2023

M.Sc.

Fourth Semester

DISCIPLINE SPECIFIC ELECTIVE – 03

CHEMISTRY

Course Code: MCHD 4.11 (C)

(Nanotechnology & Polymer Technology)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) Discuss the structure of nanomaterials using X-ray diffraction method. 7
   (b) Explain the working principle of dynamite light scattering. Give its application in biomedical sciences. 7

2. (a) Explain the X-ray powder diffraction technique. 7
   (b) Using Scherrer's formula how will you determine the crystallite size/grain size using X-ray diffraction. 7

UNIT–II

3. (a) What are nanomaterials? Explain the principle of electron microscope for the study of nanomaterials. 2+5=7
   (b) Explain in detail transmission electron microscope for the synthesis of nanomaterials. 7

4. (a) What do you mean by scanning electron microscope? Give its strength and limitation of SEM. 3+4=7
   (b) Explain how scanning tunnelling microscope method is used in analysing nanoparticles. 7

UNIT–III

5. (a) Explain the application of magnetic oxide as nanomaterials. 3

(b) Write a note on nanomaterials in communication sector. 5
(c) Discuss the role of nanomaterials in automobiles. 6

6. (a) How are nanomaterials used in ceramics? 7
(b) Write a note on nanomaterials for the environment. 3
(c) Explain the application of silver nanoparticles. 4

UNIT–IV

7. (a) Explain the following terms with suitable examples: 3×3=9
(i) Flame retardants
(ii) Foaming agents
(iii) Polymeric coatings
(b) Explain the role of Ziegler-Natta catalyst in the polymerization of terminal alkenes. 5

8. (a) Write short notes on the following polymers: 3×3=9
(i) PVC (ii) Polystyrene
(iii) PP
(b) Explain metathesis polymerization and give its application in polymer industry. 5

UNIT–V

9. (a) Write the structure, function, and properties of one naturally occurring polymer. 6
(b) What are biodegradable polymers and why is it necessary to develop? 4
(c) Explain the application of hyaluronic acid HA as ophthalmic drug delivery. 4

10. (a) Give the three idealized oxidation states of polyaniline (PANI). Briefly explain the synthesis of PANI nanomers. Mention some application of conducting polymers. 2+3+2=7
(b) Write the steps involve in the mechanical process of recycling plastics. Discuss its application and advantages. 3+4=7