Seat No.

Set **P**

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2019
Nano-Technology
FUNDAMENTALS OF NANOTECHNOLOGY IN PHYSICS

Day & Date: Monday, 18-11-2019
Max. Marks: 70
Time: 11:30 AM To 02:00 PM

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

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

1) An ionic solid consists of atoms held together by _____.
   a) chemical bonds
   b) ionic bonds
   c) molecular solids
   d) none of these

2) The diameter of an atom is approximately _____.
   a) 2-3 A^0
   b) 1-3 A^0
   c) 4-3 A^0
   d) 3-4 A^0

3) Sate Bragg's law _____.
   a) $n\lambda = 2d \sin\theta$
   b) $n\lambda = 2d \sin^2\theta$
   c) $n\lambda = 2d \cos\theta$
   d) $n\lambda = 2d \cos^2\theta$

4) _____ crystal has arrangement as $a \neq b \neq c$ with $\alpha = \gamma = 90° \neq \beta$.
   a) tetragonal crystal
   b) triclinic crystal
   c) monoclinic crystal
   d) orthorhombic crystal

5) X-rays are electromagnetic radiation with wavelengths between about _____.
   a) 2 A^0 and 200 A^0
   b) 20 A^0 and 300 A^0
   c) 0.02 A^0 and 100 A^0
   d) 30 A^0 and 500 A^0

6) In an semiconductor p-type is _____ semiconductor.
   a) rejecter
   b) donor
   c) acceptor
   d) equilibrium

7) Quantum dot optical memory is used to _____.
   a) store data
   b) reject data
   c) does not store data
   d) none of these

8) The quantum dots are ____ nano materials.
   a) zero dimension
   b) one dimension
   c) two dimension
   d) three dimension

9) Polarization is measured as _____.
   a) $P = N\mu$
   b) $P = N\mu^2$
   c) $P = N/\mu$
   d) $P = N\mu^3$

10) State dielectric constant _____.
    a) $E = \varepsilon_0 - \varepsilon_r$
    b) $E = \varepsilon_0/\varepsilon_r$
    c) $E = \varepsilon_0 + \varepsilon_r$
    d) $E = \varepsilon_r/\varepsilon_0$

11) Ionic polarization occurs in _____.
    a) ionic materials   b) metallic material
    c) molecular   d) covalent

12) Dielectric constant ____ with frequency.
    a) unequal   b) equal
    c) increases   d) decreases

13) Nano particles are changed its properties due to _____.
    a) size   b) surface area
    c) area   d) elasticity

14) All kinds of magnetism originate similar to _____.
    a) superconductivity   b) conductivity
    c) insulators   d) dielectric

Q.2 A) Attempt any four of the following questions.   **08**
    1) Define Crystal.
    2) What do you mean by Fermi level?
    3) What is meant by Hall effect?
    4) What is meant by Dielectric constant?
    5) Define Electronic polarization.

B) Write Notes. (Any Two)   **06**
    1) Crystal structure
    2) Bragg's equation
    3) Quantum Dot

Q.3 A) Attempt any two of the following question.   **08**
    1) Describe with a neat diagram line crystal defects.
    2) Explain applications of nano materials.
    3) With a neat diagram explain orientation polarization.

B) Attempt any one of the following question.   **06**
    1) With a neat diagram explain atomic bonding in Solids.
    2) Give a brief explanation on quantum dot optical memory.

Q.4 A) Attempt any two of the following question.   **10**
    1) Describe with a neat diagram electronic polarization.
    2) What are the applications of electro luminescence?
    3) Explain Lorentz field in cubic materials.

B) Attempt any one of the following question.   **04**
    1) Explain properties of micro and nano materials.
    2) Describe optical properties of nano materials.

Q.5 Attempt any two of the following question.   **14**
    a) Describe with the help of neat diagram intrinsic and extrinsic semiconductor.
    b) Give a brief explanation semiconductor quantum dots.
    c) Define dielectric constant and explain clausius-mosotti equation.

Seat
No.

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2019
Nano-Technology
FUNDAMENTALS OF NANOTECHNOLOGY IN CHEMISTRY

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

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

Q.1 **Select the most correct alternative amongst those given below and rewrite** **14**
the complete sentence.
1) Lightest metal of group I-A is _____.
   a) Sodium b) Lithium
   c) Potassium d) Rubidium

2) Force of attraction between metal cations and free electron gives birth to
   _____.
   a) Metallic b) Ionic
   c) Polymeric d) Covalent

3) In formation of oxygen molecule (O_2) _____.
   a) single covalent bond is formed b) two covalent bond is formed
   c) dative covalent bond is formed d) metallic covalent bond is formed

4) Binary compounds of hydrogen with other elements are called as _____.
   a) Halides b) Oxides
   c) Hydrides d) Hydroxides

5) Order of electronegativity of Br_2, Cl_2, N_2, O_2, F_2 is _____.
   a) increasing b) decreasing
   c) falling d) constant

6) In Calcium chloride ($CaCl_2$), chloride Cl^- gains _____.
   a) one electron b) two electrons
   c) three electrons d) four electrons

7) Substance present in large amount in solution is _____.
   a) solvent b) solute
   c) solution d) mixture

8) Increase in oxidation number is called as _____.
   a) Oxidation b) Reduction
   c) Halogenation d) Hydration

9) Ionic compounds are _____ in water.
   a) soluble b) insoluble
   c) immiscible d) nonreactive

10) Electron affinity value is expressed in figures _____.
   a) positive b) negative
   c) mixed values d) positive & negative

11) Ionization is an _____.
   a) exothermic process
   b) endothermic process
   c) reversible process
   d) irreversible process

12) A rigid lattice with more open arrangement of molecules is found in ____.
   a) Water
   b) Nitrogen
   c) Oxygen
   d) Alcohol

13) Number of moles of solute dissolved in 1000g of solvent is _____.
   a) Molality
   b) Molarity
   c) Normality
   d) Quantity

14) Molecular mass of HNO_3 is _____.
   a) 61 amu
   b) 62 amu
   c) 63 amu
   d) 64 amu

Q.2 **A)** **Attempt any four of the following question.**   **08**
   1) What are diatomic and polyatomic molecules?
   2) What are ions? Give the types of ions.
   3) Define electronegativity and give example.
   4) What is ionic radius and atomic radius?
   5) What are principle and angular quantum numbers?

    B) **Write short notes any two.**   **06**
   1) Write a note on valence bond theory.
   2) Write a note on Carbon Nanomaterials.
   3) Write a note on nature of light.

