Use of log table or calculator is allowed.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) The gradient of a scalar function is _____ rate of change of the space function.
   a) maximum
   b) minimum
   c) slow
   d) constant

2) Divergence of vector field is _____ quantity.
   a) vector
   b) scalar
   c) non zero
   d) negative

3) The rise and fall of axis of rotating body is called _____.
   a) rotation
   b) precession
   c) nutation
   d) vibration

4) The radius of curvature of path of rolling disc does not depend on _____.
   a) acceleration
   b) linear velocity
   c) radius of disc
   d) mass of disc

5) Gyrocompass is used to determine _____.
   a) angle of dip
   b) geographic north-south direction
   c) distance between two places
   d) magnetic north-south direction

6) A spiral spring is said to be flat, if angle made by plane of its turn to the horizontal is _____.
   a) zero
   b) less than 90°
   c) greater than 90°
   d) equal to 90°

7) A beam is fixed horizontally at one end and loaded at other is known as _____.
   a) loaded beam
   b) column
   c) cantilever
   d) centrally loaded beam

8) The rotating cylinder method is used to determine the viscosity of _____ liquid.
   a) highly viscous
   b) low viscous
   c) any liquid
   d) moderate viscous

9) The dimensions of the coefficient of viscosity are _____
   a) $[M^1L^{-1}T^{-1}]$
   b) $[M^2L^{-1}T^{-1}]$
   c) $[M^{-1}L^{-1}T^{-1}]$
   d) $[M^1L^1T^{-1}]$

10) Entropy remains constant in _____ process.
    a) isobaric   b) isothermal
    c) isochoric   d) adiabatic

11) The unit of entropy is _____.
    a) J/k   b) cal/k
    c) both (a) & (b)   d) K/J

12) If auditorium of volume 1982 m^3 has reverberation time 0.9 sec then area of hall is _____.
    a) 352.6 m^2 b) 354.6 m^2
    c) 350 m^2 d) 348 m^2

13) Microphone converts _____ energy into electrical energy.
    a) optical   b) mechanical
    c) heat   d) sound

14) The frequency of ultrasonics is _____.
    a) below 20 Hz   b) above 20,000 Hz
    c) 20 to 20,000 Hz   d) below 20 KHz

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What is Del operator?
2) State Lanchester's rule.
3) Define
   i) neutral surface
   ii) neutral axis
4) What is T-S diagram?
5) Give any two applications of ultrasonics.

B) Write Notes on. (Any Two)   **06**
1) (a) Rifling of barrel of gun (b) Riding of bicycle
2) Bending moment
3) Entropy of steam

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Define scalar triple product. Explain its physical significance.
2) What is precessional motion? Show that torque is necessary for precession.
3) A spiral spring of radius 1 cm consists of 100 turns of wire of diameter 4 mm. The modulus of rigidity of wire is 10×10^{11} dyne I cm^2 and mass of spring is 51 gm. Calculate the time period of vertical oscillation when mass of 103 gm is attached to it.

B) Answer the following questions. (Any One)   **06**
1) Obtain an expression for Young's modulus of the material of the wire of flat spiral spring.
2) Describe Ostwald's viscometer.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Obtain an expression for period of gyrostatic pendulum.
2) Derive an expression for entropy of perfect gas in terms of temperature and pressure.
3) Explain construction and working of moving coil loudspeaker.

B) Answer the following questions. (Any One)   **04**
1) Explain method of piezoelectric effect for production of ultrasonic waves.
2) Calculate the change in entropy when 10 gm of ice at $0°C$ is converted into water at same temperature. Latent heat of ice is 80 cal/gm.

Q.5 Answer the following questions. (Any Two)   **14**
a) What is curl of a vector? Explain the physical significance of the curl of vector field.
b) Describe construction and working of Searle's viscometer for the viscosity of highly viscous liquid.
c) What is reverberation time? Derive Sabine's formula for reverberation time.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Physics (Paper - VI)
ELECTRONICS

Day & Date: Thursday, 10-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Use of calculator or log table is allowed.
              4) Neat diagram must be drawn wherever necessary.

Q.1   **Fill in the blanks by choosing correct alternatives given below.**   **14**

    1)   A differential amplifier is used to amplify _____.
        a) d. c. signals   b) a. c. signals
        c) both d.c. and a.c. signal   d) none of these

    2)   An oscillator employs _____ feedback.
        a) negative   b) positive
        c) no   d) positive as well as negative

    3)   If the feedback network made by passive components, then value of feedback factor is _____.
        a) less than unity   b) greater than unity
        c) equal to unity   d) equal to zero

    4)   High order of frequency stability is for _____.
        a) Crystal oscillator   b) Colpitt's oscillator
        c) Hartley oscillator   d) Phase shift oscillator

    5)   In the tank circuit of an oscillator, the energy is stored in the form of _____ energy.
        a) electromagnetic   b) only electric
        c) only magnetic   d) none of these

    6)   For smaller values of V_{DS}, the FET behaves as _____.
        a) resistor   b) constant current source
        c) constant voltage source d) none of these

    7)   UJT has $\eta = 0.6$ and $R_{BB} = 10\ K\Omega$, the value of R_{B_1} is _____.
        a) $4 K\Omega$ b) $10 K\Omega$
        c) $2\ K\Omega$ d) $6 K\Omega$

    8)   The logical circuit used to perform addition of two binary bits is called as _____
        a) half adder   b) full adder
        c) flip-flop   d) parallel adder

    9)   A half adder can be constructed from a combination of _____.
        a) one XOR gate and one OR gate
        b) one XOR gate and one AND gate
        c) two XOR gates only
        d) two AND gates only

10) IC 7805 is a _____ volt regulator.
    a) +5　　　　　　　　　　　　b) -5
    c) 8　　　　　　　　　　　　　d) 7

11) In CRT, time base circuit produces _____ waveform.
    a) sine　　　　　　　　　　　b) saw-tooth
    c) square　　　　　　　　　　d) rectangular

12) A CRO is used to measure _____.
    a) voltage　　　　　　　　　b) frequency
    c) phase　　　　　　　　　　d) all of these

13) If negative potential at control grid of CRT is decreased then intensity of light spot is _____.
    a) increased　　　　　　　　b) decreased
    c) not affected　　　　　　　d) invisible

14) What is the value of voltage gain of differential amplifier, when input voltage are $V_1 = 5$ volt and $V_2 = 2$ volt and output voltage $V_o = 30$ volt?
    a) 6　　　　　　　　　　　　b) 15
    c) 10　　　　　　　　　　　　d) 1

Q.2 A) Answer the following questions. (Any Four)　　　　　　08
    1) State the Barkhausen criterion for sustained oscillator.
    2) Define the term intrinsic stand-off ratio and write its limit.
    3) Draw the circuit diagram to study the operation of P-channel FET.
    4) Draw a logical circuit diagram of Half adder.
    5) Calculate load regulation of a power supply, if the no- load voltage is 30.3 volt and full-load voltage is 30 volt.

B) Write Notes on (Any Two)　　　　　　06
    1) Give the comparison between normal amplifier and differential amplifier.
    2) Write any three uses of CRO in detail.
    3) Define the term line regulation and Load regulation.

Q.3 A) Answer the following questions. (Any Two)　　　　　　08
    1) Explain working of UJT by its equivalent circuit.
    2) In UJT relaxation oscillator, charging resistance is $22\ K\Omega$ and capacitor is $0.01\mu F$, Calculate the frequency of saw tooth wave form produced by relaxation oscillator. $(\text{Given } \eta = 0.6)$.
    3) Explain the operation of transistor series voltage regulator with neat circuit diagram.

B) Answer the following questions. (Any One)　　　　　　06
    1) State and prove De Morgan's theorems.
    2) Draw block diagram of digital multimeter and explain its applications.

Q.4 A) Answer the following questions. (Any Two)　　　　　　10
    1) Describe with neat circuit diagram the working of Colpitt's oscillator.
    2) What is oscillator? Find the frequency of oscillation produced by Colpitt's oscillator, if $C_1 = C_2 = 0.001\mu F$ and $L = 1mH$.
    3) Describe the construction and working of J-K flip-flop.

B) Answer the following questions. (Any One)　　　　　　04
    1) With a neat circuit diagram explain the voltage divider bias.
    2) Explain the concept of positive feedback and negative feedback.

Q.5 Answer the following questions. (Any Two)   **14**
    a)   Explain transistor RC coupled amplifier with advantage and disadvantage.
    b)   Describe dual power supply with neat circuit diagram.
    c)   Draw the Block diagram of CRO and explain the function of each block.

Seat No.		**Set**	**P**

B.Sc.(Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - I)
ALGEBRA

Day & Date: Saturday, 16-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
                         2) Figures to the right indicate full marks.

Q.1   Select the correct alternatives from the following and rewrite the sentence.   08

1) If rank of $[A]$ = rank of $[AB]$ =no. of unknown then syatem of equation $AX = B$ passes _____.
   a) No solution   b) Unique solution
   c) Infinite solution   d) Trivial solution

2) Homogenous system of Linear Equation is of the form _____.
   a) $AX = B$ b) $AX = 0$
   c) $AB = X$ d) $ABX = 0$

3) $cosech\,(ix) = $ _____.
   a) $i\,cosech\,x$ b) $cosech\,x$
   c) $-i\,cosech\,x$ d) $-cosech\,x$

4) Obtain the characteristic equation of matrix $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ is _____.
   a) $x^2 - 2x + 1 = 0$ b) $x^2 - 2x - 1 = 0$
   c) $x^2 - 2x = 0$ d) $x^2 + 2x = 0$

5) The polar form of $1 + \sqrt{3}i$ is _____.
   a) $2\left(\cos\dfrac{\pi}{6} + i\sin\dfrac{\pi}{6}\right)$ b) $2\left(\cos\dfrac{\pi}{3} + i\sin\dfrac{\pi}{3}\right)$
   c) $2\left(\cos\dfrac{5\pi}{6} + i\sin\dfrac{5\pi}{6}\right)$ d) $2\left(\cos\dfrac{2\pi}{3} + i\sin\dfrac{2\pi}{3}\right)$

6) The eigen value of matrix $\begin{bmatrix} 7 & 2 & 3 \\ 0 & 6 & 4 \\ 0 & 0 & 5 \end{bmatrix}$ are _____.
   a) $7, 2, 3$ b) $3, 4, 5$
   c) $7, 6, 5$ d) $2, 3, 4$

7) The real part of $\sqrt{i}$
   a) $\sqrt{2}$ b) $-\dfrac{1}{\sqrt{2}}$
   c) $-\sqrt{2}$ d) $\dfrac{1}{\sqrt{2}}$

8) If $z = \cos\theta + i\sin\theta$ then $z^7 - z^{-7} = $ _____.
   a) $2\cos 7\theta$ b) $2\,i\sin\theta$
   c) $2\sin 7\theta$ d) $2\,i\sin 7\theta$

Q.2   Answer the following questions. (Any Four)   08

1)   Find the values of $(-1)^{\frac{1}{2}}$

2)   Find the rank of matrix $\begin{bmatrix} 1 & 3 & -4 & 5 \\ -1 & 2 & -6 & 7 \\ -1 & 5 & 0 & 10 \end{bmatrix}$

3)   Find $\left(\sin \frac{\pi}{2} + i \cos \frac{\pi}{2} \right)^2$

4)   Prove that $\cos^2 \theta - \sin^2 \theta = \cos 2\theta$

5)   Find the characteristic equation of matrix $\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$.

6)   Define rank of matrix.

