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Fourth Semester M.Sc. Degree Examination, July 2018
Branch : Chemistry
CH/CL/CA 241 : CHEMISTRY OF ADVANCED MATERIALS
(2016 Admission)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any two** among **(a), (b)** and **(c)** from **each** question. **Each** question carries
2 marks.

1. a) Describe about different stabilisation methods adopted in colloidal synthesis.

   b) Explain the vapour deposition method for the synthesis of nanomaterial.

   c) Explain the synthesis of metal nanoparticle with an example.

2. a) Explain the working principle of photocatlysis.

   b) Describe about electron source used in scanning electron microscopy.

   c) How particle size is determined by X-ray diffraction analysis ?

3. a) How X-ray diffraction data can be used to estimate the sizes of polymer crystallites ? Explain.

   b) Define the term number average molecular weight.

   c) Explain the term tacticity.

4. a) Explain negative and positive photoresists in lithography with examples.

   b) Write an example for polymer reagent used in organic synthesis.

   c) Discuss the term heterochain polymer.

5. a) What are piezoelectric materials ? Explain with an example.

   b) Explain the polymorphism in polycaprolactone.

   c) What is meant by pseudoelasticity ?

(2×10=20 Marks)

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SECTION – B

Answer either **(a)** or **(b)** of **each** question. **Each** question carries **5 marks.**

6. a) Describe the theory of Surface Plasmon Resonance and its applications.
   b) Explain about the electronic property of 0D, 1D, 2D and 3D materials.

7. a) Describe about application of IR spectroscopy in nanomaterial analysis.
   b) Explain the principle and applications of Atomic Force Microscopy (AFM).

8. a) Unlike free radical polymerization, both cationic and anionic polymerizations
      show a marked dependence on the type of solvent used. Discuss the causes
      and nature of these effects.
   b) Explain the kinetics and mechanism of free radical polymerisation.

9. a) Discuss the structure and working principle of lithium polymer batteries.
   b) Explain the structure and applications of liquid crystal polymers.

10. a) Discuss the chemistry behind the photochromism in spiropyrans.
    b) Write short note on synthesis and application of ferrofluid. **(5×5=25 Marks)**

SECTION – C

Answer **any three** questions. **Each** question carries **10 marks.**

11. Explain application and role of metal nanoparticles in catalysis with examples.

12. Describe about synthesis, properties and applications of C_{60}.

13. Elaborate different methods to determine the molecular weight of a polymer.

14. Explain the synthesis and applications of following conducting polymers

    a) poly acetylenes   b) poly anilines and

    c) polythiophenes.

15. Describe with proper examples :

    a) Shape memory polymers

    b) pH sensitive polymers.

    c) Temperature responsive polymers.   **(10×3=30 Ma**

Reg. No. : ....

Name : ....

Fourth Semester M.Sc. Degree Examination, May 2020

Chemistry

CH/CL/CA 241 : CHEMISTRY OF ADVANCED MATERIALS

(2016 Admission onwards)

Time : 3 Hours   Max. Marks : 75

SECTION – A

Answer any two among (a), (b) and (c) from each question. Each sub question carries **2** marks.

1. (a) Explain hydrothermal method of synthesis of nanomaterials.

   (b) What 2D and 3D nanomaterials with eg?

   (c) Explain Sol-Gel method of preparation of nano materials.

2. (a) Differentiate Single crystal XRD and powder XRD.

   (b) What are applications of SEM?

   (c) Explain two methods for functionalization of CNT?

3. (a) Explain anionic polymerisation.

   (b) Explain degree of crystallinity.

   (c) What is bulk polymerisation?

4. (a) Explain one method for synthesis of polyaniline.

   (b) What are photoresponsive polymers?

   (c) What are hetrochain polymers?

5. (a) What is electrochromism?

   (b) Give example for pH responsive polymers.

   (c) What are self-healing polymers?

(2 × 10 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each question. Each question carries **5** marks.

6. (a) How properties of nanomaterials varies with size?

   (b) Explain quantum confinement.

7. (a) Explain any two methods for the synthesis of flullerene.

   (b) Discuss the applications of nano-technology in effluent treatment.

8. (a) Explain GPC method for molecular weight determination.

   (b) Explain Emulsion polymerisation.

9. (a) What is photorefractive polymer?

   (b) Explain phase morphology.

10. (a) Give short notes on Photochromic Coordination compounds.

    (b) Explain polymorphism.

(5 × 5 = 25 Marks)

SECTION – C

Answer any **three** questions and each question carries **10** marks. :

11. Give short note on optical property of nanoparticle. Explain role of metal nanoparticles in catalysis.

12. With the help of a neat diagram explain the principle, working and applications of AFM.

13. Explain the thermal stability of polymers and how DSC is used for detecting the stability.

14. What are conducting polymers? Explain the synthesis and applications of polyacetylenes?

15. Write short notes on shape memory polymers and dielectric elastomers?

(3 × 10 = 30 Marks]

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