Q.3 **A)** **Attempt any two of the following question.**   **08**
   1) What are the electronic and structural properties of an atom?
   2) Write the postulates of Dalton's atomic theory.
   3) Explain Nano-metals, Chalcogenides.

    B) **Attempt any one of the following question.**   **06**
   1) Explain molecular orbital's with its types.
   2) Explain Phonon density.

Q.4 **A)** **Attempt any two of the following question.**   **10**
   1) Explain Bohr atomic theory of hydrogen atom.
   2) Explain the ionization energy and electron affinity trends in periodic table.
   3) Explain the difference between ionic and covalent bond. Give examples.

    B) **Attempt any one of the following question.**   **04**
   1) Explain the difference between compound and molecule with suitable example.
   2) Explain the various types of nano-structures and nano-crystals.

Q.5 **Attempt any two of the following question.**   **14**
   a) Briefly explain the Classification of bulk Nano-Structured materials. 0D, 1D, 2D structures.
   b) Explain homonuclear and heteronuclear diatomic molecules with suitable example, comment on their structure.
   c) What is periodic table? Explain all groups present in periodic table with example.

Seat No.

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2019
Nano-Technology
NANO-MATERIALS FABRICATION

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

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

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

1) Laser ablation refers to removing material with a _____.
   a) pulsed laser   b) mechanical
   c) physical   d) chemical

2) The total mass ablated from the target per laser pulse is usually referred to as _____.
   a) physical rate   b) mechanical rate
   c) arc discharge rate   d) ablation rate

3) After arc discharging for a period of time, a _____ is built up at the cathode.
   a) polymer   b) carbon rod
   c) simple rod   d) composite

4) The different type of ball milling can be used for _____.
   a) synthesis of normal material   b) synthesis of plant
   c) synthesis of nanomaterials   d) none of these

5) Arc discharge was the first recognized technique for producing _____.
   a) Graphene   b) Graphite
   c) MWNTs   d) Simple CNT

6) APCVD instruments works at _____.
   a) Non-pressure   b) low pressure
   c) high pressure   d) atmospheric pressure

7) Combustion chemical vapor deposition (CCVD) or pyrolysis is an _____.
   a) open-atmosphere   b) close-atmosphere
   c) vacuum   d) none of these

8) Gallium arsenide is used in some integrated circuits (ICs) and _____.
   a) photovoltaic devices   b) conductor
   c) fuel cell   d) LED device

9) Spray pyrolysis is a process in which a thin film is deposited by _____ a solution on a heated surface.
   a) spraying   b) drying
   c) freezing   d) air drying

10) Nanotubes have _____ on the nanoscale.
    a) three dimensions   b) two dimensions
    c) four dimensions   d) six dimensions

11) The particles in nanopowders are _____ the wavelength of visible light
   a) smaller than
   b) greater than
   c) equal
   d) very large

12) Aggregation of colloidal particles occurs when _____ bring particle surfaces in contact with each other.
   a) thermodynamic
   b) chemical processes
   c) physical processes
   d) mechanical processes

13) Redox is a _____ in which the oxidation status of atoms are changed.
   a) chemical reaction
   b) mechanical reaction
   c) physical reaction
   d) all of these

14) Reduction is the _____.
   a) loss of electrons
   b) gain of electrons
   c) equal of electrons
   d) decrease of electrons.

Q.2 A) Answer the following question. (Any Four) 08
   1) Define laser ablation.
   2) What is meant by top-down method.
   3) Define arc discharge.
   4) What do you mean by MOCVD.
   5) Define active flux.

B) Write Notes. (Any Two) 06
   1) Spontaneous condensation nanoparticles.
   2) Gas phase synthesis by evaporation.
   3) homo-nucleation growth methods.

Q.3 A) Answer the following question. (Any Two) 08
   1) Explain the techniques of sputtering.
   2) Explain special features of nanoscale growth.
   3) Explain synthesis of metallic nanoparticles.

B) Answer the following question. (Any One) 06
   1) With a neat diagram explain chemical vapor deposition (CVD).
   2) Describe with a neat diagram molecular beam epitaxy.

Q.4 A) Answer the following question. (Any Two) 10
   1) Explain hot-wire plasma enhanced CVD method.
   2) With a neat block diagram explain sol-gel method.
   3) Explain fundamental of nucleation growth.

B) Answer the following question. (Any One) 04
   1) Explain Spinodal decomposition.
   2) Explain nanoparticles morphology.

Q.5 Answer the following question. (Any Two) 14
   1) Describe with a neat diagram arc discharge technique.
   2) With a neat diagram explain Gas phase synthesis of Nanopowder.
   3) Describe with a neat diagram biogenic synthesis by fungi.

Seat No.

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2019
Nano-Technology
FUNDAMENTALS OF BIOTECHNOLOGY

Day & Date: Saturday, 09-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

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

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

1) The word cyto means _____.
   a) Cell   b) Dark
   c) Jelly   d) Small

2) Unlike eukaryotes, prokaryotes do not have _____.
   a) DNA   b) Cytoplasm
   c) Cell walls   d) A membrane bound nucleus

3) _____ part of the cell makes proteins.
   a) Ribosomes   b) Mitochondria
   c) Lysosomes   d) Vacuole

4) Amino acids are joined together by _____.
   a) Peptide bond   b) Hydrogen bond
   c) Ionic bond   d) Glyosidic bond

5) Lipid bilayer is _____.
   a) Hydrophilic and hydrophobic
   b) Acidic and basic
   c) Depends on the surrounding medium
   d) Symmetrical and asymmetrical

6) The pH of the Lysosome is _____.
   a) Neural   b) Basic
   c) Acidic   d) Depends on the cell type

7) Bacterial flagella is made up of _____.
   a) Flagellin   b) Tublin
   c) Desmin   d) Actin and myosin

8) _____ of the following is accessory pigments.
   a) Chlorophyll A   b) Chlorophyll B
   c) Chlorophyll C   d) Carotenoids

9) _____ is the composition of nucleoside.
   a) Sugar + phosphate   b) Base + sugar
   c) Base + phosphate   d) Base + sugar + phosphate

10) Programmed cell death is termed as _____.
    a) Metastasis   b) Apoptosis
    c) Proliferation   d) Mitotic termination

11) The extra chromosome, self – replicating, double stranded, closed, circular DNA molecules are called _____.
    a) Viruses   b) Phages
    c) Chloroplasts   d) Plasmids

12) The biological response of the biosensor is determined by _____.
    a) Biocatalytic membrane
    b) Physico – chemical membrane
    c) Chemical membrane
    d) Artificial membrane

13) _____ type of cell actually secrets antibodies.
    a) Plasma cells
    b) T cells
    c) Macrophages
    d) Dendritic cells

14) The solidifying agent commonly used in preparation of media is _____.
    a) Agar
    b) Silica gel
    c) Glucose
    d) NaOH

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What are prokaryotes and eukaryotes?
2) What are membrane proteins?
3) What are different phases of cell cycle?
4) What are hydrophilic and hydrophobic amino acids?
5) Write the functions of Proteins.

