SLR-UV-650

Seat No.		Set	P

M.Sc. (Semester - II) (CBCS) Examination Mar/Apr-2018
Nano-Technology
CHARACTERIZATION TOOLS OF NANOMATERIALS

Time: 2½ Hours Max. Marks: 70

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) A scanning electron microscope (SEM) is a type of _____.
   a) Electron microscope b) Charge microscope
   c) Magnetic microscope d) Conductance microscope

2) EDAX is an analytical technique used for the _____ of a sample.
   a) Chemical characterization b) Physical characterization
   c) Electron characterization d) None of these

3) UV-VIS refers to absorption spectroscopy or reflectance spectroscopy in the _____ spectral region.
   a) Near IR-visible b) Ultraviolet-visible
   c) Far IR-visible d) X-ray visible

4) X-ray photoelectron spectroscopy (XPS) is a _____ quantitative spectroscopic technique.
   a) Effective-sensitive b) Horizontal
   c) Vertical d) Surface-sensitive

5) Bulge test equipment, consisting of an automatic pneumatic _____ regulating system.
   a) Temperature b) Vacuum
   c) Pressure d) Compressor

6) Surface tension is the _____ tendency of a fluid surface which makes it acquire the least surface area possible.
   a) Elastic b) Solid
   c) Liquid d) Rigid

7) Sample reactions can be assayed ion __ well format micro-titer plates.
   a) 6-1536 b) 2-120
   c) 3-150 d) 200-300

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

a) SEM
b) TEM
c) NMR
d) DPI
e) Raman Spectroscope
f) Poisson ratio
g) Excitation wavelength

Part - II

Answer any four of the following:-

Q.2	What is meant by EDAX and give a brief explanation of EDAX.	**14**
Q.3	What is neat block diagram explain in detail STM.	**14**
Q.4	Give a brief explanation on XRD and its applications.	**14**
Q.5	What is mean by FTIR and explain in detail FTIR.	**14**
Q.6	**Write a short note about any two:-** a) UV-VIS Spectroscope b) SIMS c) Nano-lithographic technique	**14**
Q.7	**Explain in detail about any two:-** a) Surface tension b) Thermal conductivity c) Micro Plate reader	**14**

SLR-UV-651

Seat No.	

Set P

M.Sc. (Semester - II) (CBCS) Examination Mar/Apr-2018
Nano-Technology
PROPERTIES OF NANOMATERIALS

Time: 2½ Hours Max. Marks: 70

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

2) The size effect can have two causes:-
   a) Statistical, & Energetic b) Only Energetic
   c) Only statistical d) Stress & impact

3) _____ Structure is responsible for the magnetic behavior of ferromagnetic materials.
   a) Magnetic crystal b) Magnetic
   c) Magnetic domain d) Size dependent

4) Magnetic domain is region within a magnetic material in which the magnetization is in _____ direction.
   a) Uniform b) Zero
   c) One d) Two

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

6) Particle size is a notion introduced for comparing _____ of solid particles.
   a) Dimension b) Intermolecular bonds
   c) Volume d) Size

7) Magnetism is a class of physical phenomena that are mediated by ____.
   a) Domain b) Magnetic field
   c) Spin of electron d) Temperature

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

a) Dielectric
b) Coercivity
c) Ceramic
d) Nanodisc
e) Florescence
f) Magnetic domain
g) Surface energy

Part – II

Answer any four of the following.

Q.2 What is surface stress? Describe the effect on lattice parameter. **14**

Q.3 Explain the phenomenon of stimulated Raman and Brillion Scattering. **14**

Q.4 Describe the size effect on structure and morphology nanoparticles. **14**

Q.5 Explain the non-leaner optical susceptibility and properties of nanomaterials. **14**

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

a) Harmonic generation
b) Quantum confinement of superlattice
c) Stimulated Raman scattering

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

a) Write a short note on capacitance in nonparticles.
b) Diffusion in nanocrystalline materials.
c) Dielectric constant of nonoscale silicon.

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Seat No.	