Q.3   Answer the following questions. (Any Two)   08

1)   Prove that
$$[\sin(\alpha + \theta) - e^{i\alpha} \sin \theta]^n = sin^n \alpha \; e^{-in \, \theta}$$

2)   Reduce the matrix to their normal form and hence find rank
$$\begin{bmatrix} 1 & 4 & 3 & 2 \\ 1 & 2 & 3 & 4 \\ 2 & 6 & 7 & 5 \end{bmatrix}$$

3)   Prove that
$$\cos(z_1 - z_2) = \cos z_1 . \cos z_2 + \sin z_1 . \sin z_2$$

Q.4   Answer the following questions. (Any Two)   08

1)   Prove that
$$(\sqrt{3} + i)^n + (\sqrt{3} - i)^n = 2^{n+1} \cos \frac{n\pi}{6}.$$

2)   Find eigen value of matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 3 & 2 & 3 \end{bmatrix}$

3)   Reduce the matrix in normal form and hence find their rank
$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 6 & 10 \end{bmatrix}$$

Q.5   Answer the following questions. (Any One)   08

1)   Determine the eigen values and eigen vectors of the matrix
$$A = \begin{bmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

2)   If x is real then show that
1) $\tan h^{-1} x = \frac{1}{2} \log \left(\frac{1+x}{1-x} \right)$
2) $\tan h^{-1} x = \sin h^{-1} \left(\frac{x}{\sqrt{1-x^2}} \right)$

Seat No.

B.Sc. (Semester – III) (CBCS) Examination Oct/Nov-2019
Statistics (Paper – V)
CONTINUOUS PROBABILITY DISTRIBUTIONS

Day & Date: Friday, 11-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory and carry full marks.
           2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below.   **14**

1) If $X \sim U(a, b)$ then $Var(X)$ is _____.
   a) $\dfrac{(b-a)^4}{80}$ b) $\dfrac{(b-a)^2}{80}$
   c) $\dfrac{(b-a)^2}{12}$ d) None of these

2) Let (X, Y) be jointly distributed with density function f(x,y) then _____.
   a) $E[E(X \mid Y = y] = E(X)$ b) $E[E(X \mid Y = y] = E(Y)$
   c) $E(X \mid Y = y] = E(X)$ d) $E(X \mid Y = y] = E(Y)$

3) If (X, Y) is a continuous bivariate random variable then $E(XY) - E(X)E(Y)$ is _____.
   a) 0   b) $Corr\ (X, Y)$
   c) $Var(X - Y)$ d) $Cov\ (X, Y)$

4) The distribution function of X is _____.
   $$F(x) = \begin{cases} \sqrt{x}, & 0 < x < 1 \\ 0, & otherwise \end{cases}$$
   Then the pdf of X is _____.
   a) $\dfrac{1}{2\sqrt{x}}$ b) $\sqrt{x}$
   c) x d) None of these

5) If $F(x, y)$ is a joint c.d.f. of continuous bivariate r.v. (X, Y) then $F(-\infty, -\infty) =$ _____.
   a) 0   b) 1
   c) ∞ d) None of these

6) $E[X|Y = y]$ is called the _____.
   a) regression line of Y on X   b) regression line of X on Y
   c) Both (a) and (b)   d) none of these

7) If $F(x)$ is a distribution function of a continuous r.v. and $X_2 > X_1$ then ____.
   a) $F(x_2) < F(x_1)$ b) $F(x_2) \leq F(x_1)$
   c) $F(x_2) \geq F(x_1)$ d) $F(x_2) > F(x_1)$

8) If X and Y are two continuous random variables such that their expectations exist and $P(X > Y) = 1$, then _____.
   a) $E(X) \leq E(Y)$ b) $E(X) = E(Y)$
   c) $E(X) > E(Y)$ d) None of these

9) If $M_X(t)$ is a m.g.f. of X then $M_{(X-5)}(t) =$ _____.
   a) $e^{-5t}M_X(t)$ b) $M_X(t)$
   c) $e^{5t}M_X(t)$ d) $M_X(t) - e^{5t}$

10) Suppose that Y is a symmetric r.v. with $E(Y) = M$ then the third central moment of Y will be _____.
   a) M
   b) M^3
   c) 0
   d) 1

11) If $X \sim U(3,8)$ then c.d.f. of X at 5 i.e. $F(5)$ is _____.
   a) 5/11
   b) 3/5
   c) 2/5
   d) 3/11

12) If $f(x) = c.e^{-2x}$; $x \geq 0$ is the p.d.f. of a r.v. X then mean of X is _____.
   a) 0.5
   b) -2
   c) 1
   d) 2

13) If $X \sim U(4,16)$ then $E(X)$ is _____.
   a) 20
   b) 12
   c) 10
   d) 8

14) If $X \sim \exp(\theta)$ then _____.
   a) mean = variance
   b) mean = standard deviation
   c) mean < variance
   d) none of these

Q.2 A) Answer the following questions. (Any Four) 08
   1) Define cumulative distribution function of a continuous r.v.
   2) Define m.g.f. of (X, Y).
   3) If a r.v. X has p.d.f.
      $$f(x) = 2x \quad ; 1 < x < 3$$
      $$= 0 \quad ; \text{ otherwise}$$
      find distribution function of X.
   4) Define independence of two continuous random variables X and Y.
   5) Define harmonic mean of a continuous r.v.

B) Answer the following questions. (Any Two) 06
   1) Define marginal p.d.fs. of X and Y.
   2) Prove that $E(X + Y) = E(X) + E(Y)$
   3) If $X \sim \cup(a, b)$, obtain the distribution of $Y = \frac{b-X}{b-a}$

Q.3 A) Answer the following questions. (Any Two) 08
   1) For two independent random variables X and Y prove that, $E(XY) = E(X) E(Y)$
   2) Verify whether the function.
      $$f(x) = x \quad ; \quad 0 \leq x \leq 1$$
      $$= 2 - x \quad ; \quad 1 \leq x \leq 2$$
      Is a p.d.f. of a continuous r.v. X.
   3) If X is a r.v. with p.d.f.
      $f(x) = 3x^2/2$; $-1 \leq x \leq 1$ the find p.d.f of $Y = X^2$

B) Answer the following questions. (Any One) 06
   1) Define quartiles, deciles and percentiles of a continuous r.v.
   2) Find the distribution function of a r.v. X having p.d.f.
      $$f(x) = \frac{1}{2}e^{-|x-5|} \quad ; -\infty < x < \infty$$

Q.4 A) Answer the following questions. (Any Two) 10
   1) Obtain distribution function of an exponential variate with parameter θ.
   2) If (X, Y) is a continuous bivariate r.v. then prove that $E[E(Y|X = x] = E(Y)$.

3) A continuous r.v. X has the p.d.f.
$$f(x) = A + B \text{ x} \quad ; \quad 0 \le \text{x} \le 1 , A > 0, B \ge 0$$
$$= 0 \quad\quad ; \quad\quad \text{otherwise}$$
If the mean of X is 0.5, find the values of A and B.

B) Answer the following questions. (Any One) **04**
1) Let (X, Y) be a continuous bivariate r.v. with joint p.d.f.
$$f(x, y) = \text{ C} \quad ; 5 \le \text{x} \le 10 , 4 \le \text{y} \le 9$$
$$= 0 \quad ; \text{ otherwise}$$
Determine the value of C.
2) Find the median of an exponential variate with mean 5.

Q.5 Answer the following questions. (Any Two) **14**
a) Define exponential distribution. Find its mean, variance.
b) Let X and Y be continuous random variables having joint p.d.f.
$$f(x, y) = 12\, xy\, (1 - y) \; ; 0 < x < 1, 0 < y < 1$$
$$= 0 \quad\quad ; \text{ otherwise}$$
Show that X and Y are independent.
c) The joint p.d.f. of two dimensional continuous r.v.(X,Y) is
$$f(x, y) = 2 \quad ; \quad 0 < x < y < 1$$
$$= 0 \quad ; \quad \text{otherwise}$$
Find:
1) Marginal distributions of X and Y.
2) conditional distribution of X given $Y = $ y.

Seat No.	

B.Sc.(Semester – III) (CBCS) Examination Oct/Nov-2019
Statistics (Paper – VI)
DISCRETE PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS

Day & Date: Saturday, 12-10-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) What will be the conditional distribution of X given $X + Y = 20$, where X and Y are i.i.d Poisson r. v's?
   a) $P(20)$ b) $B(20, 1/20)$
   c) $B(10, 0.5)$ d) $B(20, 0.5)$

2) What is the approximate distribution for Binomial, if n is very large and p is very small?
   a) Hypergeometric b) Geometric
   c) Poisson d) Uniform

3) If a r. v. X has p. g. f. $e^{4(s-1)}$ then mean of X is _____.
   a) 2 b) 3
   c) 4 d) 5

4) If X is a geometric r.v. then $P\left[X \geq 5 / X \geq 2\right]$ is equal to _____.
   a) $P[X \geq 5]P[X \geq 2]$ b) $P[X \geq 5]$
   c) $P[X \geq 5]/P[X \geq 3]$ d) $P[X \geq 3]$

5) If X ~ Geo(0.6), then the variance of waiting time distribution is _____.
   a) $\dfrac{10}{6}$ b) $\dfrac{10}{4}$
   c) $\dfrac{10}{9}$ d) $\dfrac{3}{2}$

6) Negative binomial distribution NB (k, p) reduces to geometric distribution when k equal to _____.
   a) 0 b) 1
   c) ∞ d) None of these

7) If $X \sim NB(k, p)$ such that $E(X) = 9$ and $V(X) = 36$, then _____.
   a) $k = 9, p = \dfrac{1}{3}$ b) $k = 3, p = \dfrac{1}{4}$
   c) $k = 36, p = \dfrac{1}{4}$ d) $k = 3, p = \dfrac{1}{3}$

8) Let (X_1, X_2, X_3, X_4) be a random vector follows multinomial distribution with usual notations, then $E(X_3)$ is _____.
   a) $4P_3$ b) $4P_3(1 - P_3)$
   c) $P_1 P_3$ d) nP_3

9) The order of partial regression coefficient $b_{12.345........n}$ is _____.
   a) n b) $n + 2$
   c) $n - 1$ d) $n - 2$

10) In usual notations, if $X_{1.23}$ is a residual of order 2 then _____.
  a) $\sum X_{1.23}$ is minimum
  b) $\sum X_{1.23} > 0$
  c) $\sum X_{1.23} = 0$
  d) None of these

11) A coefficient of any independent variable in a multiple linear regression equation is known as _____.
  a) Simple regression coefficient
  b) Partial regression coefficient
  c) Multiple regression coefficient
  d) None of these

12) If the value of multiple correlation coefficient R is near to 1, it leads to the conclusion that _____.
  a) there is a lack of linear relationship
  b) linear relation is a good fit
  c) there is a curvilinear relation
  d) all of these

13) The range of multiple correlation coefficient is _____.
  a) 0 to 1
  b) -1 to 1
  c) 0 to ∞
  d) $-\infty$ to ∞

14) The correlation coefficient between $X_{1.3}$ and $X_{2.3}$ is _____.
  a) r_{23}
  b) $r_{12.3}$
  c) $r_{13.2}$
  d) r_{12}

Q.2 A) Answer the following questions. (Any Four)   **08**
  1) State the probability mass function of Poisson distribution with parameter λ.
  2) Let X be a geometric random variable with parameter 0.5, then show that $P(X \geq 2) = 0.25$
  3) Find probability generating function of Negative Binomial Distribution.
  4) Find mean of residual.
  5) Define Partial correlation coefficient.

B) Answer the following questions. (Any Two)   **06**
  1) If $r_{23} = 0$, then prove that $R_{1.23}^2 = r_{12}^2 + r_{13}^2$
  2) State and prove recurrence relation for probabilities of negative binomial distribution.
  3) State and prove additive property of Poisson distribution.

Q.3 A) Answer the following questions. (Any two)   **08**
  1) A random variable X has Poisson distribution such that $P(X = 0) = P(X = 1) = k$. Find K and also find $P(X < 2)$
  2) Prove that $X_{1.23}$ is uncorrelated with X_2
  3) Find marginal distribution of X_1 from multinomial distribution.

