SLR-MU-705

Seat No.		Set	P

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2017
Nano-Technology
FUNDAMENTALS OF NANO TECHNOLOGY IN PHYSICS

Day & Date: Thursday, 16-11-2017 Max. Marks: 70
Time: 10.30 AM to 01.00 PM

Instructions: 1) Part-I, question 1 is compulsory.
2) Attempt any four questions from Part - II
3) Figures to the right indicate full marks.
4) Answers to the Part - I and Part - II are to be written in same answer book.

Part - I

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) Bragg's law can be expressed by _____.
   a) $n\lambda = 2d\sin\theta$ b) $n\lambda = 2d\sin^2\theta$
   c) $n\lambda = 2d\cos\theta$ d) $n\lambda = 2d\cos^2\theta$

2) In _____ crystal has arrangement as $a \neq b \neq c$ with $\alpha = \gamma = 90^0 \neq \beta$.
   a) Tetragonal b) Triclinic
   c) Monoclinic d) Orthorhombic

3) The quantum dots are _____ dimensional nonmaterial's.
   a) Zero b) One
   c) Two d) Three

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

5) Dielectric constant E = _____.
   a) $\varepsilon_0 - \varepsilon_r$ b) $\varepsilon_0/\varepsilon_r$
   c) $\varepsilon_0 + \varepsilon_r$ d) $\varepsilon_r/\varepsilon_0$

6) Nonmaterials are more reactive due to their _____.
   a) Size b) Surface area
   c) Density d) Elasticity

7) _____ originates similar as magnetism originates.
   a) Superconductivity b) Conductivity
   c) Insulators d) Dielectric

Q.1 B) Define the following terms. **07**

a) Crystal
b) Fermi level
c) Quantum dot
d) Dielectric constant
e) Electronic polarization
f) Magnetism
g) Thermal property

Part – II

Q.2	With neat labeled diagram explain crystal structure.	**14**
Q.3	Explain band structure of semiconductor.	**14**
Q.4	Discuss quantum theory of nanomaterials.	**14**
Q.5	Explain electronic and ionic polarization with a neat diagram.	**14**
Q.6	**Answer any TWO of the following:** **a)** What ate applications of dielectric materials? **b)** Explain the term Polarization. **c)** Discuss Electroluminescence in brief.	**14**
Q.7	**Write short notes on. (Any Two)** **a)** Nanostructure materials **b)** Mechanical properties of nanomaterials **c)** Electronic properties of nanomaterials.	**14**

SLR-MU-706

Seat No.		Set	P

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2017
Nano-Technology
FUNDAMENTALS OF NANO TECHNOLOGY IN CHEMISTRY

Day & Date: Saturday, 18-11-2017 Max. Marks: 70
Time: 10.30 AM to 01.00 PM

Instructions: 1) Part-I, question 1 is compulsory.
2) Attempt any four questions from Part - II
3) Figures to the right indicate full marks.
4) Answers to the Part – I and Part – II are to be written in same answer booklet only.

Part – I

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) The four quantum number of the 19^{th} electron in Ti (Z=22) are ____.
   a) $n = 4, l = 1, m = 0, s = +1/2$
   b) $n = 4, l = 0, m = 0, s = +1/2$
   c) $n = 3, l = 2, m = +2, s = +1/2$
   d) $n = 4, l = 2, m = -1, s = +1/2$

2) _____ has a non-spherical shell of electrons.
   a) He b) Be
   c) B d) Li

3) A chemical bond formed by sharing pair of electrons between atoms called _____.
   a) Covalent bond b) Ionic bond
   c) Co-ordinate bond d) Hydrogen bond

4) The energy required break a bond called as _____.
   a) Electronegativity b) Redox potential
   c) Bond energy d) Potential energy

5) Chalcogenide is a chemical compound consisting of at least one _____.
   a) Chalcogen anion b) Cluster
   c) Atomic assembly d) Metalloid

6) Carbon nanotubes are allotropes of _____.
   a) Oxygen b) Carbon
   c) Citrate d) Mineral

7) _____ are zero dimension materials.
   a) CNT b) Film
   c) Quantum dots d) Flux

Q.1 B) Define the following: **07**

a) Hund's Rule
b) Orbital
c) Octet rule
d) Nanoscale
e) Metals
f) Crystal
g) Lattice

Part – II

Answer any four of the following:

Q.2 Explain quantum mechanical model & calculate all quantum numbers of 16^{th} electron of Chlorine atom. **14**

Q.3 Explain 'Covalent bonding' and elaborate quantum mechanical approach to covalent bonding. **14**

Q.4 Explain Molecular Orbital theory with CO molecule as examples. **14**

Q.5 Explain the carbon nanomaterials. **14**

Q.6 Answer any two from the following: **14**

a) Applications of chalcogenides.
b) Describe boron nitrile.
c) Describe zero dimension materials.