Set P

M.Sc. (Semester - II) (CBCS) Examination Mar/Apr-2018
Nano-Technology
CARBON AND NANOFORMS OF CARBON

Time: 2½ Hours Max. Marks: 70

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) Diamond is a metastable allotrope of _____.
   a) Hydrogen b) Nitrogen
   c) Oxygen d) Carbon

2) Graphic archaically referred to as plumbago, is a ____ form of carbon.
   a) Crystalline b) Semi crystalline
   c) Amorphous d) Agglomerated

3) Diamond-like carbon is a class of _____ carbon material.
   a) Amorphous b) Crystalline
   c) Semi Amorphous d) Semi crystalline

4) Activated carbon, also called activated _____.
   a) Charcoal b) Chocolate
   c) Coal d) Coal tar

5) Carbon nanotubes are allotrope of carbon with _____ nanostructure.
   a) Cylindrical b) Spherical
   c) Cubic d) Tube type

6) Nanotubes are members of the structural family _____.
   a) Nanowire b) Nano cones
   c) Fullerene d) Nanoring

7) One-atom-thick sheets of carbon, called _____.
   a) Graphite layer b) Graphite Sheet
   c) Thin Film d) Graphene

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

a) SP^2 – hybridization
b) Diamond
c) Graphite
d) Carbon black
e) CNT
f) CNF
g) Nanocatalyst

Part – II

Answer any four of the following.

Q.2 Write the different forms of carbon and explain Diamond like carbon. **14**

Q.3 What are carbon nonomaterials? Write briefly about the different types of carbon nanotubes. **14**

Q.4 What are carbon nano fibers? Explain their structure and properties. **14**

Q.5 Explain the different methods of synthesis of carbon nanomaterials. **14**

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

a) Purification of CNF
b) Amorphous carbon
c) Graphene

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

a) Carbon dots
b) Arc discharge
c) Opening of Fullerene Cage

SLR-UV-653

Seat No.		Set	P

M.Sc. (Semester - II) (CBCS) Examination Mar/Apr-2018
Nano-Technology
NANO-ELECTRONICS

Time: 2½ Hours Max. Marks: 70

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) Electron-beam lithography is the practice of scanning a focused beam of _____.
   a) Electrons b) Charge
   c) Thermal d) None of these

2) Nanoelectromechanical systems (NEMS) are a class of devices integrating _____ and mechanical functionality on the nanoscale.
   a) Electrical b) Physical
   c) Electro-chemical d) Chemical

3) Semiconductor temperature increase, so does their _____ which is opposite behavior to that of metal.
   a) Conductivity decrease b) Conductivity increase
   c) Conductivity stationary d) Null Conductivity

4) An optical amplifier is a device that amplifies an _____ directly, without the need to first convert it to an electrical signal.
   a) Current signal b) Temperature
   c) Thermal signal d) Optical signal

5) PN-junction is a boundary or interface between two types of semiconductor material _____.
   a) x-type and y-type b) a-type and b-type
   c) p-type and n-type d) u-type and v-type

6) Thermodynamics is a branch of science concerned with _____ and temperature and their relation to energy and work.
   a) Cold b) Heat
   c) Thermal d) None of these

7) Supercapacitor is a high-capacity capacitor with capacitance values _____ than other capacitors.
   a) Low higher b) Much higher
   c) Smaller d) Much smaller

Q.1 B) Define/Explain the following in one word or one sentence:- **07**

1) Molecular electronics
2) Insulator
3) Pressure sensor
4) Laser
5) Electronic Field Emission
6) Semiconductors
7) Fuel cell

Part – II

Answer any four of the following:

Q.2 What is meant by electron beam lithography? Explain the properties of optical and electron beam lithography. **14**

Q.3 Give a detailed note on silicon MEMS fabrication technology. **14**

Q.4 What is meant by optical amplifiers? Explain in detail, the optic electronic devices. **14**

Q.5 Define sensors and explain in detail, the types and applications of sensors. **14**

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

a) Explain Schottky junction
b) Photovoltaic module
c) Carbon homo/hetero junction solar cells

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

a) Comparison of fuel cell with battery
b) Properties of metal hybrids
c) Double layer capacitors

SLR-UV-658

Seat No.		Set	P

M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
Nano-Technology
POLYMERS AND NANOCOMPOSITES

Time: 2½ Hours Max. Marks: 70

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 book.