B) Answer the following questions. (Any One)   **06**
  1) If X and Y are two independent geometric variables with same parameter p. find distribution of X given $X + Y = k$.
  2) With usual notation, prove that
  $$1 - R_{1.23}^2 = (1 - r_{12}^2)(1 - r_{13.2}^2)$$

Q.4 A) Answer the following questions. (Any Two)   **10**
  1) If X is a Poisson variate with parameter λ, establish the following relation
  $$P(X = x + 1) = \frac{\lambda}{x + 1} P(X = x)$$
  2) Show that the necessary and sufficient condition that the three planes in case of trivariate distribution coincide is
  $$r_{12}^2 + r_{13}^2 + r_{23}^2 - 2\, r_{12}\, r_{13}\, r_{23} = 1.$$

3) If $X_1 = Y_1 + Y_2, X_2 = Y_2 + Y_3, X_3 = Y_3 + Y_1$ where $Y_1 Y_2 Y_3$ are uncorrelated variables each of which has zero mean and unit variance. Find multiple correlation coefficient between X_1 and (X_2, X_3)

B) Answer the following questions. (Any One)   **04**

1) If $X_{1.23}$ is the error of the estimate of X_1 on X_2 and X_3 and $e_{1.23}$ is the estimate of X_1 for given X_2 and X_3, then show that $Cov(X_1; e_{1.23}) = V(X_1 - X_{1.23})$

2) If r_{12}, r_{13}, r_{23} are the simple correlation coefficient between $(X_1; X_2)(X_1; X_3)$ and $(X_2; X_3)$ respectively show that
$$r_{12}^2 + r_{13}^2 \geq 2r_{12}r_{13}r_{23}$$

Q.5 Answer the following questions. (Any two)   **14**

a) If X and Y are two independent Poisson variate, then show that conditional distribution of X given $X + Y$ is binomial.

b) Derive the equation of regression plane of X_1 on X_2 and X_3 by method of least square.

c) Suppose $X_1, X_2 \ldots \ldots X_k$ are independently and identically distributed random variables has Geometric Distribution with parameter p then show that $\sum_{i=1}^{k} X_i$ follows Negative Binomial Distribution.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - V)
DIFFERENTIAL CALCULUS

Day & Date: Monday, 14-10-2019　　　　　　　　　　　　Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　2) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　The polar sub tangent equal to _____.
　　a)　$\dfrac{d\theta}{dr}$ 　　　　　　　　　　　　b)　$r\dfrac{d\theta}{dr}$
　　c)　$r^2\dfrac{d\theta}{dr}$ 　　　　　　　　　　d)　$\dfrac{1}{r}\dfrac{d\theta}{dr}$

2)　Angel of intersection of curves $r = a(1 + \cos\theta)$ and $r = b(1 - \cos\theta)$ is _____.
　　a)　π 　　　　　　　　　　　　　　b)　$\pi/2$
　　c)　0 　　　　　　　　　　　　　　d)　$-\pi/2$

3)　The angle of intersection of two curves is defined as the angle between their _____.
　　a)　normals 　　　　　　　　　b)　radius vectors
　　c)　tangents 　　　　　　　　　d)　none of these

4)　Pedal equation of a curve $r = e^{a\cot\alpha}$ is _____.
　　a)　$p = r\sin\alpha$　p 　　　　　　b)　$p = r\cos\alpha$
　　c)　$p = r$ 　　　　　　　　　　　d)　None of these

5)　The intrinsic formula for radius of curvature is _____.
　　a)　$\rho = \dfrac{dy}{dx}$ 　　　　　　　　　b)　$\rho = \dfrac{ds}{d\psi}$
　　c)　$\rho = \dfrac{1}{s}\dfrac{ds}{d\psi}$ 　　　　　　d)　none of these

6)　Radius of curvature for $y = e^x$ at the point (0,1) is _____.
　　a)　$2\sqrt{2}$ 　　　　　　　　　　b)　0
　　c)　$3\sqrt{2}$ 　　　　　　　　　　d)　none of these

7)　The radius of curvature for $xy = c^2$ at any point is _____.
　　a)　$\dfrac{\left(x^2+y^2\right)^{2/3}}{2c^2}$ 　　　　　b)　$\dfrac{\left(x^2+y^2\right)^{3/2}}{2c}$
　　c)　$\dfrac{\left(x^2+y^2\right)^{3/2}}{2c^2}$ 　　　　　d)　none of these

8)　The radius of curvature at any point on the hyperbola $pr = a^2$ is _____.
　　a)　$\dfrac{r^3}{a^2}$ 　　　　　　　　　　b)　$\dfrac{r^2}{a^2}$
　　c)　$\dfrac{r}{a^2}$ 　　　　　　　　　　d)　none of these

9)　If $x = r\cos\theta$, $y = r\sin\theta$ the $\dfrac{\partial(r,\theta)}{\partial(x,y)} =$ _____.
　　a)　r 　　　　　　　　　　　　　b)　$\dfrac{1}{r}$
　　c)　a 　　　　　　　　　　　　　d)　None of these

10) If $u = x^2 - y^2, v = xy$, then $\frac{\partial(u,v)}{\partial(x,y)} =$ _____.
   a) $x^2 + y^2$ b) $2(x^2 + y^2)$
   c) $x + y$ d) $2(x + y)$

11) If $u = x^2, v = y^2$ then $\frac{\partial(u,v)}{\partial(x,y)} =$ _____.
   a) xy b) $4xy$
   c) $\frac{1}{xy}$ d) $\frac{1}{4xy}$

12) A function $f(x, y)$ is minimum at (a, b) if _____.
   a) $AC - B^2 > 0$ and $A > 0$ b) $AC - B^2 > 0$ and $A < 0$
   c) $AC - B^2 < 0$ and $A > 0$ d) none of these

13) $f(x) = \sin x (1 + \cos x)$ is maximum at _____.
   a) $x = \pi$ b) $x = \pi/2$
   c) $x = \pi/3$ d) none of these

14) The function $f(x) = x^3 - 6x^2 + 24x + 4$ has _____.
   a) minimum at $x = 6$ and maximum at $x = 4$
   b) minimum at $x = 2$
   c) maximum at $x = 2$
   d) Neither maximum nor minimum at any point.

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Find the equation of a tangent at any point of $y^2 = 4ax$.
   2) Find the angle between $y = \sin x$ and $y = \cos x$.
   3) Find the radius of curvature at any point for $y = c.\log(\sec \psi)$.
   4) Find $\frac{ds}{dt}$ for $x = a(t - \sin t), \; y = a(1 - \cos t)$
   5) State the necessary condition for the function of one variable to a maximum value.

B) Answer the following questions. (Any Two)   **06**
   1) If $u = \frac{yz}{x}, v = \frac{xz}{y}, \omega = \frac{xy}{z}$ then find $\frac{\partial(u,v,\omega)}{\partial(x,y,z)}$
   2) Find the maximum and minimum value of the polynomial $f(x) = 2x^3 - 15x^2 + 36x + 10$.
   3) Find the radius of curvature for $r = 3(1 + \cos\theta)$ at any point on it.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Obtain the expression for radius of curvature for the curve given in parametric from $x = \phi(t), \; y = \psi(t)$.
   2) Find the equation of a tangent and Normal at any point on it to the circle $x^2 + y^2 = a^2$.
   3) Find the extreme values of xy^2z^3 subject to the condition $x + y + z = 6$

B) Answer the following questions. (Any One)   **06**
   1) If ρ_1 and ρ_2 are radii of curvature at the extremities of a focal chord of a parabola $y^2 = 4ax$ then prove that $\rho_1^{-2/3} + \rho_2^{-2/3} = (2a)^{-2/3}$
   2) If J be a Jacobian of u, v, w with respect to x, y, z and J' be a Jacobian of x, y, z with respect to u, v, w then prove that $J.J' = 1$

Q.4 A) Answer the following questions. (Any Two) 10

1) Find the radius of curvature for the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at any point on it.
2) Obtain the expression for length of tangent, normal, sub tangent and subnormal, for the cartesian curve $y = f(x)$
3) If $u^3 + v + w = x + y^2 + z^2$, $u + v^2 + w = x^2 + y + z^2$, $u + v + w^3 = x^2 + y^2 + z$ then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$

B) Answer the following questions. (Any One) 04

1) Determine the points where the function $x^3 + y^3 - 3axy$ has maximum and minimum value.
2) Prove that the radius of a curvature of a circle is constant and it is equal to radius of circle.

Q.5 Answer the following questions. (Any Two) 14

a) Define the angle of intersection of two curves. If θ is an angle between two curves then obtain the formula to find it and hence find angle of intersection of $y = 4 - x^2$ and $y = x^2$
b) Explain the Lagrange's method of undetermined multipliers to determine the extreme values of $u = f(x, y, z)$ subject to $\phi_1(x, y, z) = 0$ and $\phi_2(x, y, z) = 0$
c) Find the radius of curvature at any point (r, θ) on the cuve $r^m = a^m . \cos m\theta$ and show that ρ at any point to $r^2 = a^2 \cos 2\theta$ is $a^2/3r$

Seat No.	

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - VI)
REAL ANALYSIS

Day & Date: Tuesday, 15-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) If p is prime then $\sqrt{p}$ is _____ number.
   a) Rational   b) Irrational
   c) Complex   d) None

2) If $(a, b) \in R$ and $(b, a) \in R \Leftrightarrow a = b, \forall a, b \in R$ then R is _____ relation.
   a) Reflexive   b) Symmetric
   c) Anti symmetric   d) None

3) If $x_1 \neq x_2 \Rightarrow f(x_1) \neq f(x_2), \forall x_1, x_2 \in A$ then $f: A \to B$ is _____.
   a) One - one   b) Onto
   c) One - many   d) None

4) Which is complete ordered field?
   a) N   b) I
   c) Q   d) R

5) $\lim\limits_{n \to \infty} \sqrt[n]{n} =$ _____.
   a) 1   b) 0
   c) ∞ d) None

6) The sequence $\{(-1)^{n-1}\}$ is _____.
   a) Only bounded below   b) Bounded
   c) Bounded above   d) None

7) $\lim\limits_{n \to \infty} \left[\dfrac{1 + n}{n}\right]^n$ lies between _____.
   a) 0 and 1   b) 1 and 2
   c) 2 and 3   d) None

8) The sequence $\{x^n\}$ is convergent if and only if _____.
   a) $-1 < x < 1$ b) $x < -1$
   c) $x > 1$ d) None

9) The glb of the sequence $\{1 + 1/n\}$ is _____.
   a) 0   b) 1
   c) 2   d) None

10) The series $\sum \dfrac{1}{n^p}$ is convergent if _____.
   a) $p < 1$ b) $p = 1$
   c) $p > 1$ d) None

11) The series $\sum \sin(1/n)$ is _____.
   a) Diverges   b) Absolutely cgt
   c) Conditionally cgt   d) None

12) The series $1 + r + r^2 + r^3 + \dots$ is oscillatory if _____.
   a) $r < 1$ b) $r > 0$
   c) $r = 1$ d) $r = -1$

13) The series $1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{4}} + \dots$ is _____.
   a) Divergent   b) Conditionally cgt
   c) Absolutely cgt   d) None

14) After the failure of Raabe's test _____ test is used.
   a) Ratio test   b) Root test
   c) Gauss's test   d) None

Q.2 A) Answer the following questions. (Any Four)   08
   1) Define Cartesian Product of two sets with example.
   2) Define Equivalence Relation.
   3) If $A_1 \leq A_2$ then prove that $f(A_1) \leq f(A_2)$.
   4) Explain bounds of a sequence.
   5) Give the statement of logarithmic test.

B) Answer the following questions. (Any Two)   06
   1) Explain order structure.
   2) Show that $\{J_n\}$ where $Jn = \frac{(-1)^n}{n}$ is convergent sequence.
   3) Show that $\sum_{n=1}^{\infty} n$ is not convergent.

Q.3 A) Answer the following questions. (Any Two)   08
   1) Prove that $\forall\, x, y \in R$
      $|x + y| = |x| + |y|$ if and only if $xy > 0$
   2) Discuss the convergence of a sequence.
      $$0.7, 0.77, 0.777 \dots \dots \dots 0.777 \dots\dots$$
   3) Discuss the convergence of series.
      $$1 + \frac{1}{2!} + \frac{1}{3!} + \dots\dots\dots$$

B) Answer the following questions. (Any One)   06
   1) Show that $|x + y|^2 + |x - y|^2 = 2|x|^2 + 2|y|^2$
   2) State and prove Cauchy's root test.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Prove that, the inverse image of the Union of two sets is equal to the union of their inverse images.
   2) Prove that, Every Convergent sequence has unique limit.
   3) Prove that, the series $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$ converges.

