Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS) Examination: March/April - 2025
English (Comp.)
Communication Skil (BT1101)

Day & Date: Thursday, 08-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Choose the correct alternatives from the options. **08**

1) Where did Gandhi meet his missionary friend?
a) Ahmedabad b) Anji
c) Vellore d) Orissa

2) How long did the author go abroad for studies?
a) ten years b) nine years
c) five years d) four years

3) The poem 'Let me not pray to be sheltered from dangers' is written by _.
a) Rabindranath Tagore b) Toru Dutt
c) Coventry Patmore d) Sarojini Naidu

4) Who is queen of heaven and goddess of light, birth, women and marriage?
a) Flora b) Juno
c) Aphrodite d) None of these

5) The father feels _____ for his actions.
a) remorse b) glad
c) merry d) happy

6) _____ occur at the end of a base or root word and create new words.
a) Fixing b) Prefixes
c) Fix d) Suffixes

7) _____ are used to join sentences, clauses and words.
a) Adverb b) Conjunctions
c) Interjections d) Preposition

8) She runs <u>fastly</u>. The underlined word is _____.
a) a verb b) an adverb
c) an adjective d) an interjection

Q.2 Write the answers in short. (Any four out of six) **12**

a) Discuss the importance of Khadi through the essay ‘The Birth of Khadi’.
b) Write a note on the author’s life in village in ‘The Portrait of a Lady'?
c) What are the various qualities that Tagore discusses as important in the poem ‘Let Me Not Pray to be Sheltered from Dangers’?
d) Discuss the theme of pride and culture used in the poem ‘The Lotus’.
e) What religious lesson is there in the poem 'The Toys’?
f) What is sonnet? Describe with example.

Q.3 Answer any One of the following questions. **10**

a) What are the probable reasons of communication breakdown?
b) Write a detailed note on channels of communication. Discuss the principles of effective communication.

Q.4 What are intrapersonal skills? Write five tips to improve your intrapersonal skill. **10**

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS) Examination: March/April - 2025
CHEMISTRY (Paper- I) (BT1102)

Day & Date: Friday, 09-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple Choice Questions. **08**

1) ____ is the sum of atomic masses of the elements present in a molecule.
a) Average atomic mass b) Atomic mass
c) Gram formula mass d) Molecular mass

2) Group I elements are called as ____.
a) Alkali metals b) Noble gases
c) Chalcogens d) Halogens

3) ____ is the full form of pH.
a) Positive hydrogen b) Potential Hydrogen
c) Positron d) Proton of hydrogen

4) ____ series of transition elements are present in the periodic table.
a) One b) Two
c) Three d) Four

5) Dipoles in any electric field undergo ____.
a) Magnetism b) Electromagnetism
c) Magnetisation d) Polarisation

6) In Mendeleev's periodic classification, _____ number of groups.
a) 12 b) 8
c) 7 d) 6

7) The electrons' distribution into the atomic orbitals is called as ____.
a) Electronic order b) Electronic distribution
c) Electronic filing d) Electronic configuration

8) _____ concentration determine techniques gives a more accurate value.
a) Molarity b) Molality
c) Formality d) Normality

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

a) Define Valancy.
b) Define phosphodiester bond.
c) Define bond angle.
e) Define freezing point.
f) Define molarity.
g) Define bond energy.

Q.3 Write short note. (Any Two) **08**

a) Ionic and covalent bonds with suitable examples
b) Sp3 hybridization
c) Solubility & factors affecting solubility

Q.4 Answer the following. (Any Two) **08**

a) Define and write significance of Dipole moment.
b) Explain pH and buffers.
c) Explain classification of solvents.

Q.5 Answer the following. (Any One) **08**

a) What is solution? Explain the mole concepts with examples of solution preparation.
b) State and explain the types of bonds in biomolecule.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS) Examination: March/April - 2025
Biochemistry (Paper - II) (BT1103)

Day & Date: Saturday, 10-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equation whenever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions. **08**

1) _____ is an example of aromatic amino acid.
a) Glycine b) Tyrosine
c) Alanine d) Valine

2) _____ is an example of trisaccharide.
a) Sucrose b) Lactose
c) Mannose d) Raffinose

3) In the protein structure, the peptide bond is formed between the functional groups _____.
a) -CH and -CH b) -NH and -NH
c) -S and -S d) -CO and -NH

4) Vitamin _____ is an example of water-soluble vitamin.
a) B b) A
c) D d) E

5) The ribose sugar present in the nucleic acids contains _____ carbons.
a) 2 b) 3
c) 4 d) 5

6) The storage polysaccharide present in animal cells is _____.
a) Starch b) Peptidoglycan
c) Glycogen d) Cellulose

7) Nucleotide base pairing between Guanine and Cytosine contain _____ hydrogen bonds.
a) 01 b) 02
c) 03 d) 04

8) The structural polysaccharide found in cell walls of Gram positive bacteria is _____

a) Chitin b) Peptidoglycan
c) Cholesterol d) Cellulose

Q.2 Answer any Four of the following in brief. **08**

a) Draw chemical structure of any two monosaccharides.
b) Give examples of saturated and unsaturated lipids.
c) What is hypervitaminosis?
d) Draw the double helix structure of DNA proposed by Watson and Crick.
e) Give four examples of proteins.
f) Write biological role of Vitamin C.

Q.3 Write short notes on any Two of the following. **08**

a) Differentiate between DNA and RNA.
b) Explain classification of proteins based on composition.
c) Explain titration curve of an amino acid with example.

Q.4 Answer any Two of the following **08**

a) Describe the properties of monosaccharides.
b) Describe the source and daily requirement of fat-soluble vitamins.
c) Differentiate between the purine and pyrimidine structure.

Q.5 Answer any One of the following **08**

a) Describe classification of amino acids based on R group with structure.
b) Write an account on ‘Polysaccharides - types and structure’.

SLR-YC-4

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS) Examination: March/April - 2025
Biophysics (Paper - I) (BT1104)

Day & Date: Tuesday, 13-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equation whenever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions. **08**

1) _____ is the unit of entropy.
a) J mol^{-1} b) J$Kmol^{-1}$
c) $J^{-1}k^{-1}mol^{-1}$ d) JK^{-1} mol^{-1}

2) First law of thermodynamics is based on?
a) Conservation of energy
b) Conservation of mass
c) Conservation of momentum
d) Conservation of work

3) What is the use of a bomb calorimeter?
a) To calculate the calorific value of a volatile liquid
b) To calculate the calorific value of a gas
c) To calculate the calorific value of a non-volatile liquid
d) To calculate the calorific value of sparingly soluble salt

4) The specific heat of a material can be determined by ____
a) calorimetry b) manometers
c) barometers d) anemometer

5) β-pleated sheets are the examples of ____
a) Primary structure b) Secondary structure
c) Tertiary structure d) Quaternary structure

6) Water molecules contain _____ hydrogen bond/s.
a) intermolecular
b) intramolecular
c) both intermolecular and intramolecular
d) neither intermolecular nor intramolecular

7) Which of the following thermodynamic law gives the concept of enthalpy?

a) First law of thermodynamics
b) Second law of thermodynamics
c) Third law of thermodynamics
d) Fourth law of thermodynamics

8) The H-O-H bond angle in water molecule is _____

a) 104.0 b) 105.0
c) 104.5 d) 105.5

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

a) Write two properties of water.
b) What is a Scatchard plot?
c) Give two examples of ligand receptor binding.
d) What is free energy of a system?
e) Give two examples of hydrophobic solutes.

Q.3 Write notes on any two of the following. **08**

a) Describe molecular structure of water.
b) Write a note on oxygen and hemoglobin binding.
c) Describe the role of water in structure formation.

Q.4 Write notes on any two of the following. **08**

a) Write a note on Scatchard plot.
b) Write a note on Bomb Calorimeter.
c) Write a note on Laws of Thermodynamics.

Q.5 Answer any one of the following. **08**

a) Write a note on protein-protein Interaction.
b) Energy generation and energy transfer process in biochemical reactions.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS) Examination: March/April - 2025
Cell Biology (Paper - II) (BT1105)

Day & Date: Wednesday, 14-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equation whenever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.
(At. Wts.: H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5)

Q.1 Choose the correct alternative and rewrite the following sentences. 08

1) Microfilaments are composed of _____
a) mosaic protein b) tubulin protein
c) actin protein d) chitin protein

2) Chromosome structure can be observed best during _____
a) Anaphase b) Metaphase
c) Telophase d) Prophase

3) The main function of nucleolus is _____.
a) rRNA synthesis b) Protein synthesis
c) ATP production d) DNA synthesis

4) Leukemias usually arise from _____
a) epithelial cells b) Neurons
c) blood-forming tissues d) epidermal cells

5) Formation of cell plate starts at ____
a) G_2 phase b) Telophase
c) Prophase d) S phase

6) _____ is the study of the cell, its types, structure, functions and its organelles.
a) Cell Biology b) Biology
c) Microbiology d) Biotechnology

7) In the plasma membrane, lipid molecules are arranged in ____
a) alternate b) scattered
c) head parallel d) series

8) Eukaryotic cells contain a variety of specialized structures known collectively as _____

a) Cell membranes b) Tissues
c) Organs d) Organelles

Q.2 Answer any four of the following. **08**

a) State the principals of cell theory.
b) Discuss the significance of mitosis.
c) What are prokaryotes? Give an example.
d) Differentiate between prokaryotic and eukaryotic cell.
e) Explain Cell synchrony.
f) Define Carcinogenesis.

Q.3 Write short notes on any two of the following **08**

a) Characteristics and molecular basis of cancer
b) Cell cycle
c) Structure and function of microfilament

Q.4 Answer any two of the following **08**

a) Explain compartmentalization of eukaryotic cells.
b) Discuss structure and function of rough Endoplasmic Reticulum.
c) Explain types of chromosomes based on centromere.

Q.5 Answer any one of the following **08**

a) Give a detailed account on mitosis.
b) Explain in detail structure and functions of chloroplast.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS) Examination: March/April - 2025
Animal Physiology (Paper – I) (BT1106)

Day & Date: Thursday, 15-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Choose the correct alternative and rewrite the following **08**

1) This is the functional unit of the kidney _____
a) Medulla b) Hilum
c) Neurons d) Nephrons

2) The location of the neuro centre activity of the heart is _____
a) Cerebrum b) Midbrain
c) Medulla Oblongata d) Pons

3) Layer of cells immediately surrounding the ovum but outside the zona pellucida is called as _____
a) theca interna b) corona radiate
c) membrana granulosa d) germinal epithelium

4) This artery passes blood to the kidney _____
a) renal b) common iliac
c) coeliac d) cystic

5) _____ stimulates the production of gastric juice in the stomach
a) Digestion b) Enterokinase
c) Gastrin d) Rennin

6) The respiratory system, gaseous exchange takes place at _____
a) Alveoli b) Trachea
c) Pharynx d) Larynx

7) “Heart of heart” is _____
a) SA node b) AV node
c) Purkinji fibers d) Bundle of HIS

8) Main function of Henle’s loop is _____
a) Formation of urine b) Passage of urine
c) Conservation of urine d) Filtration of blood

Q.2 Answer the following question (Any Four) **08**

a) Draw structure of Nerve Cell.
b) Write a note on Composition of bile.
c) Explain Exchange of gases.
d) Define Chloride Shift.
e) Define Digestive fluids.
f) Define Nerve cells.

Q.3 Write short notes of the following (Any Two) **08**

a) Explain in detail about Mechanism of coagulation of blood.
b) Discuss about Transport of O_2 and CO_2.
c) Write a note on functions of Nerve cells.

Q.4 Answer the following question (Any Two) **08**

a) Explain in detail about mechanism of respiratory system.
b) Describe in detail about urine formation
c) Write a note on Composition of blood.

Q.5 Answer the following question (Any One) **08**

a) Write a detail account on Mechanism of working of heart.
b) Define Reproductive system and add a note on female reproductive system with hormonal regulation.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS): Examination
March/April - 2025
Developmental Biology (Paper - II) (BT1107)

Day & Date: Friday, 16-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equation whenever necessary.
3) Figures to right indicate full marks.

Q.1 Multiple choice questions. **08**

1) The onset of spermatogenesis starts at _____.
a) puberty b) birth
c) adulthood d) intercourse

2) Embryonic shoot is covered by a protective layer called _____
a) Coleoptile b) Coleorrhiza
c) Scutellum d) Aleurone

3) _____ part of the oviduct does the sperm encounter the egg.
a) Ampulla b) Isthmus
c) Infundibulum d) Fundus

4) The zygote undergoes cleavage forming a solid ball of cells of the uniform size _____
a) Morula b) Blastula
c) Gastrula d) Neurula

5) Wall of pollen grain is called as _____
a) sporopollenin b) sporoderm
c) stomium d) tapetum

6) At the time of implantation, the embryo is called as _____
a) Blastocyst b) Zygote
c) Fetus d) Morula

7) In _____ female gametophytes stop their growth at 8 nucleate stages.
a) cleistogamous b) chasmogamous
c) gymnosperms d) angiosperms

8) Testosterone belongs to a class of hormones called _____
a) Gonadotrophins b) Androgens
c) Estrogens d) Catecholamines

Q.2 Answer Any Four of the following **08**

a) Define oogenesis.
b) Define Gastrulation.
c) Define Pronuclei.
d) Define Embryogenesis.
d) Define Organogenesis.
e) Define morphogenesis.

Q.3 Write short notes on Any Two of the following **08**

a) Spawning and Copulation
b) Double fertilization in angiosperm
c) Activation of ovum

Q.4 Answer Any Two of the following **08**

a) Describe seed formation in germination.
b) Describe internal vs External fertilization.
c) Explain structure of egg and sperm.

Q.5 Answer any one of the following **08**

a) Define cleavage, Explain in details about its pattern and types.
b) Define and explain the morphogenesis and organogenesis in plants.

Seat No.	

Set | P

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS) Examination: March/April - 2025
Ecology (Paper - I) (BT1108)

Day & Date: Saturday 17-05-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple choice questions. **08**

1) The natural place of an organism or community is known as_____
   a) Niche b) Biome
   c) Habitat d) Habit

2) An association between root of plant and fungi is called _____.
   a) Mycorrhiza b) Lichen
   c) Leech d) Fern

3) _____ is known as an edaphic abiotic factor.
   a) Light b) Soil
   c) Air d) Water

4) _____ requires maximum energy.
   a) Secondary consumer b) Decomposer
   c) Primary consumer d) Primary producer

5) Sacred grooves in India are found in the regions of _____.
   a) Western Ghat of Maharashtra
   b) Khasi and Jaintia hills of Meghalaya
   c) Aravalli hills of Rajasthan
   d) All of the above

6) _____ is not terrestrial habitat.
   a) Desert b) Pond
   c) Rainforest d) Garssland

7) In ecological succession the final stage is known as _____
   a) ultimate community b) climax community
   c) final community d) seral community

8) Hot spots are the areas that are severely threatened by _____
   a) natural calamities b) flood
   c) drought d) human activities

Q.2 Answer Any Four of the following **08**

1) Define Autecology and synecology.
2) What is commensalism? Give one example.
3) What is effect of oxygen and carbon dioxide on animals?
4) Enlist the types of diversity indices.
5) Give any two examples of faunal adaptations.
6) Define food chain.