B) Write Notes. (Any Two)   **06**
1) Write a note on molecular composition of cells.
2) Write a note on physical and chemical properties of DNA.
3) Write a note on mitosis and meiosis.

Q.3 A) Answer the following questions. (Any Two)   **08**
1) Describe the process of endocytosis in cell-cell interactions.
2) Monoclonal antibody synthesis and their applications.
3) Write a note on immunity.

B) Answer the following questions. (Any One)   **06**
1) Explain different cell organelles of eukaryotic organisms.
2) Explain in detail cell signaling, transduction and Biosensors.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Explain in detail the phases of cell cycle.
2) Explain the structure of prokaryotic cell with neat labelled diagram.
3) Explain bacterial flagella as a locomotory organ.

B) Answer the following questions. (Any One)   **04**
1) Explain in detail the cytoskeleton.
2) Explain the classical interpretation of cell theory.

Q.5 Answer the following questions. (Any Two)   **14**
a) Explain in detail tumor immunology and life cycle of HIV virus.
b) Explain in details regulation of cell cycle on molecular basis.
c) Explain protein-based nanotechnology.

Seat No.

M.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Nanotechnology
CHARACTERIZATION TOOLS OF NANOMATERIALS

Day & Date: Monday, 04-11-2019   Max. Marks: 70
Time: 11:30 AM To 02:00 PM

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

Q.1   Fill in the blanks by choosing correct alternatives given below.   14
1)   Thermal analysis is defined as _____.
a)   Measurement of concentration of materials as a function of temperature
b)   Measurement of solubility of materials as a function of temperature
c)   Measurement of physical properties as a function of temperature
d)   Measurement of line positions of crystals as a function of temperature

2)   _____ are true for electron microscopy.
a)   specimen should be thin and dry
b)   image is obtained on a phosphorescent screen
c)   electron beam must pass through evacuated chamber
d)   specimen should be thin and dry, image is obtained on a phosphorescent screen and electron beam must pass through evacuated chamber

3)   Principal of XRD is based on _____.
a)   Beer-Lambert law   b)   Bragg's Law
c)   Both a) and b)   d)   All of the above

4)   Vibrational transition of molecule is related to _____.
a)   FTIR   b)   UV -vis Spectroscopy
c)   XRD   d)   NMR

5)   Energy of the electromagnetic radiation is decreases with _____.
a)   Increasing wavelength   b)   Decreasing wavelength
c)   Both a) and b)   d)   None of the above

6)   In FTIR spectroscopy 4000-1000 cm^{-1} known as the ____.
a)   Functional group region   b)   Fingerprint region
c)   Both a) and b)   d)   None of the above

7)   In Electron microscope, light source is replaced by a beam of very fast moving _____.
a)   Electron   b)   Neutron
c)   Proton   d)   Photon

8)   _____types of waves has the shortest wavelength?
a)   Radio waves   b)   X-ray
c)   Microwave   d)   UV

9) _____statement is true.
   a) Gamma rays have longer wavelengths than UV rays
   b) X-rays have longer wavelengths that microwaves
   c) Radio waves have shorter wavelengths than X-rays.
   d) Gamma rays have shorter wavelengths than microwaves.

10) Metal can transmit these _____.
   a) Radio wave   b) Visible light
   c) Microwave   d) X ray

11) Energy band gap size for semiconductors is in the range _____eV.
   a) 1-3   b) 3-4
   c) Greater than 4   d) Greater than 5

12) Elastic scattering is take place in _____.
   a) Raman Scattering   b) Rayleigh's scattering
   c) Both a) and b)   d) None of the above

13) 0.1 nm means _____ A°.
   a) 100 A°   b) 10 A°
   c) 1 A°   d) 0.01 A°

14) _____ thermal procedures we learned so far is not destructive in nature.
   a) TGA   b) DTA
   c) DSC   d) None of the above

Q.2 A) Answer the following questions. (Any Four)   **08**
   1) Define Poisson Ratio.
   2) Short note on need of characterization of nanomaterials.
   3) Difference between optical microscopy and electron microscopy.
   4) Define band gap.
   5) Give two examples of Photoluminescence and chemiluminescence.

B) Write Notes. (Any Two)s   **06**
   1) Short note on Raman scattering
   2) How X-rays are formed explain in detail
   3) Describe STM with diagram

Q.3 A) Answer the following questions. (Any Two)   **08**
   1) What is the principal of Raman spectroscope and gives its uses.
   2) Explain principle and working of XPS.
   3) What do you mean by thermal gravimetric analysis and thermal stability of nanomaterials.

B) Answer the following questions. (Any One)   **06**
   1) Elaborate term photoluminescence and optical band gap.
   2) Explain in detail difference between SEM and TEM.

Q.4 A) Answer the following questions. (Any Two)   **10**
   1) What do you mean by spectroscopy and explain UV Vis Spectroscopy in detail.
   2) Which technique is used for surface area measurement explain in detail.
   3) Write short note on bulge test and surface tension.

B) Answer the following questions. (Any One)   **04**
   1) Write a short note on quantum yield.
   2) Explain FTIR spectroscopy with application.

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

   a) Explain principle, instrumentation and working of XRD with neat labelled diagram.

   b) Mention any thee mechanical properties of nanomaterials and how we characterize mechanical properties of nanomaterials.

   c) Explain Scanning Probe Microscopy in detail.

Seat No.