B) Answer the following questions. (Any One)   04
   1) A necessary and sufficient condition for a monotonic sequence to be converges is that it is bounded.
   2) Show that the series
      $$\frac{1}{(\log 2)^P} + \frac{1}{(\log 3)^P} + \frac{1}{(\log 4)^P} + \dots + \frac{1}{(\log n)^P} \text{ diverges for } P > 0$$

Q.5 **Answer the following questions. (Any Two)** **14**
  a) Show that the set of rational number is not order complete.
  b) State and prove nested Interval theorem.
  c) State Raabe's test.
  Solve $\frac{3}{7} + \frac{3.6}{7.10} + \frac{3.6.9}{7.10.13} + \cdots$

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Electronics (Paper - V)
ELECTRONICS CIRCUITS

Day & Date: Wednesday, 16-10-2019　　　　　　　　　Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　2) Figures to the right indicate full marks.
　　　　　　　3) Draw neat labeled diagram wherever necessary.
　　　　　　　4) Use of Log Table and Calculator is allowed.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1) If the peak value at the output of Centre-tapped full-wave rectifier is 10V then the ideal dc output voltage would be _____.
　　a) 3.18 V　　　　　　　　　b) 6.36 V
　　c) 9.54 V　　　　　　　　　d) 12.72 V

2) A 12 V Zener diode of 0.5 W power capacity can handle maximum current of _____.
　　a) 41.6 V　　　　　　　　　b) 24.5V
　　c) 60.8 V　　　　　　　　　d) 49.6 V

3) The ripple factor of half-wave rectifier with capacitor filter is _____ that of full-wave rectifier with capacitor filter.
　　a) half　　　　　　　　　　b) double
　　c) triple　　　　　　　　　d) same as

4) As far as stability factor is concerned, which one of the biasing methods is poorest?
　　a) Emitter-bias　　　　　　　b) Voltage-Divider-Bias
　　c) Fixed-bias　　　　　　　　d) Collector to base bias

5) In transistor saturation state, collector current is _____ and collector to emitter voltage is _____.
　　a) minimum, maximum　　　　b) minimum, minimum
　　c) maximum, maximum　　　　d) maximum, minimum

6) The input impedance of common-emitter amplifier is _____.
　　a) smallest of all configurations
　　b) largest of all configurations
　　c) in between that of CB and CC configurations
　　d) none of these

7) The voltage gain of CS FET amplifier is approximately _____.
　　a) $-g_m R_D$　　　　　　　　b) g_m / R_D
　　c) R_D / g_m　　　　　　　　d) $g_m + R_D$

8) The overall voltage gain of two-stage RC-coupled amplifier is 100. If the gain of first stage is 20, the gain of second stage will be _____.
　　a) 0.2　　　　　　　　　　　b) 80
　　c) 120　　　　　　　　　　　d) 5

9) If the current gain of Darlington pair of transistors is 100 & 120 respectively, the overall gain of the pair would be _____.
   a) 220
   b) 12
   c) 12000
   d) 20

10) The theoretical power efficiency of Class-B push-pull amplifier is approximately _____.
    a) 25%
    b) 48%
    c) 78%
    d) 90%

11) The disadvantage of current-series negative feedback is _____.
    a) Its input impedance increases
    b) Its output impedance increases
    c) The input and output impedances do not change
    d) Its voltage gain decreases

12) The voltage gain of basic amplifier is 25. If 3% feedback is introduced, its loop-gain will be _____.
    a) 7.5
    b) 75
    c) 0.75
    d) 0.075

13) In oscillators, if the loop-gain G is much less than unity, it leads to _____.
    a) sinusoidal oscillations
    b) non-sinusoidal oscillations
    c) damping oscillations
    d) no oscillations

14) As far as frequency stability of oscillators is concerned, _____ oscillator is considered best.
    a) RC
    b) LC
    c) crystal
    d) clap

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Draw the circuit diagram of Bridge-rectifier.
   2) Explain the role of Q-point in transistor biasing.
   3) Draw the Darlington-pair amplifier diagram.
   4) Enlist the four advantages of negative feedback in amplifiers.
   5) Draw the circuit diagram of crystal oscillator.

B) Answer the following questions. (Any Two)   **06**
   1) Write in short about distortion in power amplifiers.
   2) Explain the effect of negative feedback on noise in amplifiers.
   3) Compare half-wave and full-wave rectifiers.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Explain Zener Regulator.
   2) Discuss in brief Complementary-Symmetry power amplifier.
   3) Explain in brief the working of Phase-shift oscillator.

B) Answer the following questions. (Any One)   **06**
   1) Explain in detail the Transformer-coupled amplifier.
   2) Discuss Emitter-bias method and obtain the equation for stability factor.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain Class A amplifier.
   2) Discuss the effect of negative feedback on voltage-gain and bandwidth of an amplifier.
   3) Derive the equation for average DC voltage and PIV of a Centre-tapped full-wave rectifier.

B) **Answer the following questions. (Any One)** **04**
1) Calculate the operating frequency of a Hartley oscillator for
$L1 = 20\ \mu H,\ L2 = 80\ \mu H$ and $C = 1nF.$
2) Analyze FET as CS amplifier and obtain the equation for voltage-gain.

Q.5 **Answer the following questions. (Any Two)** **14**
a) Discuss the DC and AC analysis of CE-amplifier. Obtain the equations for voltage-gain and input impedance.
b) Analyze the Current-series feedback circuit. Obtain the equations for voltage-gain and output impedance.
c) Explain the working of Wien-Bridge oscillator and obtain the equation for frequency of oscillations and condition for sustained oscillations.

Seat No.

B.Sc.(Semester – III)(CBCS) Examination Oct/Nov-2019
Geography (Paper - V)
BIOGEOGRAPHY - I

Day & Date: Wednesday, 16-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
         2) Figures to the right indicate full marks.
         3) Neat and labeled diagrams must be drawn wherever necessary.
         4) Use of stencils is allowed.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) _____ is a branch of biogeography.
   a) Plantgeography   b) Oceanography
   c) Climatology   d) Soil geography

2) _____ is known as founder of Plant Geography.
   a) Blache   b) Semple
   c) Humbolt   d) Ritter

3) The study of living things and their geographical distribution is known as _____
   a) Biogeography   b) Oceanography
   c) Climatology   d) Soil geography

4) Altitude is the _____ factor influencing the Biosphere.
   a) Physiography   b) Climatic
   c) Anthropogenic   d) Pollution

5) _____ is the Climatic factor influencing the Biosphere.
   a) Physiography   b) Humidity
   c) Soil   d) Pollution

6) Growth of population is _____ type of factor influencing the biosphere.
   a) Physiography   b) Climatic
   c) Soil   d) Anthropogenic

7) _____ is known as the primary producer.
   a) Grass   b) Man
   c) Lion   d) Fox

8) The term Ecosystem was firstly used by _____.
   a) Tensely   b) Wagner
   c) Anderson   d) Huggett

9) The concept ecological pyramid was given by _____ in 1927.
   a) A.G. Tensely   b) Charls Elten
   c) Anderson   d) Pitter Huggett

10) Plants get _____ during the process of photosynthesis.
   a) O_2 b) CO_2
   c) H_2O d) N_2

11) The volume of nitrogen present in the atmosphere is about _____ %.
   a) 20.93   b) 0.03
   c) 78.08   d) 3.9

12) Habitat loss is the major threats of _____.
    a) Ecology   b) Energy flow
    c) Biodiversity   d) Ecosystem

13) _____ is a hotspot Biodiversity of India.
    a) Islands   b) Arabian sea
    c) Gangatic Plane   d) Eastern Himalaya

14) _____ may be transformed from one type to another.
    a) Food web   b) Ecology
    c) Ecosystem   d) Energy

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What is Biosphere?
2) State the Anthropogenic factor influencing Biosphere.
3) What is food chain?
4) Define the term of Ecosystem.
5) Define the concept of biodiversity.

B) Write Notes on (Any Two)   **06**
1) Carbon cycle
2) Hot spot biodiversity
3) Energy flow

Q.3 A) Answer the following questions. (Any two)   **08**
1) Importance of biogeography.
2) Topographical factors influencing on Biosphere.
3) Explain the term of photosynthesis.

B) Answer the following questions. (Any One)   **06**
1) Draw a diagram of Nitrogen cycle.
2) What is ecological succession?

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain the Nature of Biogeography.
2) Explain the cycle of Water.
3) Discuss the characteristics of Aquatic ecosystem.

B) Answer the following questions. (Any One)   **04**
1) Scope of biogeography.
2) Describe the law of energy.

Q.5 Answer the following questions. (Any Two)   **14**
1) Describe the biodiversity in India.
2) Describe the major ecosystem of the world.
3) Describe the ecological pyramid.

Seat No.	

B.Sc.(Semester - III) (CBCS) Examination Oct/Nov-2019
Electronics (Paper - VI)
PULSE AND SWITCHING CIRCUITS

Day & Date: Thursday, 17-10-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw the figures wherever necessary.
4) Use of log table and calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) If the input to a differentiator circuit is a square wave, then the output will be _____ wave.
   a) Square
   b) Rectangular
   c) Triangular
   d) Spikes

2) _____ is low pass circuit.
   a) Integrator
   b) Rectifier
   c) Differentiator
   d) Clamper

3) Pin no.4 of IC 555 timer is _____.
   a) Trigger
   b) Reset
   c) Output
   d) Control

4) _____ has one junction.
   a) BJT
   b) SCR
   c) UJT
   d) FET

5) In monostable multivibrator by using BJT $R = 1K\Omega, C = 10\ \mu f$ will generates width of _____.
   a) 6.9 seconds
   b) 69 milliseconds
   c) 6.9 milliseconds
   d) 69 seconds

6) Bistablemultivibrator has _____ stable states.
   a) one
   b) two
   c) no
   d) quasi

7) In Astablemultivibrator using timer IC 555, on time is _____.
   a) $(Ra + Rb)C$
   b) RbC
   c) $(Ra + 2Rb)C$
   d) RaC

8) Time period of astable multivibrator by using NAND gate is _____.
   a) $T = 1.1\ RC$
   b) $T = 2.2\ RC$
   c) $T = 0.69RC$
   d) $T = 0.69(Ra + Rb)C$

9) In Schmitt's trigger circuit UTP = 1.1 V and LTP = 0.6 V, then the hysteresis voltage is _____.
   a) 1.7V
   b) 0.5V
   c) 0.8V
   d) 1.1V

10) _____ IC is single shot multivibrator.
    a) 74131
    b) 74121
    c) 555
    d) 7400

11) A transistor used as switch is operated in _____ region.
   a) Active
   b) Cut off
   c) Saturation
   d) Cut off and Saturation

12) The clamper circuit is used to _____.
   a) introduce dc level into ac signal
   b) suppress positive cycle
   c) suppress negative cycle
   d) integrate the wave forms

13) The multivibrator that do not require external triggering pulse for its operation is _____.
   a) Astable multivibrator
   b) Monostable multivibrator
   c) Bistable multivibrator
   d) All of the above

14) Transmission error is defined as difference between _____.
   a) input and output divided by input
   b) output and input divided by input
   c) input and output divided by output
   d) output and input divided by output

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What is multivibrator? What are its types?
   2) What is need of time base circuit?
   3) What are types of wave shaping circuits?
   4) Draw the pin diagram of IC 555 and name the terminals.
   5) Draw circuit diagram of astable multivibrator by using NAND gates.

B) Write short notes (Any Two)   **06**
   1) Concept of RC time base circuit
   2) Action of transistor as a switch
   3) IC 555 as a Voltage controlled oscillator

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Explain monostable multivibrator by using NAND gate.
   2) Explain response of RC integrator with sine wave input.
   3) Explain diode as a positive clipping circuit.

B) Answer the following questions. (Any One)   **06**
   1) Explain triggering methods of bistable multivibrator.
   2) Explain general features of time base circuit.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain Miller integrator circuit.
   2) Explain construction and working of Schmitt's trigger circuit.
   3) Design monostable multivibrator using IC 555 timer to produce pulse width 100 millisecond with $R = 1 \text{ M}\Omega$

B) Answer the following questions. (Any One)   **04**
   1) Explain response of RC differentiator with square wave input.
   2) Explain functional block diagram of IC 555.