Q.3 Write short notes on Any Two of the following **08**

1) a) Natality and b) Mortality
2) Mutualism with elaborative example.
3) Effect of temperature on animals

Q.4 Answer Any Two of the following **08**

1) Describe community dominance in brief.
2) Describe in brief about aquatic ecosystem.
3) Describe in brief about sacred grooves in India.

Q.5 Answer any one of the following **08**

1) Write a brief account on attributes of population.
2) Write a brief account ecological succession.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - I) (Old) (CBCS) Examination: March/April – 2025
Biotechnology in Human Welfare (Paper-II) (BT1109)

Day & Date: Monday, 19-05-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Choose the correct alternative and rewrite the following sentences. 08

1) The Golden Rice variety is rich in _____
   a) B-carotene and ferritin b) Vitamin C
   c) Lysine d) Biotin

2) _____ is the genetically engineered insulin.
   a) R-insulin b) Rumulin
   c) H-insulin d) Humulin

3) Norman Borlaug, father of green revolution, developed new varieties of _____
   a) Rice b) Sugarcane
   c) Wheat d) Paddy

4) The term vaccine was introduced by ____
   a) Edward Jenner b) Von Behring
   c) Louis Pasteur d) Robert Koch

5) Grey biotechnology is a field of biotechnology that uses _____ to remove pollutants and maintain biodiversity.
   a) Plants and Viruses
   b) Microorganisms and Plants
   c) Animals and Microorganisms
   d) Animals and Viruses

6) _____ is a genetically modified crop.
   a) Golden rice b) Bt-cotton
   c) Bt-brinjal d) All the Above

7) In _____ city the Centre for Cellular & Molecular Biology (CCMB) is situated.
   a) Hyderabad b) Mumbai
   c) New Delhi d) Chennai

8) Remote sensing uses _____ waves in its procedure

a) Sonar waves b) Electro-magnetic waves

c) Electric field d) Gamma-rays

Q.2 Answer Any Four of the following **08**

1) Define Red Biotechnology with suitable example.
2) Define Vermitechnology.
3) Define Knock out mice.
4) Define National Institutes of Biotechnology in India.
5) Write about Contribution of Rosalind Franklin in Biotechnology.
6) Define Active and Passive immunity.

Q.3 Write short notes on Any Two of the following **08**

a) Write a detailed note on Genetically engineered insulin.
b) Discuss about Artificial Intelligence.
c) Explain in detail about National Institutes of Biotechnology in India.

Q.4 Answer Any Two of the following **08**

a) Add a note on In vitro fertilization.
b) Write a note on Vaccination and Immunization.
c) Define Revolution and add a note on Green, White and Blue revolution.

Q.5 Answer any one of the following **08**

a) Write a detailed note on Effects, Prevention and Control of human diseases - Pneumonia.
b) Explain in detail about Importance of Medicinal plants in therapeutics.

Seat No.	

Set | P

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) : Examination
March/April - 2025
English (Comp.)
Communication Skill (BT1201)

Day & Date: Thursday, 22-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Choose the correct alternative and rewrite the following sentences. 08

1) What did the famous naturalist Buffon write an account on?
a) Books b) Squirrels
c) monkey d) Science

2) What is the profession of the ideal man described in the poem 'Ode on Solitude'.
a) Farmer b) Pastor
c) Cobbler d) Teacher

3) The great epic of the soul of our people _____ gives us a wonderful vision of an overflowing life.
a) Buddhacarita b) The Arthashastra
c) The Ramayana d) The Mahabharata

4) The line 'Our earth will not die' is _____
a) a refrain b) a meaningless statement
c) a hopeless hope d) wrong statement

5) What sort of death does Alexander pope wish to have?
a) Brave b) Violent
c) Troublesome d) Unwept

6) The poem 'Remember' is actually _____
a) a ballad b) an ode
c) a sonnet d) an epic

7) She has always been a _____ (obedient) person. (Write antonym of the word given in the bracket)
a) Un obedient b) Dis obedient
c) Non obedient d) An obedient

8) Rahul _____ (be) a very clever boy. (Use past tense form of the verbs given in the bracket)

a) had be
b) was be
c) was
d) Is

Q.2 Write the answers in short. (Any Four) **12**

a) What opinion does the Bertrand Russell have of his teacher?
b) What kind of people can achieve the true essence of freedom?
c) Describe the condition of the earth through the poem 'Our Earth will not Die'.
d) What picture of a farmer does Pope present in the poem 'Ode on Solitude'?
e) What theme does the poem 'Remember' utilize?
f) What is the theme of the poem 'Ode on Solitude'?

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

a) Write a letter to your friend describing your experience after attending a seminar on pollution.
b) You are Raj Patil living at 15, Indira colony, Solapur. The continuous leaking of drain pipes in your colony is causing diseases and health complications for the residents. Write a complaint letter to the Municipal Commissioner to take necessary actions regarding the same.

Q.4 State three (for each) such situations from your personal life when you have felt the following emotions : **10**

1) Mad
2) Sad
3) Glad

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Metabolism (Paper-I) (BT1202)

Day & Date: Friday, 23-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple Choice Questions. **08**

1) Where does oxidative phosphorylation take place?
a) Ribosomes b) Nucleus
c) Mitochondria d) Cell membrane

2) Salvage pathway is used in the synthesis of _____.
a) Amino acid b) Carbohydrate
c) Nucleotide d) Fatty acid

3) Urea cycle converts _____.
a) Keto acids into amino acids
b) Amino acids into keto acids
c) Ammonia into a less toxic form
d) Ammonia into a more toxic form

4) Triglycerides (fats) can be hydrolysed to produce glycerol and _____ fatty acids.
a) one b) two
c) three d) four

5) Which substrate is used in the last step of glycolysis?
a) Glyceraldehyde 3-phosphate
b) Pyruvate
c) Phosphoenol pyruvate
d) 1, 3-bisphosphoglycerate

6) Complex I of ETC is also known as _____.
a) Cytochrome C oxidase
b) Succinate dehydrogenase
c) NADH ubiquinone oxidoreductase
d) Cytochrome oxidoreductase

7) The citric acid cycle occurs in the _____ in the eukaryotes.

a) cytoplam b) golgi apparatus
c) mitochondrial matrix d) RER

8) Which enzyme catalyzes the conversion of pyruvate to oxaloacetate?

a) Pyruvate carboxylase b) Pyruvate dehydrogenase
c) Pyruvate kinase d) Phosphofructokinase-1

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

a) Write a note on deamination reaction.
b) Give any four examples of ketogenic amino acids.
c) Define anabolism and catabolism.
d) Write a note on significance of HMP pathway.
e) Give an account on carnitine.

Q.3 Write notes of the following (Any Two) **08**

a) Biosynthesis of cholesterol.
b) Explain in detail glycogen synthesis.
c) Irreversible steps in gluconeogenesis.

Q.4 Write notes of the following (Any Two) **08**

a) Describe salvage pathway.
b) Laws of thermodynamics.
c) PFK as pacemaker enzyme.

Q.5 Answer the following (Any One) **08**

a) Explain in detail glycolysis and its energetics.
b) Give an account on P-oxidation of palmitic acid.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Enzymology Paper-II (BT1203)

Day & Date: Saturday, 24-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple choice questions. **08**

1) The term "enzymes" is coined by _____
a) Pasteur b) Buchner
c) Urey Miller d) Kuhne

2) The rule about _____ was not given by the enzyme commission.
a) Assigning each enzyme a name
b) Mention of cofactors
c) Dividing enzymes into 6 main groups
d) Assigning each enzyme a 4-digit code

3) Enzyme activity is affected by different factors because _____
a) they alter 3-D shape of enzyme
b) speed up the reaction
c) increases activation energy
d) both b and c

4) The mechanism through which enzymes boost reaction rates is _____
a) They decrease the stability of the transition state.
b) They lower the activation energy needed in the reaction.
c) They decrease the internal energy of the final product.
d) They decrease the reverse reaction rate and increase the forward reaction rate.

5) Multiple forms of the same enzyme is referred to as _____
a) allosteric enzyme b) Biosensor
c) Isoenzyme d) Effectors

6) Disadvantage of an immobilized enzyme is _____
a) Immobilization process allows continuous process
b) Immobilization mean additional cost
c) Increase productivity
d) Immobilization prevents loss of activity

7) Non-protein organic part of enzyme is called _____

a) Cofactor b) Coenzyme
c) Apoenzyme d) Isoenzyme

8) Enzymes are classified into _____ groups.

a) 6 b) 8
c) 10 d) 4

Q.2 Answer Any Four of the following **08**

a) What is simple enzyme?
b) Give example of any two enzymes belonging to hydrolase group.
c) What is the effect of substrate concentration on enzyme activity?
d) What is the significance of Km?
e) Define allosteric enzyme.
f) How is enzyme immobilized by cross linking?

Q.3 Write short notes on Any Two of the following **08**

a) i) Active site ii) Enzyme activators
b) Lactose dehydrogenase enzyme.
c) Effect on pH on enzyme activity with graph.

Q.4 Answer Any Two of the following **08**

a) Describe Lineweaver Burk plot.
b) What are isoenzymes? Give their application.
c) Describe in brief about classification and nomendature of enzymes.

Q.5 Answer any one of the following. **08**

a) Derive Michaelis-Menten equation and give the significance of Vm.
b) Write an account on enzyme immobilization.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Cell Physiology Paper- I (BT1204)

Day & Date: Monday, 26-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple choice questions **08**

1) _____ is the ability of a single cell to stick to another cell or an extracellular matrix (ECM).
a) Cell senescence b) Cell adhesion
c) Apoptosis d) PDC

2) _____ are cell adhesion molecules.
a) Integrins b) Ribosomes
c) Mitochondria d) Chloroplast

3) _____ messengers are small molecules and ions that relay signals received by cell-surface receptors to effector proteins.
a) Primary b) Second
c) Lytic d) CDKs

4) _____ is signaling molecule in glycogen metabolism.
a) Epinephrin b) Cytokinin
c) Auxin d) GA

5) _____ is a process of movement of molecules through a semi-permeable membrane from a region of lower concentration to higher concentration.
a) Osmosis b) Apoptosis
c) PDC d) Lysis

6) _____ is the fusion of secretory vesicles with the plasma membrane and results in the discharge of vesicle content into the extracellular space.
a) Endocytosis b) Phagocytosis
c) Exocytosis d) Pinocytosis

7) _____ is the movement of molecules along the concentration gradient to reach equilibrium.

a) Active transport b) Passive transport
c) Diffusion d) Chemotaxis

8) _____are clusters of intercellular channels that allow direct diffusion of ions and small molecules between adjacent cells.

a) Tight junction b) Desmosomes
c) Gap junctions d) Centromeres

Q.2 Answer any four of the following **08**

a) Define Chemotaxis.
b) What are cell adhesion molecules?
c) What is quorum sensing?
d) Differentiate between active and passive transport.
e) What is stress response in microbes?
f) Define endocytosis.

Q.3 Write short notes on any two of the following **08**

a) Extracellular matrix.
b) Signal transduction pathway e.g. epinephrine signaling in glycogen metabolism
c) Cell structure and function in digestive system

Q.4 Answer any two of the following **08**

a) Membrane pumps
b) Differentiate between endocytosis and exocytosis
c) Microbial growth

Q.5 Answer any one of the following **08**

a) Cell structure and function in different systems
b) Role of golgi and ER in protein synthesis and Vesicle trafficking

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Bioinstrumentation (Paper-II) (BT1205)

Day & Date: Tuesday, 27-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Draw neat diagrams and give equation whenever necessary.

Q.1 Multiple choice questions **08**

1) _____ is analytical technique that involves the transfer of a specific DNA, RNA or a protein separated on gel to a carrier membrane, for their detection or identification.
a) Blotting b) Centrifugation
c) Chromatography d) Spectroscopy

2) _____ are used as a light source for measurement in the visible spectrum and near-infrared ranges.
a) Halogen lamps b) Tungsten lamps
c) Deuterium lamps d) Ruby lamps

3) SDS-PAGE is an analytical method used to separate components of a _____ mixture based on their size.
a) Protein b) DNA
c) RNA d) Lipid

4) _____ is a method by which a radioactive material can be localized within a particular tissue, cell, cell organelles or even biomolecules.
a) Blotting b) Centrifugation
c) Chromatography d) Autoradiography

5) In paper chromatograph _____ layers in filter paper contain moisture which acts as a stationary phase.
a) Protein b) Cellulose
c) Ribose d) Silica

6) The basic principle of _____ is based on the measurement of light scattered by particles, and the fluorescence observed when these particles are passed in a stream through a laser beam.
a) Blotting b) flow cytometry
c) Chromatography d) Autoradiography

7) The _____ is the main body of the incubator consisting of a double-walled cuboidal enclosure with a capacity ranging from 20 to 800L.

a) Cabinet b) Door
c) control panel d) Thermostat

8) _____ is a natural linear polymer extracted from seaweed that forms a gel matrix,

a) DNA b) Agarose
c) RNA d) SDS

Q.2 Answer the following questions briefly (any four). **08**

a) Write a note on Lambert's law.
b) Enlist the applications of spectrophotometer.
c) What are X rays?
d) How to calculate RF value.
e) Give an account on applications of centrifuge.
f) What are X rays?

Q.3 Write notes on any two of the following **08**

a) Explain in detail Care and Maintenance of Autoclave.
b) Describe in detail Autoradiography.
c) Give an account on principles and applications of ECG.

Q.4 Write notes on any two of the following **08**

a) Write a note on colorimeter and its applications.
b) Describe in detail 2 D Gel electrophoresis.
c) What are different techniques used to visualized the results of TLC.

Q.5 Answer any one of the following **08**

a) Explain in detail working principal, instrumentation and application of UV spectrometer.
b) Give an account on Principle, applications of electrochemical and thermometric biosensors.

Seat No.	