Set **P**

M.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Nano-Technology
PROPERTIES OF NANOMATERIALS

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time:11:30 AM To 2:00 PM

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

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

1)   _____ is found out by calculating the area under the stress strain graph.
   a) Toughness   b) Hardness
   c) Endurance   d) Strength

2)   The smallest portion of a crystal which when repeated in different
   directions generates the entire crystal is called _____.
   a) Lattice points   b) Crystal lattice
   c) Unit cell   d) None of the mentioned

3)   _____ is a property of amorphous solids.
   a) Sharp melting point   b) Isotropy
   c) Long range order   d) Definite heat of fusion

4)   As the surface area changes the _____ the nonmaterials changes.
   a) Properties   b) Behavior
   c) Size   d) Color

5)   Thermoluminescence is a form of luminescence that is exhibited by
   certain _____.
   a) Intermolecular bonds   b) Absorption
   c) Amorphous materials   d) Crystalline materials

6)   _____ is a important part of a filter that collects and filters dirt and dust
   particles.
   a) A pleated surface   b) Small pore size
   c) Chemicals   d) A manual pump

7)   Nanoelectronic devices a less expensive alternative to the design of
   current electronic devices because _____.
   a) They are slower operating
   b) They require less parts and materials
   c) They are less reliable
   d) They are more vulnerable to viral software

8)   The size effect can have two causes _____.
   a) Statistical & Energetic   b) Only Energetic
   c) Only Statistical   d) Stress & impact

9)   Surface-area-to-volume ratio, also called the _____.
   a) Volume   b) surface-to-volume ratio
   c) Ratio   d) Size dependent

10) Fluorescence is the emission of light by a substance that has _____ light.
   a) Absorbed   b) Emit
   c) Desorb   d) Color

11) Luminescence is _____ of light by a substance not resulting from heat.
 a) Volume
 b) Emission
 c) Excitation
 d) Size dependent

12) Nanoproducts used in cell phones, cameras and computers are tied to which industry most closely _____.
 a) Transportation
 b) Electronics
 c) Cosmetics
 d) Sports equipment

13) Automobiles, which use nanotechnology to improve their functionality, benefit most by enhancing there _____.
 a) Color
 b) Efficiency
 c) Size
 d) Shape

14) Light emission from any form of matter after the absorption of photons called _____.
 a) Photoluminescence
 b) Chemiluminescence
 c) Thermoluminescence
 d) Discoloration

Q.2 A) Answer the following questions. (Any Four)   **08**
 1) What is Specific Surface Energy?
 2) What is Fluorescence?
 3) What are weakly & tightly bound excitons?
 4) What is Magnetic Moment?
 5) What is Quantum Confinement?

B) Write Notes. (Any Two)   **06**
 1) Write a note on Quantum Wells
 2) Write a note on Non-linear Optics
 3) Write a note on Lattice Parameter

Q.3 A) Answer the following questions. (Any Two)   **08**
 1) Explain Dielectric constant of nanoscale silicon.
 2) Explain Nanocrystalline ceramics.
 3) Explain Quantum confinement of supper lattice.

B) Answer the following questions. (Any One)   **06**
 1) Describe Magnetocrystalline anisotropy.
 2) Describe Nanowires and nanodisk.

Q.4 A) Answer the following questions. (Any Two)   **10**
 1) Explain Optical properties of quantum dots.
 2) Explain thermal activation and Superparamagnetic effects.
 3) Explain electronics and Optoelectronics.

B) Answer the following questions. (Any One)   **04**
 1) Explain Non-linear optical properties of nanomaterials.
 2) Explain phonon Density of States.

Q.5 Answer the following questions. (Any Two)   **14**
 a) What is random anisotropy? Write the details of magnetic materials.
 b) Describe the size effect on structure and morphology nanoparticles.
 c) Explain the size dependent properties & surface to volume ratio behavior of nanomateriales.

Seat No.		

M.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Nano-Technology
CARBON AND NANOFORMS OF CARBON

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

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

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

1) In diamond carbon atoms are connected via _____.
   a) H-C bonds   b) H-H bonds
   c) C-H bonds   d) C-C bonds

2) Diamond has an electronic structure of _____ hybridized.
   a) sp^4 b) sp^3
   c) s^1p^3 d) s^2p^3

3) Graphite is a _____ and brittle material.
   a) Hard   b) strong
   c) Soft   d) tough

4) Fullerenes are large _____ molecules.
   a) Square   b) triangle
   c) Rectangular   d) spherical

5) CNF's are made up of _____ graphene sheet.
   a) Rectangular   b) hallow
   c) Broken   d) unbroken

6) Carbon blacks are _____ finer particles.
   a) Rectangular   b) spherical
   c) Triangular   d) hallow

7) Fullerene is _____ allotropic forms of carbon.
   a) Two   b) four
   c) Six   d) eight

8) _____ properties of carbon nanotubes are more fascinating.
   a) Weak   b) magnetic
   c) Chemical   d) Electrical

9) carbon nano-beads are synthesized by _____ by CVD method.
   a) Iron   b) nickel
   c) Zinc   d) camphor

10) CNF's made from _____ by CVD process.
    a) Camphor   b) zinc
    c) Copper   d) cobalt

11) In arc discharge method we are using _____ electrodes.
    a) two graphite   b) three graphite
    c) one graphite   d) five graphite

12) A CVD reaction is almost always a _____ process.
   a) Uniform
   b) pure
   c) Heterogeneous
   d) homogeneous

13) The Nd:YAG laser is an optically pumped solid-state laser that can produce ____ emissions.
   a) no power
   b) very low power
   c) low power
   d) very high power

14) In homogeneous photocatalysis, the reactants and the photocatalysts exist in the _____.
   a) unlike phase
   b) opposite phase
   c) same phase
   d) different phase

Q.2 A) Answer the following questions.(Any Four)   **08**
   1) Define carbon
   2) What is meant by MWCNT
   3) Define CNB
   4) Define CVD
   5) What is meant by are discharge

B) Write Notes on (Any Two)   **06**
   1) Write notes on Diamond.
   2) Write notes on DLC (Diamond like carbon).
   3) Write notes on Activated carbon.

Q.3 A) Answer the following questions.(Any Two)   **08**
   1) Explain purification of CNT by liquid Phase method.
   2) Explain uses of active carbon fibers.
   3) Explain applications of CNT.

B) Answer the following questions. (Any One)   **06**
   1) Briefly explain the properties of carbon nano materials.
   2) Describe synthesis of carbon dots by chemical method.

Q.4 A) Answer the following questions.(Any Two)   **10**
   1) Briefly explain synthesis of nano-catalyst for CNT.
   2) With a neat diagram explain structure of graphite.
   3) Explain microwave-based synthesis of carbon dots.

B) Answer the following questions.(Any One)   **04**
   1) Describe properties of coal derived carbon.
   2) Explain properties of carbon dots.