Q.7 Write short notes on. (Any two) **14**

a) Two dimension nanomaterials
b) Ultra-thin film
c) Phonon density

SLR-MU-707

Seat No.		Set	P

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2017
Nano-Technology
NANO-MATERIALS FABRICATON

Day & Date: Tuesday, 21-11-2017 Max. Marks: 70
Time: 10.30 AM to 01.00 PM

Instructions: 1) Q. (1) and (2) are compulsory.
2) Answer any three questions from Q.3 to Q.7.
3) All questions carry equal marks.

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) CVD means _____.
   a) Chemical vapor deposition b) Compound vapor deposition
   c) Chemical Deposition d) Compound deposition

2) In sputtering method the particles are _____ from solid target materials.
   a) Ejected b) Deposited
   c) Neutralized d) Attached

3) The _____ used in mechanical ball milling.
   a) Filler ball b) Plastic ball
   c) Tungsten ball d) Composite

4) Arch discharge technique is a _____ method.
   a) Physical b) Chemical
   c) Biological d) Physio-chemical

5) Laser ablation is the process of _____ material from a solid.
   a) Adding b) Depositing
   c) Removing d) Placing

6) Hot wire CVD consists of _____.
   a) Liquid b) Filament
   c) Solid d) Mixture of Solid & liquid

7) _____ are used to synthesize nanoparticles by biogenic method.
   a) Metal b) Virus
   c) Fungi d) Flux

Q.1 B) Definitions: **07**

a) 2D Nano structure
b) Heavy metals
c) CVD
d) Nanoparticles
e) Sputtering
f) Intracellular
g) Bacteria

Q.2	**Attempt following**		
	a)	Explain arc discharge technique.	**05**
	b)	Explain atomic layer epitaxy.	**05**
	c)	Write a note on nucleation and growth of nanomaterials	**04**
Q.3	**a)**	Write a note on physio-chemical methods of nanomaterials synthesis.	**08**
	b)	Explain mechanical milling.	**06**
Q.4	**a)**	Describe synthesis of nanoparticles by sol gel method with one suitable example.	**08**
	b)	Explain self assembly technique	**06**
Q.5	**a)**	Explain synthesis of nanomaterials by spray pyrolysis method.	**08**
	b)	Write a note on the phase transformation	**06**
Q.6	**a)**	Describe the gas phase synthesis of nanopowders.	**08**
	b)	Write a note on synthesis of nanomaterials by algae.	**06**
Q.7	**a)**	Describe the intercellular synthesis of nanomaterials.	**08**
	b)	Write a note on Properties of living organism.	**06**

SLR-MU-708

Seat No.		Set	P

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2017
Nano-Technology
FUNDAMENTALS OF BIOTEHNOLOGY

Day & Date: Thursday, 23-11-2017 Max. Marks: 70
Time: 10.30 AM to 01.00 PM

Instructions: 1) Part-I, question 1 is compulsory.
2) Attempt any four questions from Part - II
3) Figures to the right indicate full marks.
4) Answers to the Part – I and Part – II are to be written in same answer booklet only.

Part - I

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) The target cell must have the right_____ for that signal.
   a) Bacteria b) DNA
   c) RNA d) Receptor

2) The flow of information in central dogma is _____.
   a) Bidirectional b) Unidirectional
   c) Reversible d) Diagonal

3) Chloroplast contains the green pigment_____.
   a) Grana b) Chlorophy II
   c) Stroma d) Thylakoid

4) The simplest amino acid is _____ which has a single hydrogen atom as its side chain.
   a) Glycine b) Alanine
   c) Valine d) Leucine

5) Hydrolysis of ATP results in formation of_____.
   a) GDP + Pi b) NADP
   c) ADP + Pi d) NADPH

6) Cells that are near one another communicate through_____ signaling.
   a) Endocrine b) Paracrine
   c) Autocrine d) Exocrine

7) In endocrine signaling the cells transmit signals over long distance using _____ system.
   a) Circulatory b) Respiratory
   c) Cardio vascular d) Digestion

Q.1 B) Definition: **07**

a) Mitosis.
b) Purines.
c) Ligands.
d) Nucleic acid.
e) Intracellular receptors.
f) Bacilli.
g) DNA.