Set | P

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Plant Physiology (Paper - I) (BT1206)

Day & Date: Wednesday, 28-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Draw neat diagrams and give equation whenever necessary.
4) Use of logarithmic table and calculator is allowed.
(At. Wts.: H=1, C=12, 0=16, N= 14, Na =23, Cl = 35.5)

Q.1 Multiple choice questions **08**

1) Plants obtain hydrogen from _____
   a) atmospheric hydrogen b) water in soil
   c) methane from fertilizers d) H2 from sunlight

2) Water loss in its liquid phase from special openings of veins near the tip of grass blades is termed as _____
   a) guttation b) exudation
   c) girdling d) transpiration

3) The amount of water lost by plants due to transpiration and guttation?
   a) 98% b) 12%
   c) 92% d) 50%

4) In C4 plants, Calvin cycle occurs in _____
   a) chloroplasts present in the grana of bundle sheath
   b) chloroplasts present in the grana of mesophyll
   c) chloroplasts present in the stroma of mesophyll
   d) chloroplasts present in the stroma of bundle sheath

5) In _____ phase of growth, rate of cell death is equal to cell division..
   a) Lag b) Log
   c) Decline d) Stationery

6) _____ tissue is involved in nutrient transport.
   a) Apical tissue b) Embryonic tissue
   c) Xylem d) Phloem

7) Differentiation of whole plant from single cell is called as _____
   a) Unipotency b) Division
   c) Totipotency d) Aging

8) Triple response is physiological role of _____

a) Auxin b) Cytokinin
c) Absicic acid d) Ethylene

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

a) Complex tissue
b) Plasmolysis
c) Macronutrients
d) Growth hormones
e) Photoresppiration
f) Ammonification

Q.3 Write short notes on the following.(Any Two) **08**

a) Write a note on histological organization of shoot apical meristem.
b) Explain in detail concept of two photosystem.
c) Describe in detail criteria for identification of essentiality of nutrients.

Q.4 Answer the following.(Any Two) **08**

a) Explain in detail growth curve.
b) Write a note on nitrate reduction and ammonium assimilation in plants.
c) Write note on mechanism of food transport by source to sink transport.

Q.5 Answer the following.(Any One) **08**

a) Write note on Stomatal opening and closing mechanism while transpiration.
b) Explain in detail physiological role and mode of action of auxin and gibberline plant hormone.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Tissue Culture (Paper-II) (BT1207)

Day & Date: Thursday, 29-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Draw neat diagrams and give equation whenever necessary.
4) Use of logarithmic table and calculator is allowed.
(At. Wts.: H=1, C=12, 0=16, N= 14, Na =23, Cl = 35.5)

Q.1 Multiple choice questions **08**

1) Long form of HEPA filter in Laminar Air Flow is _____
a) High efficiency particulate air
b) Hot efficiency particulate air
c) Hot effective particulate air
d) High efficiency pure air

2) _____ is not a basic requirement for animal cell culture.
a) Sterile environment
b) Appropriate growth medium
c) Uncontrolled temperature and pH
d) Adequate oxygen and carbon dioxide levels

3) In ATC the number of times that the culture has been sub-cultured is called as _____.
a) Saturation density b) Split ratio
c) Generation number d) Passage number

4) The highest feasible temperature of batch sterilization is _____.
a) 124° C b) 120° C
c) 122° C d) 121°C

5) _____ type of culture is prepared by inoculating directly from the tissue of an organism to culture media.
a) Primary ceil culture b) Secondary cell culture
c) Cell lines d) Transformed cell culture

6) The cell lines with limited culture life spans are referred to as _____
a) Infinite cell line b) Growing cell line
c) Counting cell line d) finite cell lines

7) From _____ organism first cell line was observed.

a) E.coli b) Sheep
c) Mouse d) Drosophila

8) The ratio of CO_2: O_2 used in cell culture system should be _____**.**

a) 1:5 b) 1:13
c) 1:19 d) 1:25

Q.2 Answer any four of the following **08**

a) Sterilization
b) Natural media
c) Aseptic condition
d) Trypsinization
e) Secondary cell culture
f) Anchorage dependent cell

Q.3 Write short notes on any two of the following **08**

a) Explain in detail laboratory structure of tissue culture laboratory.
b) Explain in detail technique used for sterilization of media.
c) Explain measurement of cell viability by Evans blue method.

Q.4 Answer any Two of the following **08**

a) Write note on Analysis of cell cycle: Tritiated thymidine pulse method.
b) Explain in detail cell line identification by isozyme method.
c) Write a note on criteria used for subculture.

Q.5 Answer any one of the following **08**

a) Define Synthetic media and explain in detail about Balanced salt Solution, Serum containing media, complete media.
b) Define organ culture and explain any two types of organ culture.

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Set P

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) : Examination
March/April - 2025
Computer Science (Paper-I) (BT1208)

Day & Date: Friday, 30-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of non-storage calculator is allowed.

Q.1 Multiple Choice questions. **08**

1) Which of the following is not a binary number?
a) 001 b) 101
c) 550 d) 110

2) Word files have a default extension of _____.
a) X1s b) X1w
c) Wk1 d) .doc

3) You organize files by storing them in _____.
a) Archives b) Folders
c) Indexes d) Lists

4) WWW stands for _____.
a) World Wide Wizard b) World Wide Web
c) Wide World Web d) World Wide Wonder

5) CPU is the _____ of computer.
a) Ear b) Brain
c) Eye d) Body

6) Any computer of computer you can see and touch is _____.
a) Hardware b) Software
c) Storage d) Peripheral

7) _____ is the chief of Microsoft.
a) Babbage b) Bill Gates
c) Bill Clinton d) Tim Lee

8) RAM stands for _____.
a) Random Origin Money b) Random Only Memory
c) Read Only Memory d) Random Access Memory

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

a) What is meant by Storage Unit?
b) Define- Hardware.
c) Write example of input and output devices.
d) Define- browser.
e) What is the function of RAM?
f) What are basic components of digital computer?

Q.3 Write short note on the following. (Any Two) **08**

a) Write brief account on introduction and history of computer.
b) Explain types of software with examples.
c) Write and explain computer features and application in details.

Q.4 Answer the following. (Any Two) **08**

a) Write brief account on Computer organization.
b) Write and explain number system with examples.
c) Write brief account on generation of computers.

Q.5 Answer the following. (Any One) **08**

a) Write a brief account on MS-Office and its products.
b) Describe in detail operating system with its types.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - II) (New) (CBCS) Examination
March/April - 2025
Biostatistics (Paper - II) (BT1209)

Day & Date: Monday, 02-June-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Draw neat & well labeled diagram wherever necessary.

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

1) _____ is that branch of statistics concerned with the mathematical facts and data related to biological events.
a) Biometry b) Biolab
c) Biostatistics d) Biography

2) Quantities that do not vary is called _____.
a) Variable b) Constant
c) Value d) Place

3) The collective recording of observations either numerical or otherwise is called _____.
a) Data b) Knowledge
c) file d) Documents

4) _____ means the group of individuals who actually available for investigation.
a) Population b) Group
c) Select d) Sample

5) No space between the cells on a _____.
a) Bar graph b) Pie graph
c) Histogram d) Scatter graph

6) _____ is obtained by adding the individual observations divided by the total number of observations.
a) Mode b) Mean
c) Median d) Range

7) _____ is the degree of spread or variation of the variable about a central value.
a) Dispersion b) Mode
c) Freedom d) Gap

8) ANOVA stands for _____.

a) Analysis of Velocity b) Analysis of Variance
c) Average of Variance d) Assign of Variance

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

a) Define Median.
b) Write merits of Mean.
c) Find the range of given data: 81,84,44,75,88,68,83.
d) Define 'standard deviation' also write its formula.
e) Define regression. Give an example.
f) Write merits of range.

Q.3 Write note on the following. (Any Two) **08**

a) Write a note on Classification of data and explain its types.
b) Describe brief account on Hypothesis testing.
c) Write brief account on History and Application of Biostatistics.

Q.4 Write notes on the following. (Any Two) **08**

a) Describe correlation detail with its types.
b) Explain parts of table in detail.
c) Write a brief account on graphical representation of data.

Q.5 Answer of the following. (Any One) **08**

a) Write a brief account on classification of Measures of central tendency.
b) Write and explain measures of dispersion and its types.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: March/April - 2025
Genetics - I (BT1301)

Day & Date: Thursday, 05-June-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple Choice questions. **08**

1) Considering the concept of Multiple alleles, one organism can have _____ alleles.
a) One b) Two
c) Three d) Four

2) The tendency of two or more than two genes to stay together during inheritance is called _____.
a) Genetics b) Gene interaction
c) Crossing over d) Linkage

3) An X linked recessive gene would appear to _____.
a) Be expressed in both males and females equally
b) Skip generations
c) Be lethal
d) Gradually degrade

4) ABO blood group is not an example of _____.
a) Co dominance b) Multiple allele
c) Epistasis d) Mendelian relations

5) In case of codominance product is _____.
a) Produced from both the alleles
b) Produced from one allele
c) Incompletely produced from both alleles
d) None are functional

6) The eye colour of drosophila is _____.
a) Autosomal b) Codominant
c) X linked d) Y linked

7) Which of the following is not a type of plasmid?
a) F b) R
c) Ti d) T4

8) In case of incomplete dominance monohybrid F1 _____ is 1:2:1.
a) Genotype
b) Phenotype
c) Bothe genotype and phenotype
d) The ratio is wrong

Q.2 Answer the following question: (Any Four) **08**
a) Define conjugation.
b) Define Linkage.
c) Define inhibitory gene.
d) Define epistasis.
e) Define transduction.
f) Define plasmid.

Q.3 Write short notes on the following: (Any Two) **08**
a) Interaction of complementary genes.
b) Crossing over- theories.
c) Genetic system in mitochondria.

Q.4 Answer the following question: (Any Two) **08**
a) Write a note on structure of Sex Chromosomes.
b) Write a note on Mapping by tetrad analysis.
c) Write a note on the Genetic Organization of Bacteria.

Q.5 Answer the following question: (Any One) **08**
a) Define Alleles and describe in details a multiple Alleles and Pseudo alleles with examples.
b) What is Mendel's Law of dominance? explain in details with monohybrid and Dihybrid crosses.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: March/April – 2025
Genetics-II (BT1302)

Day & Date: Friday, 06-June-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple Choice questions. **08**

1) _____ phase is involved in the conversion of chromatin to chromosome.
a) S- phase b) M- phase
c) G2- phase d) G1 - phase

2) _____ does not belong to factors affecting the Hardy Weinberg principle.
a) Gene migration b) Genetic drift
c) Genetic drop d) Mutation

3) Euploidy is a chromosomal variation in _____.
a) Size b) Position of genes
c) Number d) Structure

4) _____ is less condensed, less stained portion of chromatin.
a) Metaphase b) Interphase
c) Heterochromatin d) Euchromatin

5) Which of the following is not a part of a gene?
a) Ori b) Promoter
c) Operon d) Terminator

6) What is the substitution of a purine base with a pyrimidine base known as?
a) Deletion b) Transition
c) Addition d) Transversion

7) _____ have been used to analyze relationship between different human populations.
a) Circular DNA b) Mitochondrial DNA
c) Minisatellite DNA d) Microsatellite DNA

8) Which of the following is NOT the dye-based chromosome banding?
a) Giemsa b) Reverse
c) Centromere d) Metacentric

Q.2 Answer the following Question. (Any Four) **08**

a) Define gene frequency.
b) Define polyploidy.
c) Define Lampbrush chromosome.
d) Define insertion sequences.
e) Define Draw structure of chromosome.
f) Define Transgressive segregation.

Q.3 Write short notes. (Any Two) **08**

a) Evolutions in some crop plants and animals.
b) Chromosomal abrasions.
c) Handling of quantitative data.

Q.4 Answer the following. (Any Two) **08**

a) Write a note on Hardy-Weinberg law.
b) Write a note on Multiple factor hypothesis.
c) Write a note on Heterochromatin and euchromatin.

Q.5 Answer the following. (Any One) **08**

a) Define mutation, explain in details its types, and add a note on mutagenic agents.
b) Define transposition explain its structure, target sites and types.

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Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: March/April - 2025
General Microbiology- I (BT1303)

Day & Date: Monday, 09-June-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple Choice questions. **08**

1) _____ was the term used by Antonie van Leeuwenhoek for small unicellular organisms.
a) Cell b) Unit
c) Animalcules d) Dinosaurs

2) The famous swan-neck flask used by _____ during his studies on spontaneous generation.
a) Pasteur b) Leeuwenhoek
c) Koch d) Lister

3) In which of the following kingdom are Archaea and Nitrogen-fixing organisms classified?
a) Animalia b) Plantae
c) Monera d) Fungi

4) What is a taxon?
a) A group of related families b) A type of living organisms
c) A group of related species d) A group of any ranking

5) Flagella in bacteria enable them to _____.
a) Reproduce b) Locomote
c) Thrive in nutrient agar d) Adhere to tissue surfaces

6) An organism that can synthesize all its required organic components from CO_2 using energy from the sun is a _____.
a) Photoautotroph b) Photoheterotroph
c) Chemoautotroph d) Chemoheterotroph

7) _____ is a treatment that frees the treated object of all living organisms.
a) Incubation b) Sterilization
c) Growth d) Digestion

8) _____ is the working principle of autoclave for sterilization of objects.
a) Steam under pressure b) Filtration
c) Extreme dry heat d) Incineration

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

a) Differentiate between Spontaneous generation and Biogenesis.
b) Define vaccine.
c) Define species.
d) Differentiate between eubacteria and Archaebacteria.
e) What are Prions?
f) Enlist Chemical agents of Sterilization.

Q.3 Write notes on the following. (Any Two) **08**

a) Whittaker's five kingdom classification system.
b) Nutritional requirement of microorganisms.
c) Structure and function of cell wall

Q.4 Write notes on the following. (Any Two) **08**

a) Contributions of Louis Pasteur.
b) Growth curve.
c) Chemical agents of Sterilization.

Q.5 Answer the following. (Any One) **08**

a) Give a comparative account on Prokaryotic and Eukaryotic microorganisms.
b) Explain in detail Microbial growth in response to environment.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: March/April - 2025
General Microbiology - II (BT1304)

Day & Date: Tuesday, 10-June-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple Choice questions. **08**

1) On Mac Conkey's medium E.Coli forms _____.
a) Colorless colonies b) Greenish pigmentation
c) Pink coloured colonies d) Medusa head appearance

2) To transfer cultures from one place to another, the device used is _____.
a) Slant b) Needle
c) Inoculation loop d) Autoclave

3) Blood agar medium is _____.
a) Enrichment medium b) Enriched medium
c) Selective medium d) Differential medium

4) In Gram-staining, iodine is used as a _____.
a) Fixative b) Mordant
c) Solublizer d) Stain

5) Which part of the compound microscope helps in gathering and focusing light rays on the specimen to be viewed? _____.
a) Eyepiece lens b) objective lens
c) condenser lens d) magnifying lens

6) Total Magnification is obtained by _____.
a) Magnifying power of the objective lens
b) Magnifying power of eyepiece
c) Magnifying power of condenser lens
d) Magnifying power of both the objective lens and eyepiece

7) What is the temperature of liquid nitrogen? _____.
a) -120 degree C b) 0 degree C
c) -150 degree C d) -196 degree C

8) Type of medium used in Citrate utilization test is? _____.
a) Koser's citrate medium b) MR-VP medium
c) Common agar medium d) None of the above

Q.2 Answer the following question. (Any Four) **08**

a) Define Selective media and differential media.
b) What is a stain?
c) Define culture media and mention its types.
d) Define enriched media and give its examples.
e) What is a pure culture?
f) Define semisynthetic media and give its examples.