Q.5 Answer the following questions. (Any Two)   **14**
   1) Explain astable multivibrator by using BJT. Derive formulae for its output frequency.
   2) Explain UJT as a relaxation oscillator and derive formulae for its output frequency.
   3) Explain positive and negative clamping circuits along with its wave forms.

Seat No.		Set	**P**

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Geography (Paper - VI)
SOIL SCIENCE

Day & Date: Thursday, 17-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat and labeled diagrams must be drawn wherever necessary.
4) Use of stencils is allowed.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**

1) Soil Geography is the sub branch of _____ Geography.
   a) Human   b) Historical
   c) Settlement   d) Physical

2) The word pedology derived from _____.
   a) Roman   b) Greek
   c) Arabian   d) Marathi

3) Water holding capacity is depend on _____.
   a) Depth of soil   b) Depth of sand
   c) Depth of boulder   d) depth of coble

4) _____ is an important factor of soil formation.
   a) Erosion   b) Fading
   c) Topography   d) Color

5) Biotic weathering process of soil formation is related to _____.
   a) Climate   b) Plants and Animals
   c) Chemical   d) Physical

6) Soil texture is related to the _____.
   a) Color of partials   b) Size of particles
   c) Ton of particles   d) moisture of particles

7) _____ term is used for Black soil.
   a) Regure   b) Coluval
   c) Alluvial soil   d) Mountains soil

8) _____ Soil have the characteristics of waterlogged and vary rich vegetation.
   a) Terai   b) Khadar
   c) Bangar   d) Bhabar

9) Old alluvial soil is known as _____.
   a) Terai   b) Khadar
   c) Bangar   d) Bhabar

10) Over grazing is responsible for _____.
    a) Soil conservation   b) Soil formation
    c) Soil degradation   d) Forestry

11) _____ equation is used to describe Soil Erosion process.
    a) USLE   b) USLV
    c) GSLV   d) PSLV

12) _____ is a method of Soil Conservation.
    a) Nala Bund   b) Grazing
    c) Hunting   d) Timbering

13) _____ is form due to laterization process.
    a) Regur Soil   b) Mountain Soil
    c) Alluvial Soil   d) Laterite Soil

14) _____ helps soil conservation.
    a) Lumbering   b) Plantation
    c) Grazing   d) Hunting

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What is soil?
2) What is permanent wilting point?
3) What is parent material?
4) State the types of alluvial soil.
5) Define the term of Field capacity.

B) Write short notes (Any Two)   **06**
1) USLE
2) Check dams
3) Water holding Capacity

Q.3 A) Answer the following questions. (Any two)   **08**
1) State the soil conservation methods and explain one of them.
2) Explain the role of Topography in soil formation.
3) Describe the characteristics of Regure soil.

B) Answer the following questions. (Any One)   **06**
1) Explain the soil texture.
2) Explain the importance of Contour bunds.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain the different types of Mountain soil.
2) Explain the term of soil as a resource.
3) Explain the characteristics of Land leveling.

B) Answer the following questions. (Any One)   **04**
1) Explain the causes of soil degradation.
2) Explain the characteristics of Laterite soil.

Q.5 Answer the following questions. (Any Two)   **14**
1) Explain the consequences of soil degradation.
2) Write in brief the characteristics and distribution of alluvial soil.
3) Explain the role of Biotic factors in soil formation.

Seat No.

Set P

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper - V)
OBJECT ORIENTED PROGRAMMING USING C++

Day & Date: Friday, 18-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
               2) Figures to the right indicate full marks.

Q.1 **Fill in the blanks by choosing correct alternatives given below.** **14**

1) _____ function reduces function call overhead.
   a) inline   b) Friend
   c) both a) and b)   d) none of these

2) Have you use prototypes in destructor?
   a) YES   b) NO

3) In _____ type of inheritance, multiple classes are derived from single class.
   a) single   b) multiple
   c) hierarchical   d) multi-path

4) Which one of the following is not a valid reserved keyword in C++
   a) Explicit   b) Public
   c) Implicit   d) Private

5) class derived: public base1, public base2 { } is an example of _____.
   a) Polymorphic inheritance   b) Multilevel inheritance
   c) Hierarchical inheritance   d) Multiple inheritance

6) Static variable should be defined_____.
   a) outside the class   b) inside the class
   c) inside the function   d) none of these

7) Abstract class contains at least one _____ function.
   a) pure virtual   b) friend
   c) inline   d) none of these

8) Operator overloading is compile time polymorphism.
   a) True   b) False

9) _____ It is used to read information from files.
   a) ifstream   b) fstream
   c) ofstream   d) None of these

10) _____ accessed through object pointers.
   a) This pointer   b) virtual functions
   c) static Member function   d) constructor

11) _____ operator in C++ can't be overloaded.
   a) .   b) ::
   c) ? :   d) all of these

12) _____to refer current class instance variable.
   a) This   b) Pointer variable
   c) Object   d) Static

13) Using _____ a compile time polymorphism is achieved.
   a) Function overloading   b) Virtual function
   c) Both a) and b)   d) All of these

14) _____ function can access private data of a class.
   a) member   b) friend
   c) static member   d) all of these

Q.2 A) Attempt any four of the following questions.   **08**
   1) Define Virtual function.
   2) Define scope resolution operator (::).
   3) List out characteristics of 'Destructor'.
   4) Define array of object.
   5) Define Dynamic Initialization of Variable.

B) Write Notes (Any Two)   **06**
   1) Explain Function overloading with suitable e.g.
   2) Define inline function with characteristics.
   3) Explain different files modes.

Q.3 A) Attempt any two of the following questions.   **08**
   1) Define static data member and member function, give suitable e.g.
   2) Write a C++ program implementation of object as a argument.
   3) Define virtual function, Give suitable e.g.

B) Attempt any one of the following questions.   **06**
   1) What is Inheritance? Write a C++ program implementation of Multiple inheritance.
   2) Write a C++ program to count vowels present in a file.

Q.4 A) Attempt any two of the following questions.   **10**
   1) Define Constructor? Write a C++ program implementation of Constructor overloading.
   2) Write a C++ program implementation of constructor in derived classes.
   3) What is this pointer? Write a C++ program Implementation of this pointer.

B) Attempt any one of the following questions.   **04**
   1) Explain rules for operator overloading? Write a C++ program overload unary operator.
   2) Describe the types of Inheritance.

Q.5 Attempt any two of the following questions.   **14**
   a) Explain characteristics (features) of object oriented programming.
   b) Write a C++ program implementation of object as a returning value.
   c) Write a C++ program implementation of hybrid inheritance.

Seat No.	

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Computer Science (Paper – VI)
SOFTWARE ENGINEERING

Day & Date: Saturday, 19-10-2019　　　　　　　　　　Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
　　　　　　　　 2) Figures to the right indicate full marks.

Q.1　Fill in the blanks by choosing correct alternatives given below.　　14

1)　_____ is a graphic tool which defines input, output and processes of the system.
　　a)　CLD　　　　　　　　　　　b)　Flow Chart
　　c)　DFD　　　　　　　　　　　d)　All of these

2)　The inter connections & interactions between subsystem are called as ___.
　　a)　Input　　　　　　　　　　b)　Output
　　c)　Process　　　　　　　　　d)　Interface

3)　The smallest unit of data that provides for no further decomposition is ___.
　　a)　Data element　　　　　　　b)　Data dictionary
　　c)　Data base　　　　　　　　d)　Data set

4)　_____ is a tabular method for describing the logic of the decisions to be taken.
　　a)　Decision Table　　　　　　b)　Decision Tree
　　c)　Decision Data　　　　　　d)　Decision Method

5)　_____ model is not suitable for accommodating any change?
　　a)　Prototyping　　　　　　　b)　Build & fix
　　c)　RAD　　　　　　　　　　d)　Waterfall

6)　A _____ System is depends on idea.
　　a)　Conceptual　　　　　　　b)　Deterministic
　　c)　Physical　　　　　　　　d)　All of the above

7)　_____ is a feasibility study.
　　a)　System　　　　　　　　　b)　Technical
　　c)　Development　　　　　　　d)　None of these

8)　A decision tree contains _____.
　　a)　condition　　　　　　　　b)　Action
　　c)　Both A & B　　　　　　　d)　None of these

9)　Which of the following feasibility is related to human organizational and political aspects?
　　a)　Economical　　　　　　　b)　Technical
　　c)　Operational　　　　　　　d)　None of these

10)　HIPO stands for ____.
　　a)　Hierarchy input process out　　b)　Hierarchy input plus output
　　c)　Hierarchy input process output　d)　None of these

11) Salary of the programmer is _____ Feasibility.
   a) Technical   b) Economical
   c) Operational   d) None of these

12) ERD stands for _____.
   a) Entity Relationship Diagram   b) Entire Relationship Diagram
   c) Extended Relationship Diagram   d) None of these

13) SDLC stands for _____.
   a) Structure development Life Cycle
   b) Structure Design Life Cycle
   c) System Design Life Cycle
   d) System Development Life Cycle

14) RAD Model has _____ phases.
   a) 2   b) 3
   c) 5   d) 6

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Differentiate between open and closed system.
   2) Define the term entity and attribute.
   3) What is prototyping?
   4) What is the purpose of DFD?
   5) What is Feedback?

B) Write notes. (Any Two)   **06**
   1) Benefits of CASE tools.
   2) Advantages of spiral model.
   3) Need of Software testing.

Q.3 A) Answer the following questions. (Any two)   **08**
   1) Explain Waterfall model with suitable diagram.
   2) Explain feasibility study with types.
   3) What is White box testing? Explain in detail.

B) Answer the following questions. (Any One)   **06**
   1) Explain types of decision table.
   2) What is System? Explain types of System.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) What are different characteristics of a software?
   2) Write a short note on HIPO chart.
   3) Explain taxonomy of CASE tools.

B) Answer the following questions. (Any One)   **04**
   1) Write short note on Data Dictionary.
   2) What is ERD? Draw ERD for college admission system.

Q.5 Answer the following questions. (Any two)   **14**
   1) Explain any two fact finding techniques.
   2) What is Normalization? Explain 1NF, 2NF and 3NF.
   3) Draw the DFD for Inventory system.

Seat No.		**Set**	**P**

B.Sc. (Semester - I) (New) (CBCS) Examination Oct/Nov-2019
Mathematics (Paper - II)
CALCULUS

Day & Date: Monday, 18-11-2019   Max. Marks: 40
Time: 11:30 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
                        2) Figures to the right indicate full marks.

Q.1   Select the correct alternatives from the following rewrite the sentence.   08

1) If $\phi = x + y + z$ then $\nabla\phi =$ ____.
   a) $\hat{i} + \hat{j} + \hat{k}$ b) $i - j + k$
   c) $i + j - k$ d) $-i - j - k$

2) If $\bar{F} = x^2 i + y^2 j + z^2 k$ then $\nabla.\nabla\bar{F} =$ _____.
   a) 0   b) 4
   c) 5   d) 6

3) $\lim_{x \to \pi} \frac{1+\cos x}{(\pi - x)^2}$ is _____.
   a) $\frac{1}{4}$ b) 0
   c) 1   d) $\frac{1}{2}$

4) If $y = \log(ax + b)$ then $y_n =$ _____.
   a) $\frac{(-1)^n \, n! \, a^n}{(ax + b)^n}$ b) $\frac{(-1)^{n-1}(n-1)! \, a^n}{(ax + b)^{n+1}}$
   c) $\frac{(-1)^{n-1}(n-1)! \, a^n}{(ax + b)^n}$ d) $\frac{(-1)^n \, n! \, a^{n+1}}{(ax + b)^n}$

5) If $\bar{F} = zi + xj + yk$ then curl $\bar{F}=$ _____units
   a) $\bar{0}$ b) $xi + yi + 2k$
   c) $zi + xj + yk$ d) $i + j + k$

6) Expansion of $\frac{1}{1+x}$ in powers of x is _____.
   a) $1 + x + x^2 + x^3 +$ __   b) $1 + 2x + 3x^2 +$ __
   c) $1 - x + x^2 - x^3 +$ __   d) $1 - 2x + 3x^3 +$ __

7) The value of $\lim_{x \to 0} \frac{1 - \cos x}{3x^2}$ is _____.
   a) 3   b) $\frac{1}{3}$
   c) $\frac{1}{6}$ d) $\frac{1}{9}$

8) If ϕ is a scalar field then grad ϕ is _____.
   a) 0   b) Scalar field
   c) Vector field   d) 1

Q.2   Answer the following questions. (Any Four)   **08**
1)   Define differential operator del(∇)
2)   If $z = xe^{xy}$. then find $\frac{\partial^2 z}{\partial y \partial x}$,
3)   Evaluate $\int_0^{\frac{\pi}{6}} \sin^8 3x \, dx$
4)   Find nth derivative of $y = \frac{1}{(x+2)(2x+3)}$
5)   Evaluate $\lim_{x \to 1} \frac{1 + \log x - x}{1 - 2x + x^2}$
6)   Expand $\tan x$ in powers of x by Maclaurine's series.