Q.5 Answer the following questions.(Any Two)   **14**
   a) Describe synthesis of carbon nanomaterials by chemical vapor deposition.
   b) Briefly explain synthesis of nano-diamonds.
   c) With a neat diagram explain structure and types of carbon nanotubes.

Seat No.

M.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Nano-Technology
NANOTECHNOLOGY AND HEALTH-CARE

Day & Date: Monday, 18-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

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

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

1) _____ are excellent examples of tribological systems.
    a) bovine serum albumin   b) synovial joints
    c) tissues   d) ribosomes

2) _____ is the largest weight-bearing joint in the body.
    a) Hip joint   b) Knee Joint
    c) Bone Joint   d) Muscle Joint

3) Agriculture and Forestry comes under the category of _____.
    a) Lignocellulose Biorefining   b) Two platform Biorefining
    c) Environmental Biorefining   d) Green Biorefining

4) Enzymes are _____.
    a) Proteins   b) Carbohydrates
    c) Nucleic acids   d) DNA Molecule

5) The size of the Carbon Quantum dots (C-dots) is _____.
    a) Below 10 nm   b) Below 100 nm
    c) Below 1000 nm   d) Below 10000 nm

6) A fullerene is _____ containing nanoparticle.
    a) C-60   b) C-40
    c) C-100   d) C-200

7) _____ are a class of undifferentiated cells that are able to differentiate into specialized cell.
    a) Stem cell   b) Muscle cell
    c) T-cells   d) B-cells

8) The visible range in UV-Visible spectroscopy is _____.
    a) 40-70   b) 400-700
    c) 4000-7000   d) 40000-70000

9) Cantilevers are present in _____.
    a) TEM   b) AFM
    c) SEM   d) XRD

10) Contractile protein of a muscle is _____.
    a) Troponin   b) Myosin
    c) Tubulin   d) Tropomyosin

11) _____ is an example of a lubricated moving system in the human body.
   a) Ear
   b) Nose
   c) Leg
   d) Eye

12) Which one of the following is a route of drug administration?
   a) Intravenous (IV)
   b) Saline
   c) Topical
   d) Dissolution

13) Monoclonal antibodies are produced by _____.
   a) hybridomas
   b) lymphocytes
   c) myeloma cells
   d) plasma cells

14) Microarrays are also known as _____.
   a) Bio-circuits
   b) DNA chips
   c) Resistors
   d) Biosensors

Q.2 A) Attempt any four of the following questions. 08
   1) What are Bearings?
   2) What are Artificial Organs?
   3) What are nanoscale biosensor devices?
   4) What are MPIOS?
   5) What is Innate and adaptive immunity?

B) Write Notes. (Any Two) 06
   1) Write a note on Self-assembly of bio molecules in nanotechnology.
   2) Explain in detail the process of Biorefining and its classifications.
   3) Write a note on Biosensors and their applications.

Q.3 A) Attempt any two of the following questions. 08
   1) Write a note on Biotribiology.
   2) Explain Nanotechnology in Health-care/Pharmaceutical industry.
   3) Explain Nanotechnology-Based Products for Skin Disorders.

B) Answer the following questions. (Any One) 06
   1) Explain Nanorobot Immunoreactivity.
   2) Explain cancer cell targeting and diagnostics through Nano approach.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Explain the role of Gold nanorods in Biocompatibility of Traditional Medical Implants.
   2) Explain in detail Drug delivery to CNS with neat labelled diagram.
   3) Explain the role Of Nanobiotechnology in Tissue Engineering.

B) Answer the following questions. (Any One) 04
   1) Write a note on molecular proteins and their functions.
   2) Explain different types of bearings.

Q.5 Answer the following questions. (Any Two) 14
   a) Write a note on artificial organs and medical devices.
   b) Write a detailed note on Biotribology and their classifications.
   c) Write a detailed note on DNA and RNA enzymes.

Seat No.

M.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Nano-Technology
APPLICATION OF NANOTECHNOLOGY IN EVERYDAY LIFE

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

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

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

1) _____ is a highly strong natural polymer.
    a) Glucagon   b) Cellulose
    c) Starch   d) PEG

2) _____ is used as vehicle to deliver desired molecules into the seeds during germination.
    a) CNT   b) CNF
    c) CNR   d) CNP

3) Amyloid fibrils act as Nano-Engineered _____.
    a) Humectants   b) Surfactant
    c) Protein Fibrils   d) Synovial Liquid

4) Antibodies are _____.
    a) Proteins   b) Glycoproteins
    c) Carbohydrates   d) nucleic acids

5) Olive oil is an example for _____.
    a) Oils and fats   b) Glycoproteins
    c) Carbohydrates   d) Nucleic acids

6) Keratin proteins extracted from human hair are employed for developing coatings on _____.
    a) Silver   b) Gold
    c) Platinum   d) Titanium

7) Shampoo contains _____ as a detergent.
    a) lauryl sulfates   b) lauryl calcites
    c) lauryl bromides   d) lauryl salts

8) _____ technique can be used in Food processing and packaging.
    a) GC-MS   b) UV radiation.
    c) LC-MS.   d) HPLC

9) The stain repellent fabrics from Nano-Tex are called _____.
    a) Nano-MATERIAL   b) Nano-particle
    c) Nano-tube   d) Nano-Care

10) Programmed cell death is termed as _____.
    a) Metastasis   b) Apoptosis
    c) Proliferation   b) Mitotic termination

11) _____ for dyes could greatly reduce the amount of coloring agent needed.
    a) Nano-formulations   b) Microemulsions
    c) Detergents   d) Indicators

12) The biological response of the biosensor is determined by _____.
    a) Biocatalytic membrane   b) Physio-chemical membrane
    c) Chemical membrane   d) Artificial membrane

13) _____ contain a polymer matrix and a homogeneously dispersed reinforcing agent.
    a) Polymer nanocomposites   b) Single nanocomposites
    c) macrophages nanocomposites   d) Polymer nanocoating

14) _____ coatings have been deposited on fabric fibers in nanotechnology.
    a) Surface Phospholipids   b) Silica
    c) Nitrites   d) Bromides

Q.2 A) Answer the following questions. (Any Four)   **08**
1) What are Alcohols?
2) What are Visual Indicators?
3) What are Nanorobots?
4) Write Uses of Humectants.
5) What are CNT polymers.

B) Write Notes. (Any Two)   **06**
1) Write a note on Nano-Engineered Protein Fibrils.
2) Write a note on Biosensors with examples.
3) Write different Nanofiber Fabrication Techniques.

