P. P. SAVANI UNIVERSITY

Fifth Semester of B.Sc. Examination
December-2021
SSCH3190–Applied Chemistry- Nanomaterials
14.12.2021, Tuesday **Time: 12:30 p.m. to 03:00 p.m.** **Maximum Marks: 60**

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1 **Short Questions** **[10]**

1.1 Objectives **[05]**

1.1a Steps of CVD are
- A Chemical reactions occur on the growth surface.
- B By products produced by the gas-phase reaction has to be removed from the surface.
- C Homogeneous nucleation occurs in gas phase and heterogeneous nucleation happens in a substrate.
- D All are correct

1.1b In thermal decomposition
- A Heat is required to break chemical bonds in the compound
- B Heat is not required to break chemical bonds in the compound
- C Ice is required to break chemical bonds in the compound
- D None of the above

1.1c An emulsion is a
- A liquid in liquid dispersion
- B liquid in solid dispersion
- C solid in liquid dispersion
- D gas in liquid dispersion

1.1d What solvent is used in polyol method?
- A Ethylene glycol
- B Ethanol
- C Acetone
- D Water

1.1e Properties of CNTs are
- A their mechanical tensile strength can be 400 times that of steel
- B they are very light-weight – their density is one sixth of that of steel
- C their thermal conductivity is better than that of diamond
- D All of the above

1.1f Metal oxide nanoparticles are used in

A Sensors
B Piezoelectric devices
C Fuel cells
D All of the above

1.1g Full form of SWCNT

A Carbon nanotubes
B Single-walled carbon nanotubes
C Multi-walled carbon nanotubes
D Both B& C are correct

1.1h QD s are

A Man-made
B Artificial
C Natural
D A & B are correct

1.1i Size nanomaterials

A meter
B nm
C Micro meter
D cm

1.1j Nanostructures are

A Fullerenes
B Nanotubes
C Nanowires
D All of the above

1.2 **Answer the Following: (MCQ/Short Question/Fill in the Blanks)** **[05]**

1.2a Define the term nanoscience?
1.2b Define the term Quantum dots?
1.2c What is carbon nanotube?
1.2d What is Nanowires?
1.2e State the name of different area where Metal Oxide Nanoparticles play a very important role?

Q.2 **Short Notes (Attempt any two)** **[06]**

A Write the synthesis method of nanomaterials using sol-gel method?
B What are carbon nanotubes, describe it properly with examples?
C Write the synthesis method of nanomaterials using micro-emulsion method?

Q.3 **Explain in detail (Attempt any two)** **[14]**

A Write a long note on Fullerene with proper diagram?
B Discuss about the composite material?
C Describe the classification of Core/Shell QDs?

Section-II (Total Marks - 30)

Q.1 **Short Questions** [10]

1.1 **Objectives** [05]

1.1a What is the full form of TDDSs

A Targeted drug delivery systems
B Targeted device delivery systems
C Sustained drug delivery systems
D stimuli-responsive controlled drug delivery systems

1.1b Material used for surface plasmon resonance?

A Au
B Ag
C Ti
D Sn

1.1c Semiconductors are materials

A Metals and Insulators
B Metals and metal oxide
C Insulators and Metal oxide
D All of the above

1.1d Name the elements which are added to intrinsic semiconductors to form P-type

A Al, Ga, In
B Sc, Ti, V
C Zn, Mn, Cu
D Cd, Pb, Mn

1.1e When any pentavalent element is added to the intrinsic semiconductor

A N-type
B P-type
C N-P-N type
D P-N-P- type

1.1f In N-type semiconductors, energy level of _____ electron is called donor level

A Fifth
B Fourth
C Third
D Second

1.1g Properties of Intrinsic semiconductor

A electrons take transition from Valence band to Conduction band
B a free electron in Conduction band
C simultaneously free hole in Valence band
D All of the above

1.1h What is Intrinsic Semiconductor

A A Semiconductor which does not have any kind of impurities, behaves as an Insulator at 0k

B A Semiconductor which have any kind of impurities, behaves as an Insulator at 0k

C A Semiconductor which does not have any kind of impurities, behaves as an Insulator at high temperature.

D None of the above

1.1i The nanoporous silica surface is heavily covered with many _____groups that act as reactive sites for functionalization

A Silanol

B Methanol

C Ethanol

D alkoxide

1.1j hollow carbon nanowires are synthesized using as precursor

A polyaniline nanowire

B Carbon nanowire

C Tin Oxide nanowire

D None of the above

1.2 **Answer the Following: (MCQ/Short Question/Fill in the Blanks)** **[05]**

1.2a Give two applications of metal oxide nanoparticles?

1.2b Graphite-silicon carbide hybrid nanowires were synthesized via ____ and ___ processes.

1.2c Name the two factors which makes porous silicone effective for biomedical purpose.

1.2d ___ and _____ are elemental semiconductors.

1.2e outer most S and p orbital's of Semiconductors involve in ___ hybridanisation

Q.2 **Short Notes (Attempt any two)** **[06]**

A Write a short note on P-type semiconductors with diagram?

B Describe the Hall effect with diagrams?

C Give a short note on application of nanomaterials towards making of high sensitivity sensors?

Q.3 **Explain in detail (Attempt any two)** **[14]**

A Discuss about porous silicon material?

B Describe the application of semiconductors in solar cell, organic semiconductor and in RFID?

C Define the term semiconductors? State the different type of semiconductors? Draw the schematic diagram of Intrinsic semiconductors?