Q.3   Answer the following questions. (Any Two)   **08**
1)   Evaluate $\int_0^1 x^2 (1 - x^2)^{9/2} dx$
2)   If $y^{\frac{1}{m}} + y^{-\frac{1}{m}} = 2x$ then prove that $(x^2 - 1)y_{n+2} + (2n + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$
3)   If $u = (1 - 2xy + y^2)^{-\frac{1}{2}}$, prove that $x\frac{\partial u}{\partial x} - y\frac{\partial u}{\partial y} = y^2 . u^3$

Q.4   Answer the following questions. (Any Two)   **08**
1)   If $u = e^{ax} sinby$, prove that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$
2)   Find nth derivative of $y = x^2 . \cos x$
3)   Find the values of a and b in order that
$$\lim_{x \to 0} \frac{x(1 + a \cos x) - b \sin x}{x^3}$$

Q.5   Answer the following questions. (Any One)   **08**
1)   Prove that $\nabla^2 (r^2 logr) = 5 + 6logr$
2)   If $z = f(x, y)$ is a homogeneous function of degree n, then prove that
$x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + \frac{y^2 \partial^2 z}{\partial y^2} = n(n - 1)z.$

Seat No.

Set **P**

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Bio-Chemistry (Paper – I)
BIOMOLECULES

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Write chemical reactions where involved.
4) Draw labeled diagrams wherever necessary

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) _____ acid is an unsaturated acid.
    a) Butyric   b) Oleic
    c) Stearic   d) Palmitic

2) Vitamin B2 is also called as _____.
    a) Thiamine   b) Riboflavin
    c) Pyridoxine   d) Niacin

3) α 1→ 4 glycosidic linkage is present in _____.
    a) Maltose   b) Lactose
    c) Sucrose   d) Isomaltose

4) _____ linkages are present in the proteins.
    a) Ester   b) Glycosidic
    c) Peptide   d) Phosphodiester

5) _____ is a fat soluble vitamin.
    a) Niacin   b) Pyridoxine
    c) Retinol   d) Pantothemic acid

6) Genetic code is _____.
    a) Species specific   b) Random
    c) Universal   d) different for different individuals

7) Fructose is a _____ monosaccharide.
    a) Aldohexose   b) Ketohexose
    c) Ketotetrose   d) Aldotetrose

8) Glycolipids does not contains _____.
    a) Fatty acid   b) Phosphoric acid
    c) Glycerol   d) Nitrogen

9) Pellagra results due to the deficiency of _____.
    a) Thiamine   b) Niacin
    c) Retinol   d) Pyridoxine

10) _____ is not a monosaccharide.
    a) Sucrose   b) Erythrose
    c) Ribose   d) Glucose

11) _____ is not a fibrous protein.
    a) Collagen   b) Elastin
    c) Keratin   d) Phosphoprotein

12) Fehling test is positive for _____.
   a) Reducing sugars   b) Amino acids
   c) Nucleic acids   d) proteins

13) In phospholipids a phosphate group is attached to _____.
   a) > C=O group   b) -NH$_2$ group
   c) - OH group   d) - COOH group

14) In adult, per day requirement of retinol is _____.
   a) 800 to 1000 mg   b) 500 to 700 mg
   c) 200 to 400 mg   d) 100 to 200 mg

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) What types of lipid occurs in cell membrane?
   2) Which organs are affected in beriberi?
   3) What is Zwitterion of an amino acid?
   4) How is polynucleotide formed from nucleotides?
   5) Define carbohydrate. Write one example.

B) Write Notes. (Any Two)   **06**
   1) Explain albumins and globulins.
   2) What are the deficiency disorders of pyridoxine?
   3) Write note on m-RNA.

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe the structure of myoglobin.
   2) Write the structure and function of cholesterol.
   3) What is biological role of vitamin A?

B) Answer the following questions. (Any One)   **06**
   1) Write an account of polysaccharide of plant origin.
   2) Explain the right handed α - helix structure of protein.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain Fehling's test for reducing sugar.
   2) Write structure, biochemical role and deficiency disorder of niacin.
   3) What is phosphodiester linkage?

B) Answer the following questions. (Any One)   **04**
   1) Explain Terpenes and carotenes.
   2) What are phospholipids and Spingolipids?

Q.5 Answer the following questions. (Any Two)   **14**
   a) Explain in detail with sub classification of simple proteins.
   b) What is the structure and functions of t-RNA and r-RNA?
   c) What are hexoses? Write structural formulae of any five hexoses.

Seat
No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Plant Protection (Paper – I)
MAJOR CROPS AND METHODS OF INTEGRATED PLANT PROTECTION

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) All questions carry equal marks.
4) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams wherever necessary.

Q.1   Multiple Choice Questions.   **14**

1) Citrus canker came to India from _____
   a) America   b) Brazil
   c) China   d) England

2) Hispid beetle of coconut in Fiji is controlled by _____ beetle.
   a) Rodolia   b) Hispid
   c) Lady bird   d) All of these

3) Nematicides is the example of _____ methods.
   a) cultural   b) biological
   c) chemical   d) mechanical

4) Netting is the example of _____ methods.
   a) Cultural   b) Biological
   c) Physical   d) Mechanical

5) Crop rotation is the example of _____ methods.
   a) cultural   b) mechanical
   c) physical   d) chemical

6) Gerbera is the example of _____ .
   a) vegetable crop   b) floriculture
   c) fruit crops   d) cash crop

7) Cabbage belongs to the genus _____ .
   a) *Mangifera*   b) *Cicer*
   c) *Brassica*   d) *Arachis*

8) Mango belongs to the family _____ .
   a) leguminaceae   b) cucurbitaceae
   c) asteraceae   d) anacardiaceae

9) Grapes belongs to the genus _____ .
   a) *Vitis*   b) *Delomix*
   c) *Vitex*   d) *Albezia*

10) Cotton seed treated with _____ chemicals.
    a) Agrosan   b) Seresan
    c) Seedox   d) All of these

11) Sugarcane crop is attacked by _____ disease.
    a) whip smut   b) rust
    c) both a and b   d) none of these

12) Sunflower belongs to the species _____.
    a) *annus*   b) *arietinum*
    c) *hirsutum*   d) *regia*

13) Groundnut is native of _____ America.
    a) North   b) South
    c) East   d) West

14) Wheat belongs to the genus _____.
    a) *Cocos*   b) *Cicer*
    c) *Withania*   d) *Triticum*

Q.2 A) Answer the following. (Any Four)   **08**
    1) Define Plant Protection.
    2) Write the morphology of rose.
    3) What is organic farming?
    4) Define biofertilizers.
    5) Explain the economic importance of Grapes.

B) Write Notes. (Any Two)   **06**
    1) Cultural method of sunflower.
    2) Harvesting and threshing of Jowar.
    3) Sowing methods of cabbage.

Q.3 A) Answer the following. (Any two)   **08**
    1) Describe the crop hygiene of cultural method.
    2) Explain the physical barrier studied by you.
    3) Give the general account of use of resistant varieties.

B) Answer the following. (Any One)   **06**
    1) Describe the trap crops and fertilizers studied by you.
    2) Explain the hand picking and destruction of egg masses.

Q.4 A) Answer the following. (Any Two)   **10**
    1) Explain the fungicides of chemical method.
    2) Describe the domestic quarantine studied by you.
    3) Write the soil solarization of physical method.

B) Answer the following. (Any One)   **04**
    1) Explain the tillage of cultural method.
    2) Describe the rhodenticides studied by you.

Q.5 Answer the following. (Any two)   **14**
    a) Explain the role of organic farming in agriculture.
    b) Describe the types of biofertilizers and their application.
    c) Give the cultural practice of Tur with respect to morphology, soil types, fertilizers and irrigation.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Bio-Chemistry (Paper – II)
BIOCHEMICAL TECHNIQUES

Day & Date: Thursday, 07-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Write chemical reactions wherever involved.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) Whole cells are immobilised by _____ method.
   a) ionic binding   b) physical adsorption
   c) gel entrapment   d) covalent binding

2) TLC is the type of _____ chromatography.
   a) partition   b) gas
   c) adsorption   d) column

3) In spectrophotometer one side aluminium coated prism is used to _____.
   a) provide radiations   b) absorb radiations
   c) split radiations   d) reflect radiations

4) In electrophoresis, the rate of migration can be controlled by controlling _____.
   a) pressure   b) temperature
   c) pH   d) heat

5) In chromatographic separation, mobile phase cannot be a _____.
   a) gas   b) liquid
   c) solid   d) mixture of gases

6) Western blotting technique is used for blot transfer of _____.
   a) DNA   b) Protein
   c) Lipids   d) carbohydrates

7) _____ is the most used cross linking agent in intermolecular cross linking.
   a) Acetaldehyde   b) Glutaraldehyde
   c) Formaldehyde   d) Benzaldehyde

8) According to Beer's law absorbance of coloured solution depends on its _____
   a) length of medium
   b) pH of medium
   c) nature of colour
   d) concentration of colouring solvent

9) In HPLC, to supply pulse less flow _____ is used.
   a) solvent filter   b) pressure dumpner
   c) column injector   d) gradient eluter

10) In starch gel electrophoresis proteins are separated according to their _____.
   a) concentration of buffer   b) charge and size
   c) charge   d) molecular weight

11) Patent period for articles other than food and drug is _____ years.
    a) 2   b) 8
    c) 14   d) 20

12) Enzymes entrapped in agar is obtained by mixing the enzyme solution at ____.
    a) 45^0 to 50^oc   b) 75^0 to 80^oc
    c) 65^0 to 70^oc   d) 85^0 to 90^oc

13) The intensity of the light _____ through the suspension is less than the intensity of incident light.
    a) reflected   b) transmitted
    c) refracted   d) scattered

14) Hybridoma technology was developed by G Kohler and C Milestein in _____.
    a) 1955   b) 1965
    c) 1975   d) 1985

Q.2 A)   **Answer the following questions. (Any Four)**   **08**
    1) Define transmittance and specific absorbance.
    2) Why guard column is used in HPLC?
    3) What is the function of sodium dodecyl sulphate in SDS-PAGE?
    4) What is DNA probe? What is its use?
    5) Why the enzymes immobilised in column by absorption gradually lose their activity?

B)   **Answer the following questions. (Any Two)**   **06**
    1) What are precautions taken in selecting the printer for PCR technique?
    2) What is the effect of pH on electrophoretic migration of protein?
    3) Why the myeloma cells used in hybridoma technology?

Q.3 A)   **Answer the following questions. (Any Two)**   **08**
    1) With suitable diagram explain the construction of spectrophotometer.
    2) What are the advantages of spectrophotometer over colorimeter?
    3) Discuss use of immobilised cells and its advantages for ethanol production.

B)   **Answer the following questions. (Any One)**   **06**
    1) How are the starch gel plates prepared for electrophoresis?
    2) Describe the thin layer chromatography.

Q.4 A)   **Answer the following questions. (Any Two)**   **10**
    1) How the various separated components detected after separation by southern blotting technique.
    2) What are limitations of colorimetric measurements?
    3) Explain immobilization of enzyme by adsorption method.

B)   **Answer the following questions. (Any One)**   **04**
    1) Discuss advantages of HPLC technique.
    2) Explain any four applications of enzyme immobilization.