Q.3 Write short note on the following. (Any Two) **08**

a) Living media.
b) Cell wall staining.
c) Spread plate technique.

Q.4 Answer the following question. (Any Two) **08**

a) Explain peptidoglycan theory.
b) Differentiate between SEM and TEM.
c) Explain Negative staining process.

Q.5 Answer the following question. (Any One) **08**

a) Explain the parts and function of compound microscope with neat and labeled diagram.
b) Explain about the methods of preservation of pure culture.

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) : Examination
March/April - 2025
Plant Biotechnology- I (BT1305)

Day & Date: Wednesday, 11-June-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple Choice questions. **08**

1) Select a microelement from the following required for plant nutrition.
a) Phosphorus b) Zinc
c) Nitrogen d) Sulfur

2) _____ (1987) have proposed that the essential element can be classified according to their biochemical role and physiological function.
a) Murashige and Skoog b) Gamborget. al.
c) Mengel and Kirby d) Nisch and Nisch

3) Acclimatization of micro propagated plants on a large scale is generally carried out in _____.
a) Refrigerator b) Polyhouse
c) Soil d) Water

4) The inherent potentiality of a plant cell to give rise to a whole plant is known as _____.
a) Cytodifferentiation b) Redifferentiation
c) Dedifferentiation d) Totipotency

5) _____ have been used as the explant to produce androgenic haploids.
a) Ovary b) Anther
c) Meristem d) Ovule

6) _____ is known as the Father of embryology.
a) Hamberlandt b) Murashige
c) Skoog d) Maheshwari and Guha

7) In _____, preservation and storage of cells, tissues and organs is done by immersion into liquid nitrogen.
a) Medium b) Washing
c) surface sterilization d) Cryopreservation

8) Plant tissue culture media can be sterilized by using _____.
a) Autoclave b) Incubator
c) Refrigerator d) Centrifuge

Q.2 Answer the following questions briefly. (any four) **08**

a) What is surface sterilization?
b) Differentiate between androgenesis and gynogenesis.
c) What is an explant?
d) Define cryoprotectant with an example.
e) Enlist Viability Methods.
f) Explain Advantages Of Greenhouse.

Q.3 Write notes on any two of the following. **08**

a) Androgenic Haploids.
b) Embryo Culture and rescue.
c) Advantages and disadvantages of conventional plant breeding and plant tissue culture.

Q.4 Write notes on two of the following. **08**

a) Gynogenic Haploids.
b) Types of Greenhouse Based on Shape.
c) Chromosome elimination techniques for production of haploids.

Q.5 Answer any one of the following. **08**

a) Discuss basic techniques in Plant Tissue Culture.
b) Give a detailed account on cryopreservation.

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: March/April - 2025
Plant Biotechnology - II (BT1306)

Day & Date: Thursday, 12-June-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.
(At. Wts.: H=1, C=12, 0=16, N= 14, Na =23, Cl = 35.5)

Q.1 Choose the correct alternative and rewrite the following sentences. 08

1) The _____ is a pair of biofertilizers.
a) *Azolla* and BGA b) *Salmonella* and *E.coli*
c) *Nostoc* and legume d) *Rhizobium* and grasses

2) The Ti plasmid is found in _____.
a) *Azotobacter*
b) Yeast as a 2mm plasmid
c) *Rhizobium* of the roots of leguminous plants
d) *Agrobacterium*

3) Salts and water in hydroponic plants are absorbed by _____.
a) Outer Layer of plants b) Stem
c) Roots d) Leaves

4) _____ is an aerobic nitrogen-fixing bacterium.
a) *Azotobacter* b) *Clostridium*
c) *Rhodospirillum* d) *Rhodopseudomonas*

5) _____ is used as a biofertilizer for soybean crop.
a) *Azotobacter* b) *Azospirillum*
c) *Rhizobium* d) *Nostoc*

6) Hydroponics is a method of cultivation of plants without the use of _____.
a) Sunlight b) Water
c) Soil d) Air

7) The process of expression of foreign genes in a plant is called _____.
a) Cell hybridization b) Transgenesis
c) Genetic transformation d) Gene expression

8) The size of the T-DNA is around _____.

a) 15 - 30 kb b) 10 - 20 kb

c) 5 - 10 kb d) 25 - 30 kb

Q.2 Answer the following question. (Any Four) **08**

a) Define Hydroponic culture.

b) Define Edible vaccines

c) What is Biotransformation?

d) Explain Ri plasmids as vector.

e) Define Biocontrol of pathogens.

f) Define nodulation.

Q.3 Write short notes on the following. (Any Two) **08**

a) Explain Agrobacterium - mediated gene transfer.

b) Write a note on Direct method of gene transfer

c) Discuss about Plant growth promoting bacteria.

Q.4 Answer the following question. (Any Two) **08**

a) Write a detailed note on molecular pharming.

b) Discuss in detail about electroporation and microinjection.

c) Add a note on floriculture and horticulture.

Q.5 Answer the following question. (Any One) **08**

a) Define vermicompost and add detailed note on vermicomposting technology.

b) Define Biofertilizers and Explain its types and production.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: March/April - 2025
MOLECULAR BIOLOGY (PAPER-I)
(BT1401)

Day & Date: Wednesday, 30-April-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple Choice questions. **08**

1) _____ enzyme used for unwinding the double stranded DNA.
a) RNase b) Helicase
c) Ligase d) DNA polymerase

2) _____ Nucleotides belongs to Purine.
a) A, G b) C, T
c) G, T d) A, C

3) In eukaryotes replication process occurs in _____.
a) Nucleus b) Cytoplasm
c) Endoplasmic reticulum d) Golgi IV

4) _____ is not the type of DNA.
a) A form b) B form
c) Z form d) T form

5) _____ mechanism will remove uracil and incorporate the correct base.
a) Direct repair b) Base Excision repair
c) Nucleotide excision repair d) Mismatch repair

6) _____ type of DNA polymerase has 3 prime to 5 prime exonuclease activity.
a) DNA Polymerase - I b) DNA Polymerase - II
c) DNA Polymerase - III d) DNA Polymerase - IV

7) Mitochondrial inheritance was discovered by _____.
a) Carl Corren b) Charles Darwin
c) B. Ephrusi d) E. Tatum

8) _____ is known as the father of Molecular Biology.
a) Linus Pauling b) Harshy and chase
c) Watson and Crick d) T. Boveri

Q.2 Define the following questions. (Any Four) **08**

a) Gene
b) RNA Priming
c) Topoisomerase
d) Extra Inheritance
e) Mutation
f) Denaturation and renaturation

Q.3 Write a short note. (Any Two) **08**

a) Write a note on structure of double stranded DNA helix with labelled diagram.
b) Write down the structure and function of DNA Polymerase in eukaryotes.
c) Write a note on SOS repair mechanism.

Q.4 Answer the following. (Any Two) **08**

a) Describe in detail of mitochondrial DNA.
b) Write a note on Experimental evidence of DNA as Genetic material.
c) Describe any two mutagenic agents.

Q.5 Answer the following. (Any One) **08**

a) Explain in detailed the process of initiation, elongation & termination of Replication process in Prokaryotes.
b) Describe in detail about the organization of DNA in eukaryotes.

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: March/April - 2025
MOLECULAR BIOLOGY (PAPER-II) (BT1402)

Day & Date: Friday, 02-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple Choice Questions. **08**

1) _____ enzyme used for transcription.
a) RNase b) Restriction Enzyme
c) RNA polymerase d) DNA polymerase

2) The primary role of tRNA in protein synthesis is _____.
a) Proofreading b) Inhibition
c) Terminator d) Silencer

3) In prokaryotes transcription process occurs in _____.
a) Nucleus b) Cytoplasm
c) Endoplasmic reticulum d) Golgi IV

4) _____ is not the part of non-coding RNA.
a) rRNA b) mRNA
c) tRNA d) sn RNA

5) _____ biomolecule undergoes in to the post translational modification.
a) Carbohydrates b) Proteins
c) Nucleic acids d) Lipids

6) _____ sigma factor used for promoter recognition.
a) Sigma 32 b) Sigma 70
c) Sigma 60 d) Sigma 40

7) _____ is not the stop codon.
a) AUG b) UGA
c) UAA d) UAG

8) mRNA is also known as _____.
a) Transcript b) Transverse
c) Transform d) Transition

Q.2 Answer any four of the following. **08**

a) Name any four transcription protein factors.
b) What is mean by Promotor region?
c) Enlist any two differences between introns and exons.
d) What are the diverse functions of TFII H?
e) Write the role of each subunit of E.coli RNA polymerase.
f) What is Genetic code?

Q.3 Write a short note on any two of the following. **08**

a) Write a note on structure of spliceosome with labelled diagram.
b) Write down the properties of genetic code.
c) Write a note on Structure & Function of amino acyl tRNA synthetase.

Q.4 Answer any two of the following. **08**

a) What is the difference between prokaryotic & eukaryotic translation process?
b) Describe the process of Rho dependent and rho independent termination in prokaryotes.
c) Describe any four post-translational modifications.

Q.5 Answer any one of the following. **08**

a) Explain in detailed the process of initiation, elongation & termination of transcription process in Prokaryotes.
b) Describe in detail, different ways of RNA editing with examples.

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: March/April - 2025
Immunology (Paper - I) (BT1403)

Day & Date: Saturday, 03-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Choose the correct alternatives from the given options. 08

1) A state of protection from a particular infectious disease called as _____.
a) Immunity b) Antigen
c) Hapten d) Adjuvant

2) _____ is a group of serum proteins that lead to membrane attack complex on pathogen for recognition and elimination.
a) Complement b) Cytokine
c) MHC d) CAM

3) _____ is secondary lymphoid organ where old erythrocytes are destroyed and blood borne antigens are trapped.
a) Thymus b) Bone marrow
c) Spleen d) Liver

4) B-cells play _____ role in immune system.
a) antibody production b) antigen presentation
c) cytokine production d) all of the above

5) Maturation of T-lymphocytes occurs in _____.
a) thymus b) bone marrow
c) lymph node d) Spleen

6) The attribute of a given single cytokine with different biological effects on different target cells is known as _____.
a) pleiotropy b) redundancy
c) synergy d) antagonism

7) _____ is enzyme that breaks down the C3 component of complement into C3a and C3b.
a) C3 convertase b) Lysozyme
c) Isozyme d) granzyme

8) _____ is a group of genes encoding cell-surface molecules that are required for antigen presentation to T cells and for rapid graft rejection.

a) immunogen b) epitope
c) hapten d) MHC

Q.2 Answer any four of the following **08**

a) Explain skin as a barrier of First line of Defense of innate immunity.
b) Enlist the functions of Mononuclear phagocytes
c) Differentiate between immunogenicity and antigenicity
d) Enlist antibody classes.
e) Which cells display class I and class II MHC molecules?
f) Explain adjuvant with an example.

Q.3 Write notes on any two of the following **08**

a) Properties of cytokines
b) Components and functions of complement system
c) Basic structure of antibody

Q.4 Write notes on two of the following. **08**

a) Structure of class I MHC molecule
b) Properties of immunogen
c) Structure and functions of lymph node

Q.5 Answer any one of the following. **08**

a) Describe structure and functions of primary lymphoid organs.
b) Discuss in detail Cellular Processes in nonspecific defense mechanism.

Seat No.		Set	P

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: March/April - 2025
Immunology (Paper - II) (BT1404)

Day & Date: Monday, 05-May-2025 Total Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple choice questions. **08**

1) Host defenses that are mediated by B cells and T cells following exposure to antigen and that exhibit specificity, diversity, memory, and self-nonself-discrimination known as ____.
a) Adaptive immunity b) Autoimmunity
c) Allergy d) Cancer

2) ____ antigens are processed and presented along with class II MHC molecules.
a) Exogenous b) Endogenous
c) tumor d) Inert

3) ____ is an abnormal immune response against self-antigens.
a) Autoimmunity b) Anergy
c) Energy d) Enthalpy

4) ____ is an organ specific autoimmune disorder.
a) Grave's disease b) Rheumatoid Arthritis
c) hypersensitivity d) Tumor

5) A colorless substance that is transformed into colored products by an enzymatic reaction is referred to as ____.
a) Chromogenic substance b) Antigen
c) Radioactive substance d) Antibody

6) ____ is the immune response to an antigen that has been previously introduced and recognized by adaptive immune cells.
a) Primary response b) Secondary response
c) Tertiary response d) Antibiotic response

7) ____ is a temporary adaptive immunity conferred by the transfer of immune products, such as antibody (antiserum), from an immune individual to a nonimmune one.

a) Live-attenuated b) Possessive immunity
c) Passive immunity d) Active immunity

8) ____ is an antigen independent phase of B cell development.

a) Maturation b) Activation
c) Apoptosis d) Necrosis

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

1) Differentiate between precipitation and agglutination.
2) Enlist Components of Humoral Immunity
3) Write features of antigen-antibody interaction.
4) Explain cross reactivity.
5) Differentiate between active and passive immunization.
6) Mention Nonspecific immunity to viruses.

Q.3 Write Notes (Any Two) of the following. **08**

a) Antibody production against T cell dependent and independent antigens.
b) Subunit vaccine
c) Immunodiffusion

Q.4 Write Notes (Any Two) of the following. **08**

a) Primary and secondary immune response
b) Immunity to Protozoa infections
c) Myasthenia Gravis

Q.5 Answer (Any One) of the following. **08**

a) Give a detailed account on ELISA.
b) Explain in detail Processing of Exogenous Antigens by the endocytic Pathway.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: March/April - 2025
ANIMAL BIOTECHNOLOGY (PAPER-I) (BT1405)

Day & Date: Tuesday, 06-May-2025 Max. Marks: 40
Time: 12:00 PM 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.