Q.3 A) Answer the following questions. (Any two)   **08**
1) Explain Nano Finishing in Textiles.
2) Explain Contact Lenses and Vision Correction.
3) Explain preparation & Characterization of Keratin Coatings for Orthopedic Implants.

B) Answer the following questions. (Any One)   **06**
1) Explain the role of Nanotechnology in Food processing and packaging.
2) Explain Application of Nanotechnology in Everyday Life.

Q.4 A) Answer the following questions. (Any Two)   **10**
1) Write a note on Nano fertilizer and foliar nutrient & drug delivery.
2) Write a note on Nano-Emulsions.
3) Write a note on Nanotechnology in Agriculture.

B) Answer the following questions. (Any One)   **04**
1) Explain in nanocoating's & surface modification of textiles.
2) Explain Visual Indicator with food quality assessment.

Q.5 Answer the following questions. (Any Two)   **14**
    a) Write a note on Classification of Cosmetics Quality characteristics.
    b) Explain in detail Nanofabrication of thin polymer films.
    c) Write a note on Nanotechnology in food processing.

Seat No.

M.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Nano-Technology
ORGANIC SEMICONDUCTORS, POLYMERS & MOLECULAR ELECTRONICS

Day & Date: Thursday, 07-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

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

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

1) The band gap of inorganic semiconductor is _____.
   a) 1-2 eV   b) 1-4 eV
   c) 3-4 eV   d) 4-3 eV

2) Conjugated system has a region of overlapping _____.
   a) c-orbitals   b) d-orbitals
   c) p-orbitals   d) h-orbitals

3) An exciton can form when a photon is _____ by a semiconductor.
   a) absorbed   b) reflected
   c) refracted   d) repulses

4) The most basic OLEDs consisted of a _____ organic layer.
   a) single   b) double
   c) triple   d) all of these

5) Organic solar cell it operates in the _____ direction.
   a) forward   b) reverse
   c) equal   d) opposite

6) The lifespan of the OLED displays is _____.
   a) 35000 hours   b) 30000 hours
   c) 20000 hours   d) 15000 hours

7) Overdriving a LED will drastically _____ its lifetime.
   a) constant   b) doubled
   c) increase   d) reduce

8) Nonradiative recombination the electron energy is _____ to vibrational energy.
   a) converted   b) refuse
   c) not converted   d) none of these

9) _____ Air Mass condition is used for terrestrial study of solar cells.
   a) AM0   b) AM1
   c) AM1.5   d) AM2

10) Photoinduced charges are at the heart of _____.
   a) photovoltaics   b) capacitor
   c) inductor   d) resistor

11) A photovoltaic cell is a specialized semiconductor diode that converts _____.
    a) electricity in to light   b) light into light
    c) electricity in to electricity   d) light into electricity

12) _____ discovered the photovoltaic effect.
    a) Enrico Fermi   b) Alessandro Volta
    c) Heinrich Rudolf Hertz   d) Edmond Becquerel

13) Excitons are formed in organic photovoltaic diodes because of _____ organic materials used in OPVDs
    a) low dielectric constant   b) semiconducting properties
    c) conjugated structure   d) None of these

14) A transistor is a semiconductor device used to _____ electronic signals and electrical power.
    a) rectify   b) amplify
    c) magnify   d) all of these

Q.2 A) Answer the following questions. (Any Four)   **08**
    1) Define singlets.
    2) Define organic p-n junction.
    3) What do you mean by photovoltaic diode?
    4) Define WOLED.
    5) What is meant by OTFT?

B) Write notes. (Any Two)   **06**
    1) Spin coating
    2) Rectifiers
    3) Thermal evaporation

Q.3 A) Attempt any two of the following question.   **08**
    1) With a neat diagram, explain excitations.
    2) Describe organic semiconductor.
    3) Explain HOMO - LUMO levels of an OLED.

B) Answer the following questions. (Any One)   **06**
    1) With a neat diagram, explain energy level diagram of p-n junction.
    2) What are advantages and disadvantages of organic solar cells?

Q.4 A) Answer the following questions. (Any Two)   **10**
    1) Explain applications of OLED.
    2) Describe fabrication techniques of Organic Thin Film Transistors (OTFTs).
    3) Explain C60-polymer structure.

B) Answer the following questions. (Any One)   **04**
    1) Explain applications OTFTs.
    2) Describe with a neat diagram, a rectifier.

Q.5 Answer the following questions. (Any Two)   **14**
    a) With the help of a neat diagram explain singlets and triplets of organic semiconductor.
    b) Describe with the help of neat diagram working principle of organic light emitting devices (OLED).
    c) Describe with the help of a neat diagram organic thin film transistor (OTFT)

Seat No.

Set **P**

M.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Nano-Technology
POLYMERS & NANOCOMPOSITES

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

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

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

1) Strong and ductile materials _____.
   a) Polymers   b) Ceramics
   c) Metals   d) Semiconductors

2) _____ is not basic component of Materials Science.
   a) Cost   b) Properties
   c) Structure   d) Performance

3) Layered silicate structures in clays consists the following group _____.
   a) SiO_4^{4-} b) $Si_2O_5^{2-}$
   c) $Si_2O_7^{6-}$ d) None of the above

4) The word 'ceramic' meant for _____.
   a) soft material   b) hard material
   c) burnt material   d) dry material

5) _____ does not combine with fiber to give composites.
   a) Metals   b) Ceramics
   c) Non-metals   d) Polymers

6) _____ type of composite is not classified under the category of number of layers.
   a) Unidirectional fibre reinforced   b) Laminar
   c) Sandwich panels   d) Glass-fibre reinforced

7) One of the most popular types of core material used is _____.
   a) Metal foam   b) Honeycomb
   c) Glass   d) Plastic

8) When fibers are used as a dispersed phase for the reinforcement of matrices, the resultant composites are known as _____.
   a) Glass-fiber reinforced   b) Carbon-fiber reinforced
   c) Wood-fiber reinforced   d) Unidirectional-fiber reinforced

9) _____ is an application of glass-fiber reinforced composites.
   a) Adhesives   b) Conveyor belts
   c) Design of ships   d) Automotive parts

10) _____ is used as reinforcement in advanced polymer matrix composite.
    a) Glass-fiber reinforced   b) Carbon-fiber reinforced
    c) Wood-fiber reinforced   d) Unidirectional-fiber reinforced

11) The following material can be used for filling in sandwich structures _____.
    a) Polymers   b) Cement
    c) Wood   d) All

12) Major load carrier in dispersion-strengthened composites _____.
   a) Matrix
   b) Fiber
   c) Both
   d) Can't define

13) Al-alloys for engine/automobile parts are reinforced to increase them _____.
   a) Strength
   b) Wear resistance
   c) Elastic modulus
   d) Density

14) Major ingredients of traditional ceramics _____.
   a) silica
   b) clay
   c) feldspar
   d) all

Q.2 A) Answer the following. (Any Four)   **08**
   1) What is metal matrix composite?
   2) What is hetro polymer?
   3) What is polymer matric nano composite?
   4) What is block polymers?
   5) What is ceramic matric nano composite?