Part – I

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

1) Polymer is a large molecule or _____ composed of many repeated subunits.
   a) Macromolecule b) Behavior
   c) Nanomaterials d) Color

2) The formation of the polymer chains occurs between _____.
   a) Bio-recognition site b) Monomers
   c) Macromolecules d) Nano composites

3) Polymers formed from a single type of monomer are called _____.
   a) Homopolymers b) Analyte
   c) Only Statistical d) Stress & impact

4) Polymer derived from two or more different _____.
   a) Intermolecular bonds b) Heteropolymer
   c) Emission absorbance d) Copolymers

5) _____ have long sequences of different monomer units.
   a) Block copolymers b) Gasses
   c) Nanomaterials d) Color

6) Chain-growth polymerization involves the _____ of molecules.
   a) Linking b) Sun rays
   c) UV rays d) Size dependent

7) Degree of Polymerization, is the number of _____ in a polymer.
   a) Monomeric units b) Analyte
   c) Hydrogen d) Carbon

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

a) Polymer
b) Heteropolymer
c) Homopolymer
d) Copolymer
e) Nanocomposite
f) Carbon fiber
g) CNT

Part – II

Answer any four of the following.

Q.2	Explain the benefits of polymer composites.	**14**
Q.3	Write the synthesis process of polymer matrix nanocomposites.	**14**
Q.4	Explain the metal matrix nanocomposites & their applications.	**14**
Q.5	Briefly explain the clay + Polymer nanocomposites & its applications.	**14**
Q.6	**Answer any TWO of the following:** **a)** Applications of carbon composites **b)** Describe Matrix **c)** Describe ceramic	**14**
Q.7	**Write short notes on. (Any Two)** **a)** Silicon carbide **b)** Propellant **c)** Conducting polymer	**14**

SLR-UV-659

Seat No.		Set	P

M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
Nano-Technology
INDUSTRIAL NANOTECHNOLOGY

Time: 2½ Hours Max. Marks: 70

Instructions: 1) Part - I compulsory.
2) Attempt any four questions from part – II
3) Figures to the right indicate full marks.
4) Answer 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) Chemical mechanical planarization (CMP) is used to plane the wafer surface with the help of a _____.
   a) mechanical slurry b) chemical slurry
   c) physical slurry d) none of these

2) Diffusion is the movement of impurity atoms in a semiconductor material at _____.
   a) keep b) remove
   c) transfer d) high temperatures

3) Nano electromechanical systems (NEMS) are a class of devices integrating electrical and mechanical functionality on the _____.
   a) bulk scale b) miliscale
   c) microscale d) nanoscale

4) Mechanical sensor is a class of a sensor to measure _____ phenomenon.
   a) mechanical b) chemical
   c) physical d) all these above

5) Electroluminescent layer is a film of _____that emits light in response to an electric current.
   a) organic compound b) inorganic compound
   c) chemical compound d) physical compound

6) The excitation provided with an _____ generator or alternator; Stimulation, also called excitation.
   a) electrical b) charge
   c) voltage d) magnetic

7) A Textile is a _____ material consisting of a network of natural or artificial fibres.
   a) flexible b) solid
   c) non-flexible d) non-solid

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

a) Ion implantation
b) Lithography
c) Microactuators
d) Chemical Sensors
e) Conjugation
f) LCD
g) Fuel cells

Part – II

Answer any four the following: **14**

Q.2 Describe with the help of a neat diagram principal and performance of semiconductor nanostructures based electronic and electro-optical devices.

Q.3 Give an brief explanation on electronicmagneto transport and micromagnetic modeling. **14**

Q.4 With a neat diagram explain working principle and advantages of nano electromechanical systems. **14**

Q.5 Explain thermal and mechanical sensors with its applications. **14**

Q.6 Write Short Note on any two of the following **14**

a) Organic electroluminescent display.
b) Explain with briefly liquid crystal display.
c) Excimers

Q.7 Answer any two: **14**

a) What are applications of nanomaterials in cosmetic
b) Write applications of nanomaterials in catalysis and in lubricants.
c) Discuss applications of nanomaterials in fuel cells and batteries.