Q.1 Choose the correct alternatives from the options. **08**

1) _____ are also known as somatic stem cells.
a) Adult stem cells b) Cancer cells
c) Endometrial cells d) Epithelial cell

2) Pronuclear microinjection usually involves the direct transfer of DNA into the _____ of the fertilized mouse egg.
a) female pronucleus b) male pronucleus
c) both a and b d) none of these

3) _____ was the first mammal to be generated by nuclear transfer from an adult cell.
a) Bonnie b) Dolly
c) Morag d) Megan

4) Which of the following techniques is facing bioethical issues?
a) DNA microarray b) Fluorescence activated cell
c) Sorter d) Embryonic stem cell therapy

5) What is a cell line?
a) Multilayer culture b) Transformed cells
c) Multiple growth of cells d) Sub culturing of primary culture

6) What does IVF stand for?
a) In vivo fertilization b) In vitro fertilization
c) In vivo fermentation d) In vitro fermentation

7) Embryonic stem cells are derived from the _____ of the blastocyst.
a) Inner cell mass b) Ectoderm
c) Blastocoel d) Mesoderm

8) _____ means that attachment to the substrate is a prerequisite for cell proliferation.
a) Anchorage dependence b) Confluence
c) Contact inhibition d) All of these

Q.2 Answer any four of the following. **08**

a) Define transgenesis.
b) Define conservation biology.
c) Define cell viability.
d) Define stem cell.
e) Define transfection.
f) Define biosafety

Q.3 Write short notes on any two of the following **08**

a) Write a note on types of stem cell.
b) Describe IVF technology.
c) Describe Cartagena protocol on biosafety

Q.4 Answer any Two of the following. **08**

a) Describe GMP and GLP.
b) Describe embryo transfer techniques.
c) Describe characterization of cultured cell.

Q.5 Answer any one of the following. **08**

a) Define primary cell culture explain in detail steps involved in its method.
b) What is genetic manipulation? Explain its gene transfer methods in details.

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: March/April - 2025
ANIMAL BIOTECHNOLOGY (PAPER-II) (BT1406)

Day & Date: Wednesday, 07-May-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple choice questions **08**

1) Which carries a DNA sequence into a host?
a) Plasmid b) tRNA
c) mRNA d) Vector

2) Transgenic animals have _____
a) foreign protein b) foreign gene
c) foreign lipid d) foreign amino acid

3) The first transgenic cow was produced in?
a) 1983 b) 1995
c) 1997 d) 2000

4) What kind of disease can be cured with the help of gene therapy?
a) Infectious b) Hereditary
c) Physiological d) Acute

5) _____ Standards are required to evaluate the morality of all human activities.
a) Pathological b) Social
c) Ethical d) Psychological

6) Foot and mouth disease of cattle is caused by _____.
a) fungi b) virus
c) bacteria d) worm
.

7) Coccidiosis in poultry is caused by _____.
a) Virus b) Fungi
c) Bacteria d) Protozoan

8) The patents granted for biological entities and products derived from them are called _____.
a) ethics b) patents
c) bio-patents d) biosafety

Q.2 Answer of the following. (Any Four) **08**

a) Write a brief account on Theileriosis.
b) Define Ex-vivo gene therapy.
c) Define transgenic animal.
d) Define vector.
e) Define molecular pharming.
f) Define Bioethics.

Q.3 Write short notes. (Any Two) **08**

a) Describe Gene therapy in curing disease.
b) Gene augmentation therapy.
c) Transgenic bird

Q.4 Answer of the following. (Any Two) **08**

a) Explain in brief about coccidiosis.
b) Write a note on Monoclonal antibody production.
c) Write the applications of animal biotechnology.

Q.5 Answer the following. (Any One) **08**

a) What is Bioethics? Explain in detail ethical issues associated with genetically modified animal and food.
b) Explain in detail trypanosomiasis.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: March/April - 2025
English
Business English (BT1501)

Day & Date: Wednesday, 30-April-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Choose the correct alternatives from the given options. **08**

1) What, according to the poet, is the first stage of human life?
a) death b) old age
c) being a student d) infancy

2) A. P. J. Abdul Kalam spends twenty years in _____.
a) ISRO b) USA
c) England d) India

3) How did Phatik become ill?
a) malaria
b) ate bad food
c) walked home in the rain with a fever
d) seasonal flu

4) What order does the king give to his Vizier?
a) to find five new bribes b) to find seven new bribes
c) to replace the queen d) to find expensive diamonds

5) The _____ refers to the small village school where the schoolmaster taught.
a) noisy women b) noisy men
c) noisy animals d) noisy mansion

6) According to D. H. Lawrence what should be free?
a) education b) fire
c) land d) transport

7) The girl _____ by a cat.
a) were bitten b) bitten
c) had bitten d) was bitten

8) I was so _____ that I could not even have my dinner.
a) tied up b) tied down
c) tied in d) tied on

Q.2 Answer the following question. (Any Four) **12**

a) Describe the thinking of Indian people through the prose ‘My vision for India’.
b) Justify the title of the story ‘The Homecoming'?
c) Describe the life of queen Gulnaar.
d) What is the message of the poem ‘Money Madness’?
e) Explain the line, ‘That one small head could carry all he knew’.
f) Describe the seven stages of man through the poem ‘All the World’s a Stage’.

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

a) In the middle of your project, differences arose among the members of your group over a minor issue. What steps will you initiate to resolve the issue and ensure that harmony prevails?
b) Write a detailed note on the 4 C’s and their importance.

Q.4 Write any ten 21st century skills and their importance. **10**

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: March/April - 2025
Bioprocess Technology (BT1502)

Day & Date: Sunday, 18-May-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

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

Q.1 A) Multiple choice questions. **10**

1) Which Growth phase is usually longer in continuous culture?
a) Lag b) Exponential
c) Stationary d) Death

2) Which of the following is an upstream process?
a) Product recovery b) Product purification
c) Media formulation d) Cell lysis

3) In bioreactor aeration is achieved by _____.
a) Impeller b) Sparger
c) pH sensor d) Water jackets

4) _____ equation describes the relationship between μ and residual growth limiting substance.
a) Eyring equation b) Van't Hoff equation
c) Arrhenius equation d) Monad equation

5) Micro-carrier beads are used in _____.
a) Fluidized-bed b) Bubble column
c) Photobioreactor d) All of these

6) Molasses is the waste of _____ industry.
a) Food & Dairy b) Alcohol
c) Paper & Pulp d) Sugar refinery

7) A culture system with constant environmental conditions maintained through continual provision of nutrient and removal of wastes is called _____ culture system.
a) Continuous b) Batch
c) Fed-batch d) Semi continuous

8) The last phase of Bacterial growth curve is _____ phase.
a) Lag b) Log
c) Exponential d) Death

9) Fed-batch culture is a _____ culture system.
a) Open b) closed
c) Isolated d) Semi-closed

10) Which of the following is not a product of fermentation?
a) Oxygen b) Carbon dioxide
c) Ethanol d) Lactate

B) Answer in one sentence: **06**

1) Enlist names of microorganisms used in bioprocess as microbial culture.
2) Define batch culture.
3) Give one Microbe involved in lactic acid production.
4) What is downstreaming processing.
5) What is inoculum media.
6) Define effluent.

Q.2 Solve any eight of the following. **16**

1) Give any two examples of antifoam agents.
2) Define sterilization.
3) Write two uses of single celled protein.
4) What is transformation.
5) Write functions of impeller.
6) Write any two uses of recombinant technology in fermentation.
7) Write any two biological parameters that needs to be controlled in fermentation process.
8) State the applications of air lift bioreactor.
9) Mention the role of Nitrogen sources in fermentation media.
10) Define any two purification methods.

Q.3 A) Attempt any two of the following. **10**

1) Write a note on media preparation.
2) Write a note on microbial production of lactic acid.
3) Write a note on Chronological development in fermentation industry.

B) Attempt the following. **06**

1) Explain the basic principle components of fermentation technology.
2) Draw a well-labelled diagram of bioreactor.

Q.4 A) Attempt any two of the following. **08**

1) Write a note on fed- batch culture.
2) Write a note on product recovery.
3) Describe the phases of bacterial growth curve.

B) Attempt the following. **08**

Explain the microbial production of ethanol.

Q.5 Attempt any two of the following. **16**

a) Explain the design and operation of fluidized-bed reactor.

b) Write a note on sterilization of air.

c) Describe the growth kinetics and product formation in batch culture.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: March/April - 2025
Recombinant DNA Technology (BT1503)

Day & Date: Sunday, 25-May-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

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

Q.1 A) Select the correct alternative. **10**

1) Restriction enzymes were discovered by _____.
   a) Smith and Nathans b) Alexander Fleming
   c) Berg d) Watson and Crick

2) Bacteria protect themselves from viruses by fragmenting viral DNA with _____.
   a) Ligase b) Endonuclease
   c) Exonuclease d) Gyrase

3) Klenow fragment is derived from _____.
   a) DNA Ligase b) DNA Pol-I
   c) DNA Pol-II d) Reverse Transcriptase

4) The vaccines prepared through recombinant DNA technology are ___.
   a) Third generation vaccines
   b) First-generation vaccines
   c) Second-generation vaccines
   d) Next generation vaccines

5) Which is a genetically modified crop?
   a) Bt-cotton b) Flavr savr
   c) Golden rice d) All of these

6) The expression of a transgene in the target tissue is identified by a __.
   a) Transgene b) Promoter
   c) Enhancer d) Reporter

7) A gene whose expression helps to identify transformed cells is known as _____.
   a) Plasmid b) Selectable marker
   c) Structural gene d) vector

8) Which one of the following is a DNA transfer technique in bacteria?
   a) ultrasonication
   b) Blue-white screening
   c) immunological screening
   d) colony hybridization

9) _____ is a technique for DNA sequencing based upon the selective incorporation of chain-terminating dideoxynucleotides (ddNTPs) by DNA-polymerase during in vitro DNA replication.
   a) Maxam and Gilbert sequencing
   b) Sanger sequencing
   c) Southern blotting
   d) ELISA

10) _____ is a molecular marker that uses restriction enzymes to cut DNA strands at specific sites, producing fragments of different lengths.
   a) RFLP
   b) RAPD
   c) QLT
   d) SST

B) Define the following **06**

1) Gene targeting
2) Restriction endonuclease
3) Transduction
4) Probes
5) Molecular Markers
6) Edible vaccines

Q.2 Solve any Eight of the following. **16**

a) Write functions of DNA Polymerase I.
b) Enlist types of Restriction endonuclease with suitable example.
c) Differentiate between transformation and transduction.
d) What is ultrasonication?
e) What are molecular markers? Give examples of it.
f) Define plantibodies.
g) What is Senescence? Give an example of Senescence - tolerant transgenic plant.
h) Write about pBR322.
i) What are Shuttle vectors?
j) Enlist Examples of proteins produced in animal cells.

Q.3 A) Attempt any Two of the following. **10**

i) Explain the basic principle of Sanger's method of DNA sequencing.
ii) Write a note on Exonucleases and Endonucleases.
iii) Explain Blue-white screening.

B) Short note/Solve **06**

Explain the basic principle of Maxam and Gilbert's method of DNA sequencing.

Q.4 A) Attempt any Two of the following. **08**

i) Write a short note on probes.

ii) Write a short note on biotic Stress tolerant plants.

iii) Explain the method of colony hybridization for Screening of recombinants.

B) Describe/ Explain/ Solve: **08**

Give a detailed account on PCR and write applications of PCR.

Q.5 Attempt any Two of the following. **16**

a) Give a detailed account on vectors used in recombinant DNA technology.

b) Explain DNA transfer technique in bacteria: transformation.

c) Give a detailed account on enzymes used in recombinant DNA technology.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: March/April - 2025
Bioinformatics (BT1504)

Day & Date: Monday, 05-May-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

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

Q.1 A) Rewrite the following sentences by using correct alternative. **10**

1) Henikoff & Henikoff developed _____ scoring Matrices.
a) BLOSUM b) PAM
c) MAP d) ENSEMBL

2) Search engine of NCBI _____
a) SRS b) Entrez
c) Altas d) BankIt

3) Mother of bioinformatics _____
a) Margaret dayhoff b) Charles Babbage
c) David Lipman d) Altschul

4) SCOP stands for structural classification of _____
a) DNA b) Lipids
c) Protein d) Carbohydrates

5) Needleman-Wunsch algorithm is used for _____ alignment
a) Global b) Local
c) Pairwise d) Multiple

6) Bioinformatics has been used for _____ analysis of biological queries using mathematical and statistical techniques.
a) In situ b) In vivo
c) In vitro d) In silico

7) The PubMed provides information of _____ database.
a) Nucleotide b) Protein
c) Genome d) Literature

8) Point _____ mutation is scoring matrices used for substitution the scores in alignment.
a) Accepted b) Single
c) Assigned d) Acid

9) BLAST sequence alignment tool was designed by _____

a) Dayhoff b) Altschul
c) Smith d) Waterman

10) Primary protein sequence was analysed by using _____

a) SOPMA b) Protparam
c) RasMol d) SWISSModel

Q.1 B) Definition **06**

1) Bioinformatics
2) Databases
3) BLOSUM
4) Bibliographic database
5) Consensus sequences
6) Domain

Q.2 Solve any Eight of the following. **16**

1) Explain PubMed.
2) Explain pyrimidine and purines with nomenclature.
3) What are Boolean operators and mention its importance?
4) Define Global and local alignment.
5) Define protein sequence database with example.
6) What is RCSB PDB?
7) Write the importance of bioinformatics.
8) NCBI Bookshelf
9) What is FASTA Format?
10) Enlist the primary protein sequence databases.

Q.3 A) Attempt any Two of the following. **10**

1) White a note on nucleic acid sequence database in detail.
2) Write a note on Prokaryotic gene prediction.
3) Give a detailed nomenclature code on DNA in detail.

B) Explain FASTA. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Explain Clustal tool.
2) Write the applications of bioinformatics.
3) Explain NCBI and its resources.

B) Explain Multiple sequence analysis with methods **08**

Q.5 Attempt any Two of the following. **16**

1) Explain methods of pairwise sequence analysis.
2) Explain the methods of phylogenetic analysis
3) Explain the method of homology modelling.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: March/April - 2025
Intellectual Property Rights (BT1505)

Day & Date: Tuesday, 06-May-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

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

Q.1 A) Select the correct alternative. **10**

1) The General Agreement on Tariffs and Trade came into force on ___.
   a) 1 January 1948 b) 15 January 2020
   c) 7 March 1950 d) 20 March 1954

2) Berne Convention for the Protection of Literary and Artistic Works Written in 1886, the Berne Convention was the first major multilateral convention on Copyright law. _____ became a party to this treaty in 1989.
   a) India b) Bangladesh
   c) Russia d) The United States

3) The term “WIPO” stands for
   a) World Investment Policy Organization
   b) World Intellectual Property Organization
   c) Wildlife Investigation and Policing Organization
   d) World institute for Prevention of organized crime

4) The rights of a patentee are ____.
   a) Sell or distribute
   b) License
   c) Assign the property to others
   d) All of the above

5) The Paris Convention for the Protection of Industrial Property, 1883. The Paris Convention applies to _____.
   a) Trademarks, unfair competition, and patents
   b) Geographical Indications
   c) Wines and Spirits
   d) All of the above

6) Which is not a type of intellectual property?
   a) Trade secrets b) Trademarks
   c) Home loans d) Copyrights

7) A company wishes to ensure that no one else can use their logo.
   a) Copy rights b) Trade mark
   c) Patent d) Industrial designs

8) A trademark is represented by several key characteristics. Which of the following is one of them?
   a) A trademark identifies a product's origin
   b) Slogans are not covered under trademark law
   c) Trademarks are never an indicator of quality
   d) Trademarks are "shorthand" for retailers to use in determining pricing strategy

9) Why an invention should be patented?
   a) It gives protection to a patentable invention
   b) It gives legal recognition to the invention.
   c) It makes others aware of the fact as to whom does the invention belong.
   d) Patenting one's invention make useful data relating to the invention available to other inventions for further research and development.