B) Write Notes. (Any Two)   **06**
   1) Write a note on Applications-Chain Structure and configuration.
   2) Write a note on Metal-containing polymers.
   3) Write a note on Block copolymers.

Q.3 A) Answer the following. (Any Two)   **08**
   1) Explain polypropylene layered silicate nanocomposites.
   2) Explain Conducting polymers.
   3) Explain Nano-phase ceramic composites.

B) Answer the following. (Any One)   **06**
   1) Explain Polymeric Nanostructures.
   2) Describe micro-structural control of metal reinforced ceramic matrix nanocomposites.

Q.4 A) Answer the following. (Any Two)   **10**
   1) Explain polymer/calcium carbonate nanocomposites.
   2) Explain vapor grown carbon fiber composites & resin carbon composite.
   3) Explain poly (ethyl acrylate) / bentonite nanocomposites poly (butylene terephthlate) (PBT) based nanocomposites.

B) Answer the following. (Any One)   **04**
   1) Explain functionally graded ceramics clay nanocomposites and Bullet proof composites.
   2) Explain the fundamentals of properties of polymers and its importance and classification.

Q.5 Answer the following. (Any two)   **14**
   a) Explain Glass transition temperature (T_g) and melting point (T_m) and factors affecting its and importance (T_g).
   b) Explain Hydrophobic and hydrophilic polymers for drug delivery.
   c) Explain Silicon nitride and silicon carbide-based ceramics.

Seat No.	

M.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Nano-Technology
INDUSTRIAL NANOTECHNOLOGY

Day & Date: Wednesday, 06-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

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

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

1) Lithography is used to transfer a pattern from a _____ to the surface of the wafer.
   a) photomask   b) watermask
   c) flamemask   d) chemicalmask

2) Etching is used to _____ material selectivity in order to create patterns.
   a) deposit   b) remove
   c) scanning   d) adding

3) The principal of CVD is a _____.
   a) chemical reaction   b) physical reaction
   c) magnetic reaction   d) electrical reaction

4) CMP is used to plane the wafer surface with the help of a _____.
   a) bio slurry   b) acid slurry
   c) physical slurry   d) chemical slurry

5) Silicon dioxide layers are used as high quality _____.
   a) insulator   b) conductor
   c) capacitor   d) resistor

6) Diffussion is the movement of impurity atoms in a semiconductor material at _____.
   a) cold condition   b) no temperatures
   c) low temperatures   d) high temperatures

7) _____ is the material used create most integrated circuits.
   a) copper   b) iron
   c) cobalt   d) silicon

8) The intermolecular forces may be _____ in the case of nonpolar crystals.
   a) incorporate forces   b) dispersion forces
   c) consolidate forces   d) attractive forces

9) Organic electroluminescent materials _____ in proportion to the current flowing through them.
   a) emit light   b) voltage
   c) magnetic property   d) emit heat

10) The lifetime of an excimer is _____.
    a) very long   b) long
    c) very short   d) medium

11) The small nanoparticles of _____ helps to prevent tooth from decaying.
    a) glucose
    b) hydroxyapatite
    c) zinc
    d) magnesium

12) _____ bacteria may respond to antibacterial nanoparticles.
    a) gram-positive
    b) candida
    c) bacillus
    d) pseudomonas

13) _____ is sued for surface coasting of packaging materials.
    a) cobalt
    b) iron
    c) magnesium
    d) silica

14) The first company to introduce a nanotechnology based cosmetic was _____.
    a) bell
    b) lancome
    c) anshuman
    d) lenovo

Q.2 A) Answer the following. (Any Four)   **08**
    1) What is meant by ferromagnet?
    2) Define photoinduced magnetism.
    3) Define organic semiconductors.
    4) What is meant by solar components?
    5) Define microactuators.

B) Write Notes. (Any Two)   **06**
    1) Write notes on Properties of nanomagnetic materials.
    2) Write notes on Spintronics.
    3) Write notes on Chemical sensor.

Q.3 A) Answer the following. (Any Two)   **08**
    1) Explain applications of MEMS.
    2) Briefly explain on hybridization.
    3) Describe conducting polymers.

B) Answer the following. (Any One)   **06**
    1) Describe principal and performance of semiconductor nanostructures based electronics.
    2) Give brief explanation on applications of nanomaterials in paints.

Q.4 A) Answer the following. (Any Two)   **10**
    1) Explain advantages and applications of MEMS.
    2) Describe molecular crystals with its applications.
    3) Give an brief explanation on electroluminescent displays (ELDs)

B) Answer the following (Any One)   **04**
    1) Explain cosmetic applications of nanomaterials.
    2) Explain the applications of chemical sensors.

Q.5 Answer the following (Any two)   **14**
    a) Give brief explanation on fabrication process of semiconductors.
    b) Give brief explanation on fabrication of Micro Electromechanical Systems (MEMS).
    c) With a neat diagram explain excimers.

Seat No.

M.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Nano-Technology
THIN FILM TECHNOLOGY

Day & Date: Friday, 08-11-2019   Max. Marks: 70
Time: 03:00 PM To 05:30 PM

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

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

1) In vacuum, normally unit for pressure is _____.
   a) Torr   b) Milli bar
   c) Both a) and b)   d) None of the above

2) _____ is a type of sputtering.
   a) Glow discharge sputtering   b) Magnetron sputtering
   c) Ion beam sputtering   d) All of the above

3) _____ is thin film formation technique.
   a) Spray pyrolysis   b) CVD
   c) Thermal evaporation   d) All of the above

4) Chemical vapor deposition may be defined as the deposition of a solid on a heated surface from a _____ in the vapor phase.
   a) Physical reaction   b) Chemical reaction
   c) Physical and chemical reaction   d) All of the above

5) _____ is suitable for layer by layer thin film deposition .
   a) MBE   b) CVD
   c) Thermal evaporation   d) All of the above