Part - II

Answer any four of the following

Q.2 What is cell adhesion? Explain briefly about cell adhesion molecules. **14**

Q.3 What is cytoskeleton? Explain the process of polymerization of microtubule. **14**

Q.4 What are prokaryotic cells? Explain in detail the types of reproduction in prokaryotic cells. **14**

Q.5 What is protein? Explain the biochemistry and cellular functions of Proteins. **14**

Q.6 Write a short note about any two **14**

a) Endoplasmic reticulum and Ribosomes.
b) Types of cell receptors.
c) Nucleotides.

Q.7 Explain in detail about any two **14**

a) Programmed cell death.
b) Components of DNA.
c) Molecular composition of cells.

SLR-MU-709

Seat No.		Set	P

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2017
Nano-Technology
INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY

Day & Date: Thursday, 23-11-2017 Max. Marks: 70
Time: 10.30 AM to 01.00 PM

Instructions: 1) Part-I, question 1 is compulsory.
2) Attempt any four questions from Part - II
3) Figures to the right indicate full marks.
4) Answers to the Part I and Part II are to be written in same answer booklet only.

Part - I

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) Nucleation, the initial process that occurs in the formation of a _____.
   a) Atomic b) Crystal
   c) Molecule d) Nano – cluster

2) _____ is a form of carbon consisting of planar sheets which are one atom thick.
   a) Epitaxy b) Thin flim
   c) Graphene d) Monolayer

3) The _____ is a material particle having at least one dimension smaller than 100 nanometers.
   a) Super molecules b) Isomerization
   c) Self-assembly d) Nanocrystal

4) A quantum wire is an electrically _____ wire.
   a) Conducting b) Insulating
   c) Dielectric d) Elasticity

5) _____ a device which detects or measures a physical property and records.
   a) Sensor b) Reactor
   c) CNT d) Grain

6) A material made from two or more constituent called_____.
   a) Composite b) Conductor
   c) Camphor d) Semiconductor

7) _____ is the example of metal oxide.
   a) ZnO b) PNP
   c) Ge d) CdS

Q.1 B) Definition: **07**

a) CNT.
b) Atomic structure.
c) Grapheme.
d) Grain.
e) Nanocrystal.
f) Ceramic.
g) Transistor.

Part - II

Answer any four of the following

Q.2 What is atom? How scientific revolution occurs in atomic structure? **14**

Q.3 Explain in detail three dimensional nanostructures? What are Quantum dots? What is membrane based water purification? **14**

Q.4 What is lipid? Explain the properties of ceramics and composites? **14**

Q.5 What is molecular electronics? What is its role in nanoelectronics? **14**

Q.6 Write a short note about any two **14**

a) Applications of CNT based transistors.
b) Describe size dependent properties.
c) Working principle of biochemical sensors.

Q.7 Explain in detail about any two **14**

a) Bottom up approach.
b) Quantum electronic devices.
c) Size dependent properties of DNA.

SLR-MU-714

Seat No.		Set	P

M.Sc. (Semester - III) (New) (CBCS) Examination Oct/Nov-2017
Nano-Technology
NANOTECHNOLOGY AND HEALTH-CARE

Day & Date: Thursday, 16-11-2017 Max. Marks: 70
Time: 02.30 PM to 05.00 PM

Instructions: 1) Part-I, is compulsory.
2) Attempt any four questions from Part – II.
3) Figures to the right indicate full marks.
4) Answers to the Part – I and Part – II are to be written in same answer booklet only.