10) Which of the following is not an intellectual property law?
   a) Copyright Act, 1957 b) Trademark Act, 1999
   c) Patent Act, 1970 d) Customs Act, 1962

B) Write the definition of the following. **06**

1) WIPO
2) Copyright
3) Farmers Right
4) Trademark
5) IPR
6) Patent

Q.2 Solve any Eight of the following. **16**

a) Enlist Major International Conventions of IPR.
b) Define plant variety protection.
c) Define restoration of patent.
d) Define service mark with one example.
e) Discuss Advantages and Disadvantages of IPR.
f) Define plant breeders right.
g) Describe UPOV.
h) Define TRIPS agreement.
i) Define trade secrets.
j) Define utility patent.

Q.3 A) Attempt any Two of the following. **10**

a) Write in detail about what are the patentable criteria.
b) Write about Patent Infringement.
c) Write in detail about Trips Agreement 1994.

B) Write in detail about Farmers right and Write about the procedure for the registration. **06**

Q.4 A) Attempt any Two of the following. **08**

a) Write in detail about Pharmaceutical product and process patent.
b) Write in detail about Universal Copyright Convention 1952.
c) Write in detail about types of patent.

B) Write short note on compulsory License Acquisition. **08**

Q.5 Attempt any Two of the following. **16**

a) Describe in detail about UPOV and its contribution in plant breeder's rights.
b) Explain in detail about Procedure for granting a patent and obtaining patent in India and Abroad.
c) Write in detail about IPR and explains different kinds of IPR.

SLR-YC-36

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - V) (Old) (CBCS) : Examination
March/April - 2025
English
Business English (BT501)

Day & Date: Wednesday, 30-April-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Choose the correct alternatives from the given options. 08

1) What was Della going to cook for dinner?
a) pie b) chops
c) soup d) lentils

2) What occasion is being celebrated in the story of 'The Gift of the Magi'?
a) Easter b) Dell's birthday
c) New year d) Christmas

3) Phatik's uncle name is _____.
a) Makhan b) Vishwamber
c) Lakhan d) Bishamber

4) In the poem 'The Solitary Reaper' the term 'lass' suggests _____.
a) a girl b) grass
c) lost something d) a tree

5) Queen Gulnaar sat on her _____.
a) chair b) horse
c) ivory bed d) elephant

6) Which plant skirted the fence?
a) furze b) fagus
c) far d) farzze

7) Ravana _____ by Ram.
a) killed b) was killed
c) kill d) is killing

8) The _____ time at the airport is 5 p.m.
a) check on b) check with
c) check in d) none of these

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

a) Discuss the use of irony in the story 'The Gift of the Magi'?
b) Justify the title of the story 'The Homecoming'.
c) Describe the reaper's song.
d) Describe the unique relationship between a mother and her daughter in the context of the poem 'The Queen's Rival'?
e) How did the villagers regard the schoolmaster?
f) What is the significance of the two roads in the poem 'The Road Not Taken'?

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

a) Write a note on the four C's. Out of the four C's which do you think is most important.
b) Write a detailed note on learning and life skills. Add their importance.

Q.4 Write any eight 21st century skills and their importance. **10**

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (Old) (CBCS) Examination: March/April - 2025
Bioprocess Technology (BT502)

Day & Date: Sunday, 18-May-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

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

Q.1 A) Choose the correct answer from given options and rewrite the sentence. **10**

1) The full form of LAB is _____.
a) Lactic acid bacteria b) Lactic acid Biomass
c) Lytic acellular bacteria d) Lyophilized active biomass

2) _____ is a specific process that uses complete living cells or their components.
a) Bio-remedy b) Bioprocess
c) Bioremediation d) Biochemistry

3) Amylase enzyme acts on _____.
a) Protein b) Starch
c) DNA d) Lipids

4) Out of the following, _____ is a chemical bioprocess parameter analyzed during fermentation.
a) temperature b) Product concentration
c) viscosity d) Turbidity

5) Bacterial growth curve is obtained by plotting _____.
a) no of cells versus time
b) no of spores versus time
c) log no of cells versus time
d) log no of spores versus time

6) Spirulina is _____.
a) edible fungus b) biofertilizer
c) biopesticide d) SCP

7) In Bioreactor, mixing of cells along with the medium is achieved by _____.
a) impellers b) spargers
c) pH sensors d) water jacket

8) For ethanol production, _____ is generally used as raw material for fermentation medium.
a) Distillerssolubles b) molasses
c) corn steep liquor d) soyabean meal

9) Transfer of desired product from one liquid phase to another liquid phase is called as _____.
a) Downstream process b) solid liquid extraction
c) solvent recovery d) solvent stabilization

10) Batch culture is a _____ culture system.
a) open b) closed
c) isolated d) semi-closed

B) Define following terms. **06**
1) Fermentation
2) Bioprocess
3) Effluent
4) Photo-bioreactor
5) Batch culture
6) Inoculum

Q.2 Solve the following (Any Eight) **16**
a) Write any two names of microbial enzymes.
b) Give two examples microbial r-DNA products.
c) Write functions of Impeller.
d) Draw a neat labelled diagram of bacterial growth curve.
e) Give names of any two physical parameters for bioprocess control.
f) Give two types of centrifugation methods.
g) Name any two microbes involved in Amylase production.
h) Give any two types of bioreactors.
i) Name any two Lactic acid bacteria.

Q.3 A) Attempt the following (Any Two) **10**
1) Describe methods for sterilization of fermentation media.
2) Write a note on Components of bioreactor with neat labelled diagram.
3) Write a note on Carbon sources in fermentation medium.

B) Describe in detail Ethanol production. **06**

Q.4 A) Write a short note on. (Any Two) **08**
1) Sterilization of Air.
2) Molasses
3) Inoculum development.

B) Give a detailed account of solid liquid separation techniques for downstream processing. **08**

Q.5 Attempt the following (Any Two) **16**

a) Give a detailed account of Batch & continuous culture systems.

b) Write in detail about the Amylase production.

c) Give a detailed account on bioprocess measurement and control system.

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - V) (Old) (CBCS) Examination: March/April - 2025
Recombinant DNA Technology (BT503)

Day & Date: Sunday, 25-May-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

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

Q.1 A) Select the correct alternative. **10**

1) _____ DNA polymerase don't have 5' to3' exonuclease activity.
   a) Korenberg b) Kornberg
   c) Klenow d) Klenew

2) In _____ method guanine is methylated by Dimethyl Sulphate
   a) Maxam's & Gilbert's b) Automated
   c) Sangers d) Dideoxy

3) Blue-white selection is _____ type of screening method.
   a) Hybridization b) Indirect
   c) Immunological d) Direct

4) _____ produces E. coli DNA ligase.
   a) P. *Putida* b) *A. niger*
   c) E. coli d) Tiger pancreas

5) M. Grustein & D.S. Hogness develops _____.
   a) Southern Hybridization b) Northern Hybridization
   c) Western Hybridization d) Colony hybridization

6) _____ enzyme removes phosphate from DNA molecule.
   a) Alkaline phosphatase b) Kinase
   c) Ligase d) Endonuclease

7) _____ not required for PCR reaction.
   a) Primer b) Thermostable DNA Polymerase
   c) ddNTPs d) Template DNA

8) _____ is the natural function of restriction enzymes.
   a) Protecting bacteria by methylating their own DNA
   b) Protecting bacteria by methylating the DNA of infecting viruses.
   c) Protecting bacteria by cleaving their own DNA
   d) Protecting bacteria by cleaving the DNA of infecting viruses.

9) _____ is yeast vector.
   a) YEp b) λgt_{10}
   c) λgt_{11} d) pUC^{18}

10) _____ is First patented cloning vector
   a) pBR^{327} b) pSC^{101}
   c) pMB^{101} d) pUC^{18}

B) Fill in the blank/One sentence answer/ One word answer **06**

1) Size of pUC is _____.
2) Restriction endonucleases type not used in genetic engineering
3) Vector used to transfer DNA in both eukaryotes & Prokaryotes is known as _____.
4) Chain termination DNA sequencing developed by _____.
5) Enzymes which cut at the end of DNA chain _____.
6) Source of AMV reverse transcriptase is _____.

Q.2 Solve any Eight of the following. **16**

a) Write a short note on klenow polymerase
b) Define endonucleases.
c) Write a note on pSC1O1.
d) Define kinases.
e) Draw a neat & labeled diagram of pBR322.
f) Explain in short transformation.
g) Define Gene Shuffling.
h) Write a note on sweetness as modification of food plant taste tomato.
i) Define RNA probe.
j) Write a note on PCR.

Q.3 A) Attempt any Two of the following. **10**

i) Explain development of edible vaccines.
ii) Describe cloning of large DNA fragments in BAC.
iii) Discuss RT PCR.

B) Explain in short plant as bioreactor for polymer. **06**

Q.4 A) Attempt any Two of the following. **08**

i) Describe in detail RAPD as molecular marker.
ii) Give details of exonucleases.
iii) Write a note on protein-produced in animal cell

B) Explain immunological screening. **08**

Q.5 Attempt any Two of the following. **16**

a) Give details of Maxam Gilbert method of DNA sequencing.
b) Discuss Development of salt tolerant plants.
c) Describe plant viruses as cloning vector.

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - V) (Old) (CBCS) Examination: March/April - 2025
Bioinformatics (BT504)

Day & Date: Monday, 05-May-2025 Total Marks: 80
Time: 09:00 AM To 12:00 PM

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

Q.1 A) Rewrite the following sentences by using correct alternative. 10

1) Needleman-Wunsch algorithm is used for ____ alignment.
a) Global b) Local
c) Pairwise d) Multiple

2) Search engine of NCBI ____.
a) SRS b) Entrez
c) Atlas d) BankIt

3) Mother of bioinformatics ____.
a) Margaret dayhoff b) Charles Babbage
c) David Lipman d) Altschul

4) SCOP stands for structural classification of ____.
a) DNA b) Lipids
c) Protein d) Carbohydrates

5) > is symbol which used to start the ____ format in sequence file.
a) Msf b) Chem
c) pdb d) Fasta

6) Scientist use a tool called a phylogenetic tree to show the evolutionary pathway and connection among organism is called tree of ____.
a) Air b) Water
c) Scientist d) Life

7) The ____ tool compares nucleotide sequence against DNA database.
a) Blastn b) Gor
c) Clustal d) Phylip

8) Point ____ mutation is scoring matrices used for substitution the scores in alignment.
a) Accepted b) single
c) Assigned d) Acid

9) Primary protein sequence was analyzed by using ____

a) SOPMA b) Protparam
c) RasMol d) SWISSModel

10) Which of the following is primary sequence database?

a) PIR b) PubMed
c) EMBL d) DDBJ

B) Definition **06**

a) NCBI
b) Database
c) PAM
d) Bibliographic database
e) Entrez
f) Motif

Q.2 Solve (Any Eight) of the following. **16**

a) What is RCSB PDB?
b) Define Global and local alignment.
c) Define Multiple Sequence alignment.
d) Explain pyrimidine and purines with nomenclature.
e) Explain PIR.
f) Define nucleic acid sequence database with example.
g) Define Consensus sequence.
h) What is FASTA Format?
i) NCBI Bookshelf
k) Define Bioinformatics.

Q.3 A) Attempt (Any Two) of the following. **10**

a) Write a note on eukaryotic gene prediction.
b) Give a detailed nomenclature code on amino acids in detail.
c) Explain BLAST.

B) Write a note on nucleic acid sequence database in detail. **06**

Q.4 A) Answer the following questions. **08**

a) Write the applications of bioinformatics.
b) Write the history of bioinformatics

B) Explain NCBI and its resources. **08**

Q.5 Attempt (Any Two) of the following. **16**

a) Explain Primary protein sequence databases.
b) Explain Multiple sequence analysis.
c) Explain Pubmed and PubMed central.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (Old) (CBCS) Examination: March/April - 2025
Intellectual Property Rights (BT505)

Day & Date: Tuesday, 06-May-2025 Max. Marks:80
Time: 09:00 AM To 12:00 PM

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

Q.1 A) Fill in the blanks by choosing correct alternative. **10**

1) UPOV stands for _____.
   a) United Property of Victoria
   b) World Intellectual Property Organization
   c) International Union for the Protection of New Varieties of Plants
   d) Union Pollution Control Board

2) _____ is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises.
   a) Copy rights b) Trademark
   c) IG d) Patent

3) _____ is the practice of commercial exploitation of biochemicals or genetic materials which occur naturally.
   a) Patent b) Biopiracy
   c) Plagiarism d) Copy right

4) _____ refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce.
   a) Biopiracy b) Hypothesis
   c) Intellectual property d) Cyber crime

5) _____ are intellectual property (IP) rights on confidential information which may be sold or licensed.
   a) patent b) copyright
   c) trade secrets d) trademark

6) _____ refers to the process of conveying results stemming from scientific and technological research to the market place and to wider society.
   a) Technology transfer b) Patent
   c) Politics d) Data transfer

7) Where is the World Intellectual Property Organization located?
   a) London b) Geneva
   c) Perth d) India

8) _____ IP is related to its geographical origin.
   a) copyright b) trademark
   c) geographical indications d) trade secrets

9) _____ is an international convention that protects copyright.
   a) Universal Copyright Convention
   b) National Copyright Convention
   c) UPOV
   d) PBR

10) Which of the following information may constitute a trade secret?
   a) manufacturing processes
   b) distribution methods
   c) list of suppliers and clients
   d) all of the above

B) Define the following **06**

1) Intangible
2) Copyright
3) Patent
4) Trademark
5) Trade secrets
6) Geographical indications

Q.2 Solve any Eight of the following. **16**

a) Discuss advantages and disadvantages of IPR.
b) Discuss advantages and disadvantages of PBR.
c) Write in short TRIPS Agreement, 1994.
d) Define Intellectual Property Rights.
e) Explain Berne Convention 1886.
f) Explain the Patentability criteria.
g) What is Infringement?
h) Write Full form and role of UPOV.
i) Write Full form and role of WIPO.