6) The degree of vacuum is decided by _____.
   a) Mean free path   b) Pressure.
   c) Type of vacuum pump   d) All of the above

7) Surface diffusion of molecules is not taken in _____.
   a) CVD   b) PVD
   c) Both a) and b)   d) None of the above

8) Sputter yield (s) is increases with _____.
   a) Quantity of precursor   b) Energy of sputtering gases
   c) Both a) and b)   d) None of the above

9) In Ultrahigh vaccum CVD pressure is below _____.
   a) 10^{-6} torr   b) 10^{-8} torr
   c) 10^{-12} torr   d) 10^{-10} torr

10) _____ is not a parameter of sputtering technique.
    a) Sputter voltage   b) Argon pressure
    c) Substrate bias voltage   d) Concentration of precursor

11) In MOCVD precursor is _____.
    a) Metal oxide   b) Metal organic
    c) Metal salt   d) Metals

12) _____ used for removing metal traces on the surface of the substrate.
   a) Alcohol
   b) Acetone
   c) Aqua rigia
   d) Chromic acid

13) 1 Torr = _____.
   a) 13.28 Pa
   b) 133.28 Pa
   c) 133 Pa
   d) 13328 Pa

14) Usually thin films are _____.
   a) 1D
   b) 2D
   c) 3D
   d) None of the above

Q.2 A) Answer the following questions. (Any Four) 08
   1) Short note on gas phase and plasma phase for thin film deposition.
   2) Define sticking coefficient.
   3) What do you mean by vacuum technology?
   4) Define sputtering and mention its type.
   5) What is the effect of roughness on thin film deposition?

B) Write Notes. (Any Two) 06
   1) Explain different type of substrate for thin film deposition
   2) What are the advantages and disadvantages of CVD
   3) Short note on resistive heating

Q.3 A) Answer the following questions.(Any Two) 08
   1) Short note on nanocrystalline thin film.
   2) Describe working of diffusion pump.
   3) With neat labelled diagram explain magnetron sputtering.

B) Answer the following questions. (Any One) 06
   1) Explain organometallic CVD in detail.
   2) Explain rotary pump in detail.

Q.4 A) Answer the following questions. (Any Two) 10
   1) What do you mean by photovoltaic cells and explain of thin film in photovoltaic cell .
   2) Explain thermal evaporation.
   3) Short note on atomic layer deposition.

B) Answer the following questions. (Any One) 04
   1) Describe molecular beam epitaxy technique.
   2) Explain instrumentation and working of thermally activated CVD.

Q.5 Answer the following questions. (Any Two) 14
   1) What do you mean by sticking coefficient and find out expression for it.
   2) Explain different types of vacuum pump.
   3) Enlist type of CVD and explain any two types in detail.

Seat No.

M.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Nano-Technology
ANIMAL BIOTECHNOLOGY

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

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

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

1) _____ deals with the *in vitro* cultivation of organs, tissues and cells.
   a) Microbial culture   b) Environmental culture
   c) Soil culture   d) Tissue culture

2) In animal biotechnology, the disinfectant used to clean the base of the airflow cabinets is _____.
   a) 10% ethanol   b) 50% ethanol
   c) 70% ethanol   d) 100% ethanol

3) _____ is a proteolytic enzyme which hydrolyzes proteins.
   a) Ligase   b) Trypsin
   c) Lignin   d) Lysozyme

4) _____ is used to store medium and buffers.
   a) A refrigerator   b) TV
   c) Washing machine   d) Computers

5) Deep freezer are used for keeping pre-aliquoted stocks of _____.
   a) Organic solvents   b) Inflammable solvents
   c) Hazardous chemicals   d) serum, Buffers and antibiotics

6) Frozen cell lines are preserved by using liquid nitrogen at _____ temperature.
   a) -96°C   b) -196°C
   c) 96°C   d) 196°C

7) Media that cannot be autoclaved must be _____.
   a) Ultra-centrifuged   b) Centrifuged
   c) Filter sterilized   d) UV sterilized

8) _____ buffer is used for washing cells and for short incubations in suspension.
   a) Potassium-buffered saline (PBS)
   b) Phosphate-buffered saline (PBS)
   c) Permanganate-buffered saline (PBS)
   d) Phosphate-biological saline (PBS)

9) In cell culture technology, the naturally derived components of media is _____.
   a) Serum   b) Plasma
   c) Antibiotics   d) Buffer

10) Two types of CO_2 Incubators used in animal cell cultures are _____.
   a) Hot and Cold   b) Wet and Dehydrated
   c) Dry and Humid   d) Moist and Humid

11) _____ are simple bacteria that lack a cell wall.
   a) Viruses   b) Bacteria
   c) Fungi   d) Mycoplasma

12) The 293-cell line is a permanent line established from primary embryonic _____.
   a) human Pancreas   b) human lungs
   c) human kidney   d) human liver

13) _____ is a process of removal of the medium and transfer of cells from a previous culture into fresh growth medium.
   a) Sub culturing   b) Clonal culturing
   c) Microbe culturing   d) Co-culturing

14) Syringes are examples of _____.
   a) Industrial waste   b) Biomedical waste
   c) Garbage waste   d) E-waste

Q.2 A) Answer the following questions. (Any Four) 08
   1) What is primary culture?
   2) What is an explant?
   3) What is totipotency?
   4) What is HeLA?
   5) Give some examples of equipment's used in tissue culture.

B) Write Notes. (Any Two) 06
   1) Write a note on microscope.
   2) Write a note on different culture media in animal tissue culture.
   3) Write a note on transgenic animals along with examples.

Q.3 A) Answer the following questions. (Any Two) 08
   1) Explain in detail the process of sterilization in animal tissue culture.
   2) Explain culturing of animal cells.
   3) Explain primary cultures and their advantages and limitations.

B) Answer the following questions. (Any One) 06
   1) Write a note on the process of cryopreservation.
   2) Explain cell cycle in relevance with animal culture.

Q.4 A) Answer the following questions. (Any Two) 10
   1) Write different applications of tissue culture.
   2) Write a note on different techniques of cell counting.
   3) Write a note centrifugation technique.

B) Answer the following questions. (Any One) 04
   1) Explain in detail basic techniques in animal cell culture.
   2) Explain the applications of flow cytometry.

Q.5 Answer the following questions. (Any Two) 14
   a) Write a note on laminar air flow hood with a neat labeled diagram.
   b) Explain in detail design of tissue culture laboratory.
   c) Write a note on continuous (clonal) cell lines with their advantages and limitations.