Q.5   **Answer the following questions. (Any Two)**   **14**
    a) Write the column packing, elution and working of gel permeation chromatography.
    b) What is the principle of SDS-PAGE? How is SDS-PAGE is used to find the molecular weight of proteins?
    c) Write formation of monoclonal antibodies and their significance.

Seat No.

Set **P**

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Plant Protection (Paper – II)
CROP DISEASES AND THEIR MANAGEMENT

Day & Date: Thursday, 07-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives given below.   14

1) An organism which feeds on living host plant is called _____.
   a) saprophytic   b) parasite
   c) pathogenesis   d) host

2) An ability of pathogen to cause disease in host plant is known as _____.
   a) pathogenecity   b) pathogenesis
   c) saprophyte   d) parasite

3) An organism growing on non-living or dead plants and obtain food from them is called _____.
   a) parasite   b) saprophyte
   c) pathogen   d) all of these

4) After infection when visible characters appear on the leaves, flower and fruits are called as _____.
   a) pathogenesis   b) hyperplasia
   c) symptoms   d) resistant

5) Excessive cell division is known as _____.
   a) hypertrophy   b) hyperplasia
   c) immunity   d) resistance

6) An abnormal increase in the size of the cells is called _____.
   a) hypertrophy   b) hypoplasia
   c) hyperplasia   d) hypersensitivity

7) The slowing down in a development of the affected parts resulting in less growth or degradation of cells is known as _____.
   a) hypersensitivity   b) hypertrophy
   c) hyperplasia   d) hypoplasia

8) The condition of plant that makes it suitable for attack by pathogen is called _____.
   a) resistant   b) immunity
   c) symptoms   d) Succesptible

9) Little leaf of brinjal is the example of _____ disease.
   a) bacterial   b) viral
   c) fungal   d) phytoplasma

10) Yellow vein mosaic of okra is controlled with the help of _____.
    a) Nuvan   b) Nuvacron
    c) Rogor   d) all of these

11) Wilt of tomato is the example of _____ disease.
   a) viral   b) bacterial
   c) fungal   d) phytoplasma

12) Grain smut of jowar is caused by _____ *sorghi*.
   a) *Xanthomonas*   b) *Mycoplasma*
   c) *Hibiscus*   d) *Sphacelotheca*

13) Rust of soyabean belongs to the class _____.
   a) basidiomycetes   b) ascomycetes
   c) oomycetes   d) zygomycetes

14) Powdery mildew of cucurbits belongs to the class _____.
   a) ascomycetes   b) basidiomycetes
   c) oomycetes   d) zygomycetes

Q.2 A) Answer the following questions. (Any Four)   08
   1) Define eradication.
   2) What is quantitative method?
   3) Give the symptoms of early blight of tomato.
   4) Define fungal disease.
   5) What is etiology?

B) Write Notes. (Any Two)   06
   1) Seed bome disease
   2) Epidemic disease
   3) Germination of fungal spores

Q.3 A) Answer the following questions. (Any Two)   08
   1) Describe the spread of pathogen studied by you.
   2) Explain the mechanism of plant protection.
   3) Give the nature of damage and control measures of grassy shoot disease of sugarcane.

B) Answer the following questions. (Any One)   06
   1) Describe the classification of plant diseases based on pathogens.
   2) Explain the Koch's Postulate studied by you.

Q.4 A) Answer the following questions. (Any Two)   10
   1) Explain the factor affecting the infection.
   2) Describe the concept of plant disease.
   3) Write the qualitative methods studied by you.

B) Answer the following questions. (Any One)   04
   1) Explain the symptoms and control measures of rust of groundnut.
   2) Describe the exclusion of plant disease management.

Q.5 Answer the following questions. (Any Two)   14
   a) Explain the downy mildew of grape disease.
   b) Describe the leaf curl of chilli with respect to symptoms, causal organism, nature of damage and control measures.
   c) Write the citrus canker disease studied by you.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Meteorology (Paper – I)
CLIMATOLOGY

Day & Date: Wednesday, 23-09-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Use of stencils is allowed.
3) Figures to the right indicate full marks.
4) Draw neat diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below & rewrite the**   **14**
sentences.

1) _____ is the science which studies the atmosphere.
   a) Hydrology   b) Climatology
   c) Pedology   d) Phytology

2) Ozone occupies _____% gaseous in the atmosphere.
   a) 0.06   b) 12
   c) 0.03   d) 0.00006

3) The coriolis force is _____ in high latitudes.
   a) strongest   b) weak
   c) strong   d) absent

4) Isobars are the lines joining places equal _____.
   a) salinity   b) pressure
   c) rainfall   d) temperature

5) Normal lapse rate in the atmosphere is _____ ^{0}C per 1000 m.
   a) 5.6   b) 7.5
   c) 6.5   d) 4.6

6) Warm and moist condition prevails in _____ air mass.
   a) maritime equatorial   b) maritime temperate
   c) polar maritime   d) polar continental

7) There are _____ major source region of air masses.
   a) 6   b) 4
   c) 10   d) 8

8) Monsoon is the wind system of the _____ region.
   a) tropical   b) polar
   c) temperate   d) sub-tropical

9) Climatology is compounded by _____ word.
   a) Arab   b) Greek
   c) Roman   d) French

10) _____ Climatology is closely related to meteorology.
    a) Physical   b) Regional
    c) Applied   d) Agro

11) _____ Winds are called as primary circulation.
    a) Local   b) Seasonal
    c) Yearly   d) Planetary

12) _____ Latitudes called as horse latitude.
   a) 10^0 to 20^0 b) 15^0 to 25^0
   c) 20^0 to 30^0 d) 25^0 to 35^0

13) The line of equal surface pressure of atmosphere is called as _____.
   a) isotherm b) isohytes
   c) isohaline d) isobar

14) Typhoon cyclone exists in _____.
   a) Japan b) China
   c) Australia d) USA

Q.2 Write answer for the following questions. (Any Seven)   **14**
   1) Define climatology.
   2) What is mean by climate?
   3) Element of weather
   4) What is mean by general circulation?
   5) Applied climatology
   6) Types of air masses
   7) Relative humidity
   8) Hurricane
   9) Define monsoon.

Q.3 A) Write answer for the following questions. (Any Two)   **10**
   1) Structure of the atmosphere.
   2) Define climatology and explain its branches.
   3) Sources region of air masses.

B) Explain general circulation of northern hemisphere.   **04**

Q.4 A) Write answer for the following questions. (Any Two)   **08**
   1) Define air masses and gives its characteristics.
   2) Climatic records and statistics.
   3) Upper air circulation pattern.

B) Explain the theory of origin of cyclone.   **06**

Q.5 Write answer for the following questions. (Any Two)   **14**
   a) Explain the life cycle of cyclone.
   b) Explain the planetary wind system.
   c) Give an account of North eastern monsoon in India.

Seat
No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Geochemistry (Paper – I)
INTRODUCTION TO GEOCHEMISTRY

Day & Date: Wednesday, 23-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
                      2) Figures to the right indicate full marks.
                      3) Draw neat diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below.**   **14**
  1)   The number of triple points in Sulphur system is _____.
       a) one   b) two
       c) three   d) four

  2)   The temperature at which $S_R \rightarrow S_M$ is called as _____.
       a) transition   b) melting point
       c) boiling point   d) eutetic

  3) $M^+_{(g)} + X^-_{(g)} \rightarrow M^+X^-_{(s)} +$ _____.
       a) Ionization energy   b) Lattice energy
       c) Electron affinity   d) Dissociation energy

  4)   The radius ratio of Na^+ to Cl^- in NaCl is _____.
       a) 0.414   b) 0.93
       c) 0.524   d) 0.732

  5)   The strength of co-valent bonds depends upon _____.
       a) Number of electrons   b) The extent of overlapping of
                                                      atomic orbitals
       c) Types of orbitals   d) Types of hybridization

  6)   The substance which gets dispersed is called as _____.
       a) dispersion medium   b) dispersed phase
       c) dispersion solution   d) colloidal solution

  7)   Dispersion of liquid in solid is called as _____.
       a) sol   b) gel
       c) emulsion   d) paste

  8)   A substance which is present in more than one crystalline form is called
       as _____.
       a) monomorphism   b) polymorphism
       c) solid crystal   d) crystal lattice

  9)   In water system, there are _____ metastable curve.
       a) one   b) two
       c) three   d) four

  10) Silica is a _____clay mineral.
       a) positive   b) negative
       c) zero   d) both a and b

  11) The charge on As_2S_3 sol is _____.
       a) positive   b) zero
       c) negative   d) flexible

12) Sodium chloride is having _____ stoichiometry.
   a) 1:2   b) 2:1
   c) 1:1   d) 2:3

13) The co-ordination number of Cs^+ ion in $CsCl$ is _____.
   a) eight   b) six
   c) four   d) five

14) The crystal structure of $NaCl$ is _____.
   a) BCC   b) FCC
   c) Cubic   d) Hexagonal.

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define
       a) Co-valent bond
       b) Unit cell
   2) Give any two properties of colloidal solution.
   3) State Gibb's phase rule.
   4) Define transition temperature.
   5) Define emulsion. Give one example.

B) Write short notes. (Any Two)   **06**
   1) Tyndall Effect
   2) Goldschmidt's Mineralogical phase rule
   3) General rules of bond type

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Distinguish between lyophobic solution and lyophilic solution.
   2) Discuss the relation between co-ordination number and radius ratio.
   3) Define lattice energy. Give one example.

B) Answer the following questions. (Any One)   **06**
   1) Discuss water system.
   2) Describe the structure of rock salt with respect to unit cell, co- ordination number and stoichiometry.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Explain "clay minerals as colloids"
   2) Distinguish between sol and gel.
   3) Show that $CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$ is two component system.

B) Answer the following questions. (Any One)   **04**
   1) Give the general rules of bond type.
   2) Write a short note on Brownian Movement.

Q.5 Answer the following questions. (Any Two)   **14**
   1) Discuss Sulphur system.
   2) Discuss electronegativity.
   3) Define Colloid. Explain Bredig's Arc method for preparation of sol.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Zoology (Paper – V)
ANIMAL DIVERSITY – III

Day & Date: Wednesday, 23-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
             2) Figures to the right indicate full marks.
             3) Draw neat, labeled diagrams wherever necessary.

Q.1 **Fill in the blanks by choosing correct alternatives given below & rewrite the sentences.**   **14**

1) Bioluminescence organ present in _____.
   a) cockroach   b) mole cricket
   c) fire fly   d) butterfly

2) Lacinia and galea are the parts of ____.
   a) mandible   b) hypopharynx
   c) 1st maxilla   d) 2nd maxilla

3) Byssus threads are present in _____.
   a) Unio   b) Pila
   c) Sepia   d) Mytilus

4) Water vascular system is a characteristic feature of phylum _____.
   a) Mollusca   b) Arthropoda
   c) Echinodermata   d) Annelida

5) Dengue fever is caused by _____.
   a) *Aedes aegypti*   b) *P.vivax*
   c) *P.ovalis*   d) Ascaris

6) Anal styles are found in _____.
   a) female cockroach   b) male cockroach
   c) butterfly   d) none of these

7) In cockroach numbers of ovarioles are _____.
   a) 3   b) 4
   c) 9   d) 16

8) Piercing and sucking types of mouth parts are found in _____.
   a) cockroach   b) butterfly
   c) mosquito   d) housefly

9) Bipinnaria is the larval stage of _____.
   a) Annelida   b) Echinodermata
   c) Mollusca   d) Hemichordata

10) Numbers of teeth present in gizzard of cockroach are _____.
   a) 7   b) 5
   c) 6   d) 8

11) Swimming types of foots are present in _____.
   a) Aplysia   b) Pila
   c) Sepia   d) Mytilus

12) Heart of Pila consists of _____ chambers.
    a) 3
    b) 2
    c) 4
    d) 1

13) In Pila water quality is checked by _____.
    a) radula
    b) tentacles
    c) osphradium
    d) pulmonary chamber

14) Malpighian tubules in cockroach are used for _____.
    a) excretion
    b) reproduction
    c) digestion
    d) nervous

Q.2 A) Answer the following questions. (Any Four) 08
    1) Systematic position of cockroach.
    2) Bipinnaria
    3) Mouth parts of Housefly.
    4) Sexual dimorphism in cockroach.
    5) General characters of Mollusca.