Q.3 A) Attempt any Two of the following. **10**

i) Procedure for granting a patent and obtaining patents in India.
ii) Plant variety protection in India.
iii) Write about the Patent Co-operation Treaty, 1970.

B) Short note/Solve **06**

Discuss Pharmaceutical product and process patent.

Q.4 A) Attempt any Two of the following. **08**

i) Write about Paris Convention 1883.

ii) Discuss Grounds for opposition Working of Patents.

iii) Explain Rights of patentee.

B) Describe/ Explain/ Solve: **08**

Write a short note on Farmers' rights and Discuss procedure for its registration.

Q.5 Attempt any Two of the following. **16**

a) What are Intellectual Properties? Discuss different kinds of IPR.

b) Discuss in detail Patenting of biological materials with example and case study.

c) Discuss Surrender, Revocation, restoration and transfer of patent rights.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination
March/April - 2025
English
Business English (BT1601)

Day & Date: Wednesday, 30-April-2025 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 Choose the correct alternative from the given options. 08

1) According to Shastriji, whatever your station in future life, you should first of all think of yourself as _____.
a) future leaders of India b) citizens of India
c) warriors for peace d) all the above

2) What was found in Aksionov's luggage?
a) lots of money b) a blood-stained knife
c) the gift for his family d) a samovar

3) The poem 'Endless Time' presents the idea that time in _____ for God.
a) infinite b) finite
c) limited d) bounded

4) What was the cause of the death of the Duchess?
a) illness b) accident
c) drowning d) the duke

5) Whose grandeur does the poet refer to?
a) dooms of mighty dead b) tombs of our ancestors
c) grand places on the earth d) grand towers of kings

6) _____ time is used in the poem 'Tree at my Window'.
a) morning b) afternoon
c) day d) night

7) Can you _____ wait for a moment? (Choose the correct adverb)
a) only b) just
c) while d) after

8) She said that she wanted to talk to me that day.
(Write into Direct Speech)
a) She said, "I want to talk to you today".
b) She said, "I want to talk to you that day".
c) She says, "I want to talk to you today".
d) She said, "I wanted to talk to you that day".

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

a) Discuss the difficulties faced by young students.
b) Write the appropriateness of the title ‘God Sees the Truth but Waits’.
c) What object of nature does Keats mention as a source of joy?
d) How does the poem convey the urgency and value of time in the poem 'Endless Time’?
e) Describe the nature of Duke.
f) What is central idea of the poem ‘Tree at my Window’?

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

a) Write a note on civic literacy and health literacy. Add their importance.
b) Define initiative in your own words. Give an example of two situations in which you took initiative.

Q.4 Write a detail note on technology literacy and its uses in various field. **10**

SLR-YC-42

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) : Examination
March/April - 2025
Bio-Analytical Tools (BT1602)

Day & Date: Sunday, 18-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

Q.1 A) Multiple choice questions. **10**

1) Which of the following is the working principle of a pH meter?
a) Electromagnetic induction
b) Potentiometry
c) Colorimetry
d) Gravimetry

2) Which gel is commonly used for protein electrophoresis?
a) Agarose b) Cellulose acetate
c) Polyacrylamide d) Nitrocellulose

3) Infrared spectroscopy is mainly used to identify _____.
a) Molecular mass b) Functional groups
c) DNA sequences d) Atomic number

4) Ultracentrifugation is primarily used to separate _____.
a) Sugars
b) Organelles and macromolecules
c) Proteins only
d) Lons

5) Southern blotting is used for the detection of _____.
a) Proteins b) RNA
c) DNA d) Lipids

6) Which membrane is commonly used in Western blotting?
a) Agarose b) Nitrocellulose
c) Gelatin d) Cellulose acetate

7) The glass electrode in a pH meter is selective to which ion?
a) OH^- b) H^+
c) Na^+ d) $C1^-$

8) Electrophoresis is usually performed under which condition?
a) High pressure b) Neutral pH
c) Electric field d) High light intensity

9) Differential centrifugation separates components based on _____.

a) Electrical charge b) Shape
c) Sedimentation rate d) pH

10) Beer-Lambert Law is used in _____.

b) IR spectroscopy b) UV-Vis spectroscopy
c) Mass spectrometry d) Fluorescence spectroscopy

B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product. **06**

1) What will happen to the pH reading when an acidic solution is diluted with water?
2) Name the membrane commonly used in Western blotting.
3) Name the internal solution typically found inside a glass pH electrode.
4) Which chemical is used to visualize DNA under UV light after electrophoresis?
5) Name the constant that describes sedimentation behaviour of particles.
6) A researcher wants to detect a specific mRNA transcript. Which technique should they use?

Q.2 Solve any Eight of following. **16**

1) What is the main purpose of electrophoresis?
2) What kind of molecules absorb strongly at 280 nm?
3) Mention any two applications of immuno- electrophoresis.
4) Describe the role of hybridization probes in Southern and Northern blotting.
5) Differentiate between differential and density gradient centrifugation with examples.
6) Define pH.
7) Explain working principle of turbidometer.
8) What is autoradiography.
9) Explain the working of colorimeter.

Q.3 A) Attempt any Two of the following. **10**

1) Describe the principle, setup, and working of column chromatography using silica gel as the stationary phase. Explain how compound separation is achieved.
2) Differentiate between DNA, RNA, blotting techniques in terms of target molecule, probe used, and method of detection.
3) Discuss in detail working and application of Dot Blot technique.

B) Short note/Solve **06**

Explain the working and applications ion exchange chromatography.

Q.4 A) Attempt any Two of the following. **08**

1) Principle, construction, working and application of Electrophoresis with suitable example.
2) Discuss the Principle and application of thin layer Chromatography.
3) Explain the Principle of Beer - Lambert's Law and deviation from Beer-Lambert' Law.

B) Describe/Explain/Solve. **08**

Discuss the working principal of UV-visible spectroscopy? Give any two applications.

Q.5 Attempt any Two of the following. **16**

a) Explain the working and applications of UV-Vis spectroscopy?
b) Describe the working of Principle and application of Differential Centrifugation and Rate-Zonal centrifugation.
c) Explain Working principle of pH meter.

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination: March/April - 2025
Genomics and Proteomics (BT1603)

Day & Date: Sunday, 25-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

Q.1 A) Select the correct alternative. **10**

1) The organism of which the first complete DNA sequence was determined was _____.
   a) Dinoflagellate b) Protozoans
   c) *Haemophilus influenza* d) Cyanobacteria

2) The cost of HGP was around _____.
   a) 12 million dollars b) 81 million dollars
   c) 3-billion-dollar d) 1 billion dollar

3) For _____ pair of ionization techniques, the inventers awarded Nobel prize.
   a) Photoionisation and Electrospray ionization
   b) MALDI and Electrospray ionisation
   c) MALDI
   d) Photoionisation

4) The identification of drugs through the genomic study is _____.
   a) Pharmacy b) Pharmacology
   c) Pharmacogenomics d) Drugology

5) The sequencing of genomic DNA is included in _____.
   a) phenotypic function b) cellular function
   c) molecular function d) structural genomics

6) _____ is not used as protein denaturant.
   a) Acetic acid b) SDS
   c) Phenol d) DTT

7) The term Genomics was coined by _____.
   a) Thomas Roder b) Craig Venter
   c) T.H.Morgan d) Thomas Cech

8) _____ is the set of genes inherited together from a single parent.
   a) Genes b) Haplotypes
   c) Genotype d) Phenotype

9) In _____ technique, organisms may be differentiated by analysis of patterns derived by cleavage of their DNA.
   a) RFLP b) RAPD
   c) RTPCR d) RAT

10) According to RNA world hypothesis _____ was the first genetic material.
   a) DNA b) Proteins
   c) Phosphate d) RNA

B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. **06**

1) Define clone counting method.
2) Define Hapmap Project.
3) Define omics.
4) Define isoelectric point.
5) Define ampholytes.
6) Define spectrometry.

Q.2 Solve any Eight of the following. **16**

a) Write any two applications of proteomics.
b) Define Genome and proteome.
c) Pinpoint the features of Human genome.
d) Write about Plasmodium falciparum genome.
e) Note on human genetic disease Hemophilia.
f) Define molecular taxonomy.
g) Write about the sample preparation in 2D-PAGE.
h) Define drug development and toxicology.
i) State the features of *Caenorhabditis* genome.
j) Mention the goals of HGP.

Q.3 A) Answer of the following. (Any Two) **10**

1) Give a brief account on the genome of *Saccharomyces cerevisiae.*
2) Describe about the different computer tools employed for sequencing projects.
3) Explain the molecular diagnosis of human genetic disease Sickle-cell anemia.

B) Short note on Genome diversity. **06**

Q.4 A) Answer of the following. (Any Two) **08**

1) Briefly describe the genome significance of *Drosophila.*
2) Explain the RNA world.
3) Write a note on Whole-genome shotgun sequencing.

B) Explain Mass Spectrometry method for protein identification. **08**

Q.5 Answer of the following. (Any Two) **16**

a) Explain the application of proteome in glycobiology.

b) Elaborate the technique two-dimensional polyacrylamide gel electrophoresis.

c) Give an account on “The 1000 genome project” and “The ENCODE project”.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination: March/April - 2025
Evolutionary Biology (BT1604)

Day & Date: Monday, 05-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

Q.1 A) Select the correct alternative. **10**

1) According to Darwinism the key mechanism driving evolution is _____.
   a) Inheritance of acquired traits
   b) Natural selection
   c) The Mutation Theory
   d) The Blending Theory

2) Lamarckism proposed that _____.
   a) Species evolve due to random mutations
   b) Natural selection
   c) Inheritance of acquired characters
   d) Evolution is always progressive

3) Neo Darwinism Theory incorporated _____.
   a) Pangenesis
   b) Genetic drift and mutation
   c) Inheritance of acquired traits
   d) Environmental change

4) Fossils are _____.
   a) Remains of living organized only
   b) Evidence of past life and evolutionary change
   c) Found in sedimentary rocks
   d) Present only in tropical regions

5) Mass extinctions are characterized by _____.
   a) Gradual environmental changes
   b) Sudden and wide spread loss of species
   c) Slow, non random changes in biodiversity
   d) Appearance of new species

6) The Galapagos Finches are example of _____.
   a) Microevolution b) Macroevolution
   c) Sympatric speciation d) Allopatric speciation

7) The K-T extinction event refers to _____.
   a) The mass extinction of Dinosaurs
   b) The rise of Mammals
   c) A change in global climates
   d) The evolution of Modern Humans

8) Evolution is a _____ process.
   a) Quick b) Stochastic
   c) Slow d) Fast

9) The force that initiates evolution is _____.
   a) Variation b) Mutation
   c) Extinction d) Adaptation

10) Primates originated during _____ Era.
   a) Mesozoic b) Cenozoic
   c) Paleozoic d) Azdic

B) Define the following. **06**

1) Define Variation.
2) Define Hominins.
3) Define geological time scale.
4) Define RNA world hypothesis.
5) Define adaptive radiation.
6) Define vestigial organs.

Q.2 Solve any Eight of the following. **16**

a) Differentiate between Microevolution and Macroevolution with example.
b) Describe organic evolution with example.
c) Describe significance of fossil records in proving evolution.
d) Describe molecular evolution with an example of the globin gene family.
e) Describe allopatric speciation.
f) Describe concept of heritable variations.
g) Describe the difference between Prokaryotes and Eukaryotes in context of evolutionary development.
h) Describe short clines.
i) Describe Petrified Fossils.
j) Describe Genetic Drift.

Q.3 A) Attempt any Two of the following. **10**

1) Describe the molecular evidence for evolution particularly the universality of genetic code.
2) Explain importance of Transitional Fossils in understanding the evolutionary process.
3) Describe Industrial Melanism.

B) Short notes of the following. (Any Two) **06**

1) Theory of Lamarckism.
2) The role of Genetic drift in evolution.
3) Speciation mechanisms in allopatric and sympatric.

Q.4 A) Attempt any Two of the following. **08**

1) Describe speciation and discuss the mechanisms that drive it.
2) Describe contribution of S. Miller.
3) Describe RNA world hypothesis and its significance.

B) Describe the evolutionary genetics of Inter-population variations and their role in species concept. **08**

Q.5 Attempt any Two of the following. **16**

a) Give brief account on theories of evolution.

b) Briefly describe the role of Isolation mechanisms in speciation and explain with examples.

c) Explain origin of man in context of his evolutionary development from early Hominins to modern Homosapiens.

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Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination: March/April - 2025
Environmental Biotechnology (BT1605)

Day & Date: Tuesday, 06-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

Q.1 A) Multiple choice questions: **10**

1) How does organic material in the buried solid waste will decompose?
   a) By the action of oxidation
   b) By the action of Microorganisms
   c) By the flow of water
   d) By the soil particles

2) Which of the following can be recycled many times?
   a) Plastic b) Wood
   c) Organic materials d) Aluminum

3) Which method is best suitable for management of plastic wastes and polythene bags?
   a) Burning and incineration b) Digesting
   c) Dumping d) Recycling

4) ____ Plastics are inexpensive, recyclable more stable.
   a) High-density polyethylene b) Low-density polyethylene
   c) Polystyrene d) Nylon

5) VAM is ____.
   a) Bioinsecticide b) Bioherbicide
   c) Endomycorrhiza d) Ectomycorrhiza

6) The nitrogen fixing symbiotic organism present in Azolla is ____.
   a) *Nostoc* b) *Anabena*
   c) *Aulosira* d) *Azospirillium*

7) Use of microbial approaches for the recovery of base and valuable metals is known as ____.
   a) Bioremediation b) Mycoremediation
   c) Zooremediation d) Bioleaching

8) Environment Protection Act, a primary piece of legislation in India aimed at protecting and improving the environment, came in to play from ____ year.
   a) 1986 b) 1947
   c) 1960 d) 2025

9) Which of the following is a renewable source of energy?
   a) Coal b) Hydropower
   c) Natural gas d) Petroleum

10) ____ is a Phosphate-solubilizing bacteria.
   a) Rhizobium b) Azotobacter
   c) *Bacillus subtilus* d) Azospirillum

B) One sentence answer: **06**

1) Define gasohol.
2) Define biogas.
3) What is meant by symbiosis?
4) What is biomass?
5) What is meant by fossil fuels?
6) What are genetically modified microbes?

Q.2 Solve the following: (Any Eight) **16**

a) According to the Waste Management Rules, 2016, name the three streams by which waste generators shall segregate and store the waste.
b) Enlist Conventional and non-conventional fuels.
c) Write significance of Mycoremediation.
d) What is Industrial effluent?
e) Define bioleaching.
f) Write about Environment Protection Act.
g) What are Biofertilizers and enlist their types?
h) Differentiate between symbiotic and asymbiotic nitrogen fixing bacteria.
i) Write about Industrial effluents.
j) Define phytoremediation.