Part – I

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) Gamma globulins are administered by _____ route.
   a) Parenteral b) Intramuscular
   c) Nasal d) Intravenous

2) The aspect ratio of Gold nanorods is calculated using the formula.
   a) $\lambda max = 92\ R + 420$ b) $\lambda max = 97\ R + 420$
   c) $\lambda max = 95\ R + 420$ d) $\lambda max = 90\ R + 420$

3) Fullerenes may induce production of specific _____ antibodies.
   a) IgG b) IgA
   c) IgE d) IgD

4) Required properties of scaffold:
   a) Biocompatible
   b) Biodegradable
   c) No or less immune response/adverse effects
   d) All of these

5) Polymer – ceramic electrospun scaffolds have been used in:
   a) Wound Healing b) Cartilage tissues
   c) Bone tissue engineering d) Skin disease

6) Which of the following is a non-parenteral route of administration in drug/protein based delivery.
   a) Ocular route b) Intravascular route
   c) Subcutaneous route d) Intramuscular route

7) In Atomic force microscopy _____ probes are used to measure surface roughness.
   a) Cantilever b) Shaft
   c) Tip d) platinum-chromium

Q.1 B) Define the following terms: **07**

a) Nanogeriatrics
b) Exocytosis
c) Biocapsules
d) Quantum confinement
e) Nanoneurology
f) Surface Plasmon resonance
g) Immunoassay

Part – II

Answer any four of the following.

Q.2 Explain in detail nonorobotimmuno reactivity and different techniques of immune evasion. **14**

Q.3 Explain in detail principles of tribology. **14**

Q.4 Write in detail about targeted drug delivery with examples. **14**

Q.5 What are the parenteral routes of administration for drug/protein? Explain in detail. **14**

Q.6 Answer any two of the following. **14**

a) Explain rolling contact bearing in detail.
b) Write about applications of bucky balls in treatment of brain cancer.
c) Explain light activated ion channel with example

Q.7 Write short notes on Any Two of the following: **14**

a) Patch-clamp technique
b) Kinesin and Dynein molecular motor
c) Nanobone implants and scaffolds

SLR-MU-715

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination Oct/Nov-2017
Nano-Technology
APPLICATION OF NANOTECHNOLOGY IN EVERYDAY LIFE

Day & Date: Saturday, 18-11-2017 Max. Marks: 70
Time: 02.30 PM to 05.00 PM

Instructions: 1) Part-I, question 1 is compulsory.
2) Attempt any four questions from Part - II
3) Figures to the right indicate full marks.
4) Answers to the Part I and Part II are to be written in same answer booklet only.

Part - I

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) Microencapsulation technology involves of _____ the cells.
   a) Immobilization b) Diagnostics
   c) Emission absorbance d) Globalization

2) A biosensor typically consists of a _____.
   a) Bio-recognition site b) Surface- to volume ration
   c) Ratio d) Size dependent

3) Waxes are a diverse class of _____.
   a) Properties b) Gasses
   c) Nanomaterials d) Organic compound

4) DNA biosensors can theoretically be used for _____.
   a) Intermolecular bonds b) Medical diagnostics
   c) Emission absorbance d) External

5) Clay nanocomposites are being used to provide an impermeable barrier to _____.
   a) Properties b) Gasses
   c) Nanomaterials d) Color

6) Zinc oxide oxide NPs can be incorporated into plastic packaging to block _____.
   a) X-Rays b) Sun rays
   c) UV rays d) Size dependent

7) A vegetable oil is a _____ extracted from a plant.
   a) Triglyceride b) Analyte
   c) Biogas d) Impact

Q.1 B) Definitions: **07**

a) Biosensor
b) Oil
c) Fat
d) Wax
e) Indicators
f) Nanofiber

g) Drug Delivery

SLR-MU-715

Part - II

Answer any four of the following

Q.2	What is food matrices? Explain its advantages & application in nanotechnology.	**14**
Q.3	Explain food packaging in nanotechnology.	**14**
Q.4	Explain the nano fertilizer products in nanotechnology.	**14**
Q.5	Briefly explain the antioxidant products in nanotechnology	**14**
Q.6	**Answer any two from the following** **a)** Application of Humectant **b)** Describe protein fibril **c)** Describe Silicone	**14**
Q.7	**Write short notes on (any two)** **a)** Oily materials **b)** Humectants **c)** Polyolefin composite	**14**

SLR-MU-716

Seat No.		Set	P

M.Sc. (Semester - III) (New) (CBCS) Examination Oct/Nov-2017
Nano-Technology
NANOTECHNOLOGY IN ENVRIONMENT/ECOSYSTEM

Day & Date: Tuesday, 21-11-2017 Max. Marks: 70
Time: 02.30 PM to 05.00 PM

Instructions: 1) Part-I, question 1 is compulsory.
2) Attempt any four questions from Part - II
3) Figures to the right indicate full marks.
4) Answers to the Part – I and Part – II are to be written in same answer booklet only.