B) Write notes on. (Any Two) 06
    1) Ospharadium of Pila
    2) Uricose gland
    3) Lower lip of cockroach

Q.3 A) Answer the following questions. (Any Two) 08
    1) Explain mouth parts of Honey bee.
    2) Describe Mosquito as disease vector.
    3) Explain nervous system of Pila.

B) Answer the following questions. (Any One) 06
    1) Describe shell of Pila.
    2) Compound eye of cockroach.

Q.4 A) Answer the following questions. (Any Two) 10
    1) Describe nervous system of Pila.
    2) Explain digestive system of cockroach.
    3) Describe affinities of Hemechordata.

B) Answer the following questions. (Any One) 04
    1) Foot modification in Mollusca
    2) Ink gland

Q.5 Answer the following questions. (Any Two) 14
    a) Explain digestive system of Pila.
    b) Explain male reproductive system of cockroach.
    c) Describe mouth parts of cockroach.

Seat No.

B.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Meteorology (PAPER - II)
GENERAL METEOROLOGY

Day & Date: Thursday, 24-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
              2) Figures to the right indicate full marks.
              3) Use of scientific calculator is allowed.

Q.1   **Fill in the blanks by choosing the correct alternatives given below.**   **14**

1)   Pascal is the S. I. unit of _____.
    a)   force   b)   density
    c)   pressure   d)   momentum

2)   _____ is the meteorological unit of pressure.
    a)   Gb   b)   kb
    c)   mb   d)   Mb

3)   In stratosphere temperature _____ with increase in altitude.
    a)   increases
    b)   decreases
    c)   remains constant
    d)   first increases & then decreases

4)   Entropy _____.
    i)   is measure of disorder of the system.
    ii)   is measure of order of the system.
    iii)   never increases in a closed system such as universe.
    iv)   never decrease in a closed system such as universe.
    a)   i and iii are correct   b)   i and iv are correct
    c)   ii and iii are correct   d)   ii and iv are correct

5)   Ozone layer in the Earth's atmosphere absorbs _____ radiations.
    a)   solar   b)   UV
    c)   IR   d)   visible

6)   At the equator ($\phi = 0$) the magnitude of Coriolis force is _____.
    a)   one   b)   zero
    c)   minimum   d)   maximum

7)   The earth is bulged at the equator and flattened at the poles due to _____.
    a)   coriolis force   b)   centripetal acceleration
    c)   centrifugal force   d)   frictional force

8)   On the earth's surface centrifugal force is maximum at latitude _____.
    a) $\phi = 0°$ b) $\phi = 30°$
    c) $\phi = 45°$ d) $\phi = 90°$

9)   The man made satellite which have been launched in orbit round the Earth is known as _____ satellite.
    a)   Natural   b)   Artificial
    c)   Natural or Artificial   d)   None of the above

10) "To every action there is equal and opposite reaction and the two acts simultaneously on two different bodies" is statement of Newton's _____ law of motion.
    a) First   b) Second
    c) Third   d) Zeroth

11) A photovoltaic cell converts solar energy into _____ energy.
    a) Mechanical   b) Thermal
    c) Electrical   d) Kinetic

12) Intermediate energy is obtained from _____ energy resources.
    a) worthless   b) useful
    c) secondary   d) primary

13) _____ is branch of physics dealing with transformation of thermal energy into other forms of energy.
    a) Biological sciences   b) Electromagnetics
    c) Thermodynamics   d) Environment

14) 1 EJ = _____ joules.
    a) 10^{09} b) 10^{12}
    c) 10^{15} d) 10^{18}

Q.2 A) Answer the following questions. (Any Four)   **08**
1) Explain nature of radiations.
2) Explain coherent scattering.
3) What are effects of depletion of ozone layer?
4) What are effects of smog formation?
5) What is non-inertial frame of reference?

B) Write notes. (Any Two)   **06**
1) What is short circuit current (I_{sc}) of a solar cell?
2) Draw neat diagram of a solar cell.
3) What is energy?

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Explain green house effect.
2) Discuss non-inertial frame of reference and pseudo forces.
3) State and explain Buys-Ballot's law.

B) Answer the following questions. (Any One)   **06**
1) With neat diagram explain characteristics of solar cell.
2) What are primary resources of energy?

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Discuss in detail tephigram.
2) Discuss absorption of solar radiation by ozone.
3) Why multistage rockets are used while launching satellites?

B) Answer the following questions (Any One)   **04**
1) Explain the radiation budget of earth and its atmosphere in relation with scattering, reflection and absorption.
2) Discuss energy, man and environment.

Q.5 Answer the following questions. (Any Two)   **14**
a) Explain the formation of ozone in the stratosphere.
b) Describe in detail Geostrophic wind.
c) What do you mean by geo-stationary satellite?

Seat No.

B.Sc.(Semester – III)(CBCS) Examination Oct/Nov-2019
Geo-Chemistry (Paper - II)
INTRODUCTION TO SOLAR SYSTEM AND GEO-SPHERS

Day & Date: Thursday, 24-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
           2) Figures to the right indicate full marks.
           3) Neat labeled diagrams must be drawn wherever necessary.

Q.1 Fill in the blanks by choosing the correct alternatives given below: **14**

1) _____ are involved in photosynthesis and balances each other.
 a) (H_2O, CO_2) b) (N_2, O_2)
 c) (O_2, CO_2) d) (N_2, O_3)

2) The ozone layer in the atmosphere is present between _____ km altitude.
 a) 15 - 30   b) 20 - 30
 c) 40 - 50   d) 50 - 60

3) _____ constituent increases at the third stage of evolution of primeval atmosphere.
 a) N_2 b) CH_4
 c) H_2 d) O_2

4) The lowermost atmospheric layer is _____.
 a) Troposphere   b) Stratosphere
 c) Mesosphere   d) Thermosphere

5) The photochemical dissociation of water vapour in the upper atmosphere added _____ gas.
 a) O_2 b) H_2
 c) CO_2 d) NH_3

6) Loss of hydrogen and helium in the atmosphere took place by _____ from the earth.
 a) escape in space
 b) combustion of coal
 c) used for formation of coal and petroleum
 d) locked in carbonate sediments.

7) The major dissolved constituent in the sea water is _____.
 a) Cl, Br, SO_4, F   b) Cl, Na, SO_4, Mg
 c) Cl, Br, SO_4, Na   d) Cl, Br, SO_4, Mg

8) The major gases in solution content in sea water is _____.
 a) O_2 & N_2 b) O_2 & CO_2
 c) CO_2 & N_2 d) O_2 & O_3

9) The groundwater passing through limestone and dolomitic area is rich in _____.
 a) Ca & Mn   b) Ca & CO_2
 c) Ca & Na   d) Ca & Mg

10) The average pH value of rivers is between _____.
   a) 6 & 8   b) 7 & 9
   c) 5 & 7   d) 8 & 9

11) In seawater composition dissolve gases are _____.
   a) $Cl < SO_4 < CO_3$ b) $CO_3 > SO_4 > Cl$
   c) $CO_3 > Cl > SO_4$ d) $Cl > SO_4 > CO_3$

12) On the basis of texture the aerolites or stones are divided into _____ groups.
   a) chondri and achondrite   b) chondrules and achondrite
   c) Chondrite and achondrite   d) None of the above

13) What is composition of Cohenite?
   a) Fe_3S b) Fe_3C
   c) Fe_3O d) Fe_3SO_4

14) Pyrolite is a rock with mixture of _____ and_____ found in upper mantle.
   a) Pyroxene-Kamacite   b) pyroxene-aerolite
   c) pyroxene-olivine   d) pyroxene-calcite

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) At what depths Mohorovicic discontinuity occurs below ocean and continental base?
   2) What is the average composition of mantle + crust?
   3) Who coined the concept of geochemical classification of the elements?
   4) Role of rivers and rain in salinity of the ocean.
   5) What is composition of schreibersite?

B) Write short notes. (Any Two)   **06**
   1) What is greenhouse effect? How it is useful to keep the earth warm?
   2) What is chlorinity? How it is measured?
   3) What is composition of the crust?

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Explain "Structure of atmosphere".
   2) Gains and losses of elements in the oceanic water.
   3) Composition of primeval atmosphere.

B) Answer the following questions. (Any One)   **06**
   1) Describe zonal structure of the earth.
   2) Describe cosmic abundance of elements.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Generation of atmospheric gases in its first stage of evolution.
   2) Describe variable constituents of the atmosphere.
   3) Describe atmospheric additions during geologic time.

B) Answer the following questions. (Any One)   **04**
   1) What is primary differentiation of the elements?
   2) Define meteorites. Describe aerolites and their types.

Q.5 Answer the following questions. (Any Two)   **14**
   1) Describe in brief internal structure of the earth.
   2) Explain in brief, second and third stages of atmospheric evolution.
   3) Describe in detail, composition of sea water.

Seat No.

Set **P**

B.Sc.(Semester - III) (CBCS) Examination Oct/Nov-2019
ZOOLOGY (Paper - VI)
CELL SCIENCE, GENETICS, BIOLOGICAL CHEMISTRY AND ECONOMIC ZOOLOGY

Day & Date: Thursday, 24-10-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagram wherever necessary.

Q.1   Fill in the blanks by choosing correct alternatives given below.   14

1) During meiosis chromosomal number _____.
   a) Remains constant   b) Reduced to half
   c) Get doubled   d) Get tripled

2) _____ are responsible for the production of antibodies.
   a) Neutrophils   b) Agranulocytes
   c) Lymphocytes   d) Basophils

3) Two dominant genes A & B on a same chromosome then the genes are arranged in _____.
   a) cis phase   b) trans phase
   c) cis and trans phase   d) repulsion phase

4) Ratio of Supplementary interaction is _____.
   a) 9:3:3:1   b) 9:3:4
   c) 9:7   d) 1:1:1:1

5) Mongloid idiocy is related with _____.
   a) Klinfelters Syndrome   b) Turners Syndrome
   c) Downs Syndrome   d) Barr body

6) Two strands of DNA molecule _____ to each other.
   a) Parallel   b) Antiparallel
   c) Both a & b   d) Perpendicular

7) Glycogen is a polymer of _____.
   a) Glucose   b) Galactose
   c) Sucrose   d) Maltose

8) Isinglass is a by-product of _____.
   a) Poultry   b) Fishery
   c) Apiculture   d) Sericulture

9) _____ equipment is essential to produce streams of bubbles in aquarium.
   a) Siphon tube   b) Thermometer
   c) Aerator   d) Nets

10) _____ moults occur in life of silkworm.
   a) One   b) Two
   c) Three   d) Four

11) Indian honey bee is _____.
   a) Apis dorsata   b) Apis indica
   c) Apis mellifera   d) Apis florea

12) _____ is an indigenous breed of poultry.
   a) Assel
   b) Leghorn
   c) New Hampshire
   d) Plymoth rock

13) Sneezing, gasping and droopiness are the initial symptoms of _____.
   a) Small pox
   b) Ranikhet
   c) Liverrot
   d) Amoebiasis

14) Jamunapuri goat is native breed of _____.
   a) Uttar Pradesh
   b) Punjab
   c) Rajasthan
   d) Gujrat

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Neutrophils
   2) Significance of Meiosis
   3) Ornamental fish
   4) Curd
   5) Pollen basket

B) Write short notes. (Any Two)   **06**
   1) Importance of Honey
   2) Complete linkage
   3) Biological Significance of RNA

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) Describe the Klinefelters syndrome.
   2) Describe the structure of DNA.
   3) Describe the indigenous breeds of goat.

B) Answer the following questions. (Any One)   **06**
   1) Describe the detail process of prophase I of meiosis.
   2) Describe the fish farming in freshwater.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) Describe Supplementary genes with suitable example.
   2) Explain mechanism of crossing over.
   3) Describe the process of bee keeping.

B) Answer the following questions. (Any One)   **04**
   1) Describe the life cycle of silk moth.
   2) What is dairy science? Describe the milk products.

Q.5 Answer the following questions. (Any Two)   **14**
   1) What is Cell Cycle? Describe its different stages.
   2) Define Poultry? Explain in detail housing system of Poultry.
   3) What is Apiculture? Describe in detail caste system in honey bees.