Q.3 A) Solve the following: (Any Two) **10**

1) Explain in detail - biofertilizers.
2) Write a note on the types and chemistry of bioleaching.
3) Write Rules and regulations of Environment Protection Act(EPA).

B) What is phytoremediation? Explain about the role of phytoremediation in environmental cleaning. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Explain Conversion of sugars, agriculture and food industry waste to alcohol Gasohol.
2) Write a note on Bioremediation of pesticides.
3) Explain the degradation of oil spills.

B) Explain the process of methanogenesis. **08**

Q.5 Attempt the following. (Any Two) **16**

a) Describe in detail methods of treatment of industrial effluents.

b) Write a brief account on the use of genetically modified organisms for environmental cleanup.

c) Define Bioremediation. Write in detail about the types of bioremediation.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS) Examination: March/April - 2025
English
Business English (BT601)

Day & Date: Wednesday, 30-April-2025 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 Choose the correct alternatives from the given options. 08

1) Quick saw Kate was sitting on the _____.
a) tree b) chair
c) horse d) swing

2) At the beginning of the story Aksionov was living in the town _____.
a) Liberia b) Tsarberia
c) Vladimir d) Iberia

3) What glides on the lake?
a) swans b) peacock
c) sparrow d) duck

4) My last Duchess is written in the form of _____.
a) narrative poetry b) dramatic monologue
c) ode d) monologue

5) A thing of _____ is a joy forever.
a) beauty b) money
c) gift d) sweet

6) What should we not lament?
a) transient feelings b) fall of hope
c) fall of roses d) dreams

7) Can you _____ wait for a moment? (Choose the correct adverb)
a) only b) just
c) while d) always

8) Gopal said to Sham, "I am your brother." (Write into indirect Speech)
a) Gopal told Sham that he was her brother.
b) Gopal said Sham that he was his brother.
c) Gopal told Sham that he was being his brother.
d) Gopal told Sham that he was his brother.

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

a) Write the appropriateness of the title ‘Growing up’.
b) Discuss the impact of forgiveness with reference to the story ‘God Sees the Truth but Waits’?
c) Describe the forest in the poem ‘Sita’.
d) How do you see the Duke? Explain with example.
e) What objects of nature does Keats mention as a source of joy?
f) What is the subject matter of the poem ‘Life’?

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

a) Write a note on civic and health literacy. Add their importance.
b) Write a note on literacy skill? Describe three difficult situations you handle easily due to the use of literacy skills.

Q.4 Describe in details life skills (FLIPS) and their importance. **10**

Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS) Examination: March/April - 2025
Bio-Analytical Tools (BT602)

Day & Date: Sunday, 18-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

Q.1 A) Rewrite the following sentences by choosing correct alternatives. **10**

1) A pH scale reading of 2 indicates a _____.
   a) Strong acid b) Weak acid
   c) Strong base d) Weak base

2) _____ solution turns bases Pink.
   a) orange b) Phenolphthalein
   c) methyl orange d) litmus

3) Differential centrifugation is based on the differences in _____ of biological particles of different size and density.
   a) Size b) Structure
   c) Sedimentation rate d) mass

4) After centrifugation of Milk, the supernatant is _____.
   a) Fat b) Water
   c) Casein d) Whey

5) _____ wavelength range is associated with UV spectroscopy.
   a) 400 - 100 nm b) 0.8 - 500 µm
   c) 380 - 750 nm d) 0.01 - 10 nm

6) In infrared spectroscopy _____ frequency range is known as the fingerprint region.
   a) 400-1400 cm-1 b) 1400 -900 cm-1
   c) 900-600 cm-1 d) 600 -250 cm-1

7) _____ of using Stacking gel is to Concentrate Proteins.
   a) Amount b) Analysis
   c) Purpose d) Precipitate

8) Volume of Mobile phase per unit time is known as _____.
   a) Partition coefficient b) Sample
   c) Slurry d) flow rate

9) Usually in Paper chromatography stationary phase is _____.
   a) Water b) Cellulose
   c) Paper d) Gel

10) In IEF _____ gradient in gel is used for separation.
   b) Gel b) pH
   c) Charge d) Ion

B) Fill in the blank/One sentence answer/ One word answer. **06**

1) Electromagnetic waves carry _____ Charge.
2) _____ Centrifugation is used to separate certain organelle from whole cell.
3) Electromagnetic waves Comprises _____ waves.
4) _____ is the pH value of pure alcohol.
5) _____ is considered as father of chromatography.
6) Southern blotting is also known as _____.

Q.2 Answer the following. (Any Eight) **16**

1) Write a note on electrophoresis.
2) Define isoelectric point.
3) Nature of paper in paper chromatography.
4) Write a note on turbidometer.
5) Define acids & bases.
6) Enlist the types of centrifugation.
7) Write a note on dot blot technique.
8) Column used in column chromatography.
9) Write a note on chromatography.
10) Define Lambert & beers law.

Q.3 A) Answer the Following. (Any Two) **10**

1) Explain dissociation of acid & bases.
2) Describe measurement of pH by indicator & pH paper.
3) Explain applications of UV spectroscopy.

B) Explain in short analytical ultracentrifugation. **06**

Q.4 A) Answer the following. (Any Two) **08**

1) Describe errors in pH measurement.
2) Give details of types of transition.
3) Discuss Immunoelectrophoresis.

B) Explain southern blotting. **08**

Q.5 Answer the following. (Any Two) **16**

a) Explain instrumentation of colorimeter.
b) Discuss SDS-PAGE.
c) Describe affinity chromatography.

Seat No.	

Set | P

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS) Examination: March/April - 2025
Genomics and Proteomics (BT603)

Day & Date: Sunday, 25-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

Q.1 A) Select the correct alternative. **10**

1) Haemophilia is caused by _____.
   a) Bacteria b) Virus
   c) Genetic mutation d) Cause unknown

2) Anticodon is present in _____.
   a) DNA b) tRNA
   c) rRNA d) mRNA

3) The term genomics coined by _____.
   a) Thomas Cech b) A. H. Morgan
   c) Craig Venter d) Thomas Roderick

4) The electrophoresis technique that uses isoelectric focusing is _____.
   a) AGE b) 2D-PAGE
   c) PFGE d) SDS-PAGE

5) The Human Genome Project aimed to:
   a) Sequence the entire human genome
   b) Identify all human genes
   c) Understand the functions of human genes
   d) All of the above

6) The technique used to determine the sequence of DNA is called:
   a) PCR (Polymerase Chain Reaction)
   b) Microarray analysis
   c) Sanger sequencing
   d) Gel electrophoresis

7) Electrophoresis was developed by:
   a) Tswett b) Tsvedberg
   c) Tiselius d) Sanger

8) Which of the following RNAs' structure is similar to clover leaf?
   a) tRNA b) rRNA
   c) mRNA d) hnRNA

9) The study of the full complement of proteins expressed by a genome is called _____.
   a) Proteome b) Proteomics
   c) Genomics d) Protein formation

10) Mass spectrometry was discovered by whom?
   a) Walter Kaufmann b) J. J Thomson
   c) Francis Aston d) Ernest 0. Lawrence

B) Definitions. **06**

1) Electrophoresis
2) Macromolecule
3) Genomics
4) Proteomics
5) Genome size of Arabidopsis
6) Toxicology

Q.2 Solve any Eight of the following. **16**

a) Explain DNA structure
b) Explain RNA structure
c) Molecular taxonomy
d) Enlist the methods of protein identification
e) *Mycobacterium tuberculosis genome*
f) Explain general features of genome.
g) What is Structural genomics?
h) Enlist the application of proteome analysis
i) Proteomics in plant breeding
j) Explain about HGP

Q.3 A) Attempt any Two of the following. **10**

i) Write a note on HapMap project.
ii) Molecular diagnosis of Hemophilia
iii) Write a note on mass spectroscopy.

B) Shotgun sequencing method of genomic material. **06**

Q.4 A) Attempt any Two of the following. **08**

i) Write a note on the ENCODE project.
ii) Write in brief about Human Genome Project.
iii) Define genome sequencing and explain brief about computer tools for sequencing project.

B) Explain genome organization in prokaryotes and eukaryotes. **08**

Q.5 Attempt any Two of the following. **16**

a) Write significance of Bacteria, Yeast, Drosophila, Arabidopsis genomes.

b) Applications of genomics and proteomics.

c) Define electrophoresis and brief about 2D gel electrophoresis.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS) Examination: March/April - 2025
Evolutionary Biology (BT604)

Day & Date: Monday, 05-May-2025 Total Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) The drawback of Darwinism was that it couldn't explain ____.
a) Variations b) Large rate of production
c) Struggle for existence d) Reproductive fitness

2) The fossils are evidences buried deep inside the soil; they can occur where ____.
a) Animals are destroyed by natural disasters
b) Animals are buried and preserved by natural process
c) Animals are eaten by predators
d) Animals die themselves

3) An example of convergent evolution is ____.
a) Wing of Hawkmoths, the wing of hawks
b) Teeth of domestic dog, teeth of a wolf
c) Wings of Geospiza magnirostris, wings of Geospiza fortis
d) None of the above

4) ____ is the key to speciation of populations.
a) Reproductive health b) reproductive isolation
c) population growth d) extinction

5) ____ constitutes a fossil.
a) A mineralized burrow of an extinct animal
b) An unidentified animal found frozen in a glacier
c) An ant found inside a block of amber, dating back to 110 million years
d) All of the above

6) Protobiont was formed by a cluster of ____.
a) micro molecules b) nucleic acids
c) Lipids d) macro molecules

7) Use and disuse theory was given by ____ to prove biological evolution.

a) Ernst Haeckel b) Louis Pasteur
c) Charles Darwin d) Lamarck

8) During biological evolution, the first living organisms were ____.

a) Autotrophs b) Heterotrophs
c) Bacteria d) Mycoplasma

9) ____ is not a characteristic of Dryopithecus.

a) Semi erect posture
b) Evolution about 15-20 million years ago
c) Teeth larger and sharper
d) Meat eater

10) ____ is an abbreviation of Cretaceous-Tertiary extinction.

a) C-T b) T-C
c) K-T d) TK

B) Definition **06**

1) Primates
2) Genetic code
3) Variation
4) Mass Extinction
5) Neo-Darwinism
6) Speciation

Q.2 Solve (Any Eight) of the following. **16**

1) K-T extinction examples.
2) Name any two examples of Fossil.
3) Define clines.
4) Define Paleozoic.
5) Define Organic evolution.
6) Define Parapatricspeciation.
7) Define isolation with respect to evolution.
8) Any two example of globin gene family.
9) Define Chemogeny.
10) Dryopithecus characteristics.

Q.3 A) Attempt (Any Two) of the following. **10**

a) Write an account on Darwinism.
b) Describe Unique hominin characteristics contrasted with primate characteristics.
c) Explain inter-population variations and their role in evolution.

Q.3 B) Write short note on causes and effects of mass extinctions. **06**

Q.4 A) Attempt (Any Two) of the following. **08**

a) Give brief account on organic evolution.
b) Explain Industrial Melanism.
c) Write note on origin of life.

Q.4 B) Describe Evolution and Theories of evolution. **08**

Q.5 Attempt (Any Two) of the following. **16**

a) Describe geological time scale.
b) Explain Adaptive radiation.
c) Write note on Micro evolutionary changes.

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Seat No.	

Set P

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS) Examination: March/April - 2025
Environmental Biotechnology (BT605)

Day & Date: Tuesday, 06-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

Q.1 A) Fill in the blanks by choosing correct alternative. 10

1) The major cause of environmental degradation is _____.
   a) Bio-magnification b) Nitrogen deposition
   c) Quorum quenching d) Lyophilization

2) Use of microbes and other microorganisms to breakdown hazardous wastes into relatively harmless components, is termed as _____.
   a) Phytoremediation
   b) Source reduction
   c) Integrated waste management
   d) Bioremediation

3) _____ is the removal of a halogen substituent from an organic compound.
   a) Dehalogenation b) Biostimulation
   c) Bioaugmentation d) Bioleaching

4) Anand Chakrabarty and his co-workers used different plasmids and constructed a new bacterium called as _____.
   a) Superbug b) VAM
   c) Pseudomonas d) Pathogen

5) _____ involves aerobic biodegradation of pollutants by circulating air through sub-surfaces of soil.
   a) Bioleaching b) Bioventing
   c) BOD d) COD

6) Initiation, inventory analysis, impact assessment and improvement assessment these 4 stages are associated with Environmental _____.
   a) Pollution b) Impact Assessment
   c) Audit d) Impact Statement

7) _____ is a symbiotic nitrogen Fixing bacteria.
   a) Rhizobium b) E. coli
   c) Pseudomonas d) VAM

8) _____ is the extraction or liberation of metals from their ores through the use of living organisms.
   a) Bioremediation b) Phytoremediation
   c) Bioleaching d) Biocontrol

9) Which of the following Acts gives rights to citizens to file cases against violation of environmental norms?
   a) Environment Protection Act
   b) Air Pollution Act
   c) Water Pollution Act
   d) Forest Act

10) CNG stands _____.
   a) Common natural gas b) Compressed natural gas
   c) Common nitrogen gas d) Compressed nitrogen gas

B) Define the following **06**

1) Fuel
2) Mycoremediation
3) Bio-fertilizer
4) Phytoremediation
5) Bioleaching
6) Environmental Protection

Q.2 Solve any Eight of the following. **16**

a) Asymbiotic nitrogen fixing bacteria
b) Paraffin wax
c) Conventional fuel
d) Modern fuels
e) Bioremediation of lignin
f) Fungal biofertilizer
g) Azospirillum
h) Biofertilizer
i) Examples of petrolium products
j) Gasohol

Q.3 A) Attempt any Two of the following. **10**

1) Write a note on Conventional fuels.
2) Write a note on Phytoremediation.
3) Role of fungal and algal biofertilizer

B) Short Note/Solve **06**

Define bioleaching and micro-organisms used in bioleaching.

Q.4 A) Attempt any Two of the following. **08**

1) Write Rules and regulations of Environment Protection Act(EPA).
2) Describe brief on production of biogas.
3) Write a role of symbiotic nitrogen fixing bacteria in the enrichment of soil.

B) Describe/ Explain/ Solve: **08**

Concept of bioremediation and importance of bioremediation.

Q.5 Attempt any Two of the following. **16**

a) Describe in detail agriculture and food industry waste to produce alcohol & gasohol.

b) Describe in detail methods of treatment of industrial effluents.

c) Describe in detail Modern fuels and their environmental impact.