SLR-UV-660

Seat No.		Set	P

M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
Nano-Technology
THIN FILM TECHNOLOGY

Time: 2½ Hours Max. Marks: 70

Instructions: 1) Part – I, question 1 is compulsory.
2) Answer 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) If the pressure in chamber drops 1 millitorr to 0.001 militorr, the mean free path of gas molecules inside the chamber _____.
   a) Decreases b) Increases
   c) Remain same d) Cannot be measured

2) _____ is not a type of gas transfer pump.
   a) Rotary pump b) Cryogenic pump
   c) Turbo molecular pump d) 8 Oil diffusion pump

3) _____ can be used as roughing pump.
   a) Rotary pump b) Cryogenic pump
   c) Turbo molecular pump d) 8 Oil diffusion pump

4) Pressure range between below 10-7 Pa is referred as _____.
   a) Low Vacuum b) Medium Vacuum
   c) High Vacuum d) Ultra high Vacuum

5) _____ is a pressure gauge working on the principle of ionization of gas molecules.
   a) Pirani b) Penning
   c) Barometer d) Bourdon

6) In chemisorptions_____ bonding takes place between interacting surface and surrounding molecules.
   a) Van Der Waal b) Hydrogen
   c) Covalent d) a and b both

7) Usually, cryogenic temperature is _____.
   a) Below 0°K b) Above room temperature
   c) Below 0°C d) Below 100°K

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

a) Physical vapour deposition
b) Sputtering
c) LASER
d) Mean free path
e) Sticking coefficient
f) Condensation
g) Absolute vacuum

Part – II

Attempt any four questions from the following:

Q.2 Explain in detail working of rotary pumps. **14**

Q.3 Explain deposition parameters and their effects on thin film formation. **14**

Q.4 Mention different types of CVD and explain advantages/ disadvantages of CVD over PVD. **14**

Q.5 Explain condensation, physisorption and chemisorptions in detail. **14**

Q.6 **Attempt any two of the following:** **14**

a) Explain electron beam evaporation.
b) Explain ti sublimation pump.
c) Write short note on APCVD.

Q.7 **Attempt any two of the following:** **14**

a) Write short note on PLD method of manomaterials synthesis.
b) Write short note on glow discharge sputtering.
c) Write short note on pirani gauge.

SLR-UV-662

Seat No.		Set	P

M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
Nano-Technology
ANIMAL BIOTECHNOLOGY

Time: 2½ Hours Max. Marks: 70

Instructions: 1) Section-I, question 1 is compulsory.
2) Attempt any four questions from Section - II
3) All questions carry equal marks.
4) Draw neat and labeled diagrams wherever necessary.

Section - I

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

1) Diffusion of nutrients and gases is often limited to explants over the size of _____.
   a) 200 μm b) 250 μm
   c) 20 μm d) 100 μm

2) Loeb first attempt _____ in 1897.
   a) Cell culture b) Transformation
   c) Organ culture d) All of these

3) Organ culture can be performed using
   a) Raft method b) Plasma clot method
   c) Grid method d) All of these

4) Recombinant proteins are _____.
   a) Proteins synthesized in animals
   b) Proteins synthesized by transgene in host cells by rDNA technology.
   c) Proteins synthesized in cells that are produced by protoplast fusion
   d) Proteins synthesized in mutated cells

5) The production of complete animals from somatic cells of an animal is called _____.
   a) Cell cloning b) Animal cloning
   c) Gene cloning d) All of these

6) The first successfully cloned animal was _____.
   a) Rabbit b) Sheep
   c) Rat d) Dog

7) The method in which the nucleus of a donor cell is relocated to an enucleated target cell is known as _____.
   a) Cell transformation b) Nuclear transplantation
   c) Organ transplant d) All of these

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

1) Contact inhibition
2) Anchorage dependent tissue culture system
3) Primary cell culture
4) Passaging
5) Finite cell lines
6) Cryopreservation
7) CO_2 incubator

Section – II

Answer any four of the following:

Q.2 Classify and explain in details the different levels of bio-safety. **14**

Q.3 Write in detail different types of tissue culture with diagrams. **14**

Q.4 Explain vaccine production using cell culture in detail. **14**

Q.5 Explain in detail about transgenic sheep. **14**

Q.6 Answer any Two of the following: **14**

a) Explain MTT Assay with suitable diagram.
b) Describe different types centrifugation with their principle.
c) Describe method of cell synchronization.

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

a) Describe principle of flow cytometry and write its applications.
b) Write short note on Serum free media.
c) Short note on chemical sterilization.