Part – I

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) Which of the following is the principle component of the BBB?
   a) Astrocytes b) Pericytes
   c) Endothelial cells d) All of the given alternatives

2) A redox recation is any chemical reaction in which the oxidation number of a molecule, atom or iron changes by_____.
   a) Gaining/losing an electron b) Sharing an electron
   c) No role of electron d) Chelating

3) ZVI nanoparticles have been used for the treatment of_____.
   a) Skin disease b) Contaminated water
   c) Brain disease d) Bacterial infection

4) SAMMS stands for_____.
   a) Self-assembled Microlayers on Multilayered Supports.
   b) Self-assembled Multilayers on Mesoporous Supports.
   c) Self-assembled Monolayers on Microporous Supports.
   d) Self-assembled Monolayers on Mesoporous Supports.

5) The branch of science related or concerned with nature, effects and/or detection of poisons is termed as_____.
   a) Toxicology b) Pharmacology
   c) Biotoxicity d) None of these

6) The acceleration of a chemical reaction in the presences of light as a catalyst is known as_____.
   a) Electrolysis b) Catalysis
   c) Photocatalysis d) All of these

7) Fibrinolysis is defined as the enzymatic breakdown of _____ in blood clots.
   a) Actin b) Fibrin
   c) Thrombin d) Kinesin

Q.1 B) Definition: **07**

a) Dosimetry.
b) Cardiovascular system.
c) Bio-toxicity.
d) Translocation.
e) Dysfunction.
f) Thrombosis.
g) Coagulation.

Part - II

Answer any four of the following

Q.2 Explain the possible health impacts of nanoparticles on cardiovascular system. **14**

Q.3 Explain air pollution and the 'role of nanoparticles in mediating the adverse pulmonary effects of PM. **14**

Q.4 Explain the effects of nanoparticles on liver and gastrointestinal tract. **14**

Q.5 Explain the role of nanoparticles for environmental remediation. **14**

Q.6 **Write a short note about any two** **14**

a) Explain different entry routes of nanoparticles into the human body.
b) Explain effect of nanopaticles or nervous system.
c) Explain bio-toxicity of iron oxide and titanium oxide.

Q.7 **Explain in detail about any two** **14**

a) Self-assembled monolayers on mesoporous supports.
b) Adverse effects of PM in epidemiological studies.
c) Effect of size and surface charges of nanoparticles.

SLR-MU-717

Seat No.		Set	P

M.Sc. (Semester - III) (New) (CBCS) Examination Oct/Nov-2017
Nano-Technology
ORGANIC SEMICONDUCTORS, POLYMERS & MOLECULAR ELECTRONICS

Day & Date: Tuesday, 21-11-2017 Max. Marks: 70
Time: 02.30 PM to 05.00 PM

Instructions: 1) Part-I, question 1 is compulsory.
2) Attempt any four questions from Part - II
3) Figures to the right indicate full marks.
4) Answers to the Part – I and Part – II are to be written in same answer booklet only.

Part – I

Q.1 A) Rewrite the sentence after choosing correct answer from the given alternatives: **07**

1) The band gap of inorganic semiconductor is_____.
   a) 2.5-4 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) The most basic OLEDs consisted of _____ organic layer.
   a) Single b) Double
   c) Triple d) All of these

4) Overdriving a LED will drastically_____ its lifetime.
   a) Not change b) Double
   c) Increase d) Reduce

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

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

7) 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

Q.1 B) Definition: **07**

a) Organic semiconductors.
b) Singlets.
c) HOMO.
d) Organic p-n junction.
e) PCE.
f) Photovoltaic.
g) Molecular Rectifier.

Part - II

Answer any four of the following.

Q.2 Describe with the help of a neat diagram excitons and polarons in organic semiconductor. **14**

Q.3 Give a brief explanation on electronic on optical processes. **14**

Q.4 With a neat diagram explain working principle and advantages of organic light emitting diode (OLED). **14**

Q.5 Explain the steps involved in organic photovoltaic diode operation. **14**

Q.6 **Write a short note about any two.** **14**

a) What are advantages and disadvantages of organic solar cells?
b) Explain some C_{60} based electron acceptors.
c) Characterization of PVDs.

Q.7 **Explain in detail about any two.** **14**

a) Write short note on techniques to fabricate organic thin film transistors (OTFTs).
b) Polymer based FET.
c) Charge transport characterization.