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 Properties of sol-gel method

A producing small particles in material chemistry
B mostly used for the synthesis of metal oxides
C initial step of this process is converting monomers into a sol
D All of the above are correct

1.1b k_g stands for_____?

A rate constant for inter -micellar exchange dynamics
B rate constant for nucleation
C rate constant for particle growth
D rate constant for chemical reaction

1.1c Emulsions are divided according to the _____?

A size of droplet
B Weight of droplet
C Volume of the droplet
D None of the above are correct

1.1d Fullerenes are_____?

A nanostructure
B Nanotubes
C Nano tools
D All of the above are correct

1.1e In which synthesis method, Chemical reactions occur on the growth surface

A CVD
B Sol-gel method
C High ball milling
D Polyol method

1.1f What solvent is used in polyol method?

A Oil

B Water
C Ethylene glycol
D Acetone

1.1g The optical properties of nanostructured semiconductors are highly
A size dependent
B Mass dependent
C Volume dependent
D Weight dependent

1.1h Name the material, which has mechanical tensile strength can be 400 times that of steel?
A CNT
B QD
C Composite
D Semiconductor

1.1i A nanowire is a wire of dimensions of the order of
A nanometer
B Micrometer
C Centimeter
D Meter

1.1j What is the wavelength of blue light producing quantum dots?
A 450
B 550
C 650
D 750

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

1.2a Full form of SWCNT & QD?
1.2b Write down name of two Nano tool techniques?
1.2c Define the term quantum wire?
1.2d CNTs are chemically bonded with _____ bonds?
1.2e What are the fundamentals steps of PVD method?

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

A Write the synthesis method of nanomaterials using sol-gel method?
B Describe the quantum dots?
C Write the synthesis method of nanomaterials using the Polyol method?

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

A Discuss about the 1-d, 2-d and 3-d nanomaterials?
B Write the PVD method and high energy ball milling method for synthesis of nanomaterials?
C Discuss about the composite material?

Section-II (Total Marks - 30)

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

1.1 Objectives **[05]**

1.1a What is NGEV

A Next-generation electric vehicles
B Nano-generation electric vehicles
C New-generation electric vehicles
D None of the above

1.1b For making high definition TV which material is used

A Phosphors
B Silicone
C Aluminium
D Zirconium

1.1c In Intrinsic Semiconductor the Number of Conduction electrons will be _____ the Number of Vacant sites

A Equal to
B Greater than
C Lower than
D All of the above

1.1d _____&_____ are elemental semiconductors

A Si, Ge
B Ti, Mn
C W, Sc
D Cd, Zn

1.1e What is CDDSs

A controlled drug delivery systems
B carrier drug delivery systems
C Capacity drug delivery systems
D None of the above are correct

1.1f Semiconductors have conductivities in the range

A 10^{-4} to 10^{+4}S/m
B 10^{-1} to 10^{+4}S/m
C 10^{-4} to 10^{+5}S/m
D 10^{-8} to 10^{+9}S/m

1.1g Factors which makes porous silicone as unique material

A its ordered porous structure
B its tunable particle size
C its large pore volume and surface area
D All of the above are correct

1.1h What is full form of RFID

A Radio Frequency Identification Devices
B Organic Light Emitting Diodes
C Resonance frequency Identification Devices
D None of the above are correct

1.1i _____ are used in organic Light Emitting Diodes

A Semiconductors
B Conductors
C Metal Oxides
D All of the above

1.1j In N-type semiconductors,

A pentavalent element is added to the intrinsic semiconductor
B tetravalent element is added to the intrinsic semiconductor
C trivalent element is added to the intrinsic semiconductor
D None of the above

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

1.2a What is surface plasmon resonance?
1.2b Write the name of two typical engineered composite materials?
1.2c A fullerene is an allotrope of _____?
1.2d What is N-type semiconductor?
1.2e What is Extrinsic semiconductors?

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

A Write a short note on N-type semiconductors with diagram?
B Give a short note on application of nanomaterials in making towards Better Insulation Materials?
C Describe the Hall effect with diagrams?

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

A Discuss about Nanowires?
B What are semiconductors? How many types of semiconductors are there? Draw the schematic diagram of Intrinsic semiconductors?
C Write a long note on the World of Metal Oxide Nanoparticles?