May 2025
M.Sc.
Fourth Semester
DISCIPLINE SPECIFIC ELECTIVE – 03
CHEMISTRY
Course Code: MCHD 4.11 (A)
(Applied Inorganic Chemistry)

Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

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

UNIT–I

1. (a) What are inorganic polymers? Write down the types of inorganic polymers with an example of each. 1+4=5
   (b) Write a note on each of the following: 2×2=4
   (i) Solubility consideration in inorganic polymers
   (ii) Crystallinity
   (c) What do you mean by phophazenes? Give the preparation and structure of $(NPCl_2)_3$ and $(NPCl_2)_4$. 1+2+2=5

2. (a) Explain different mechanical properties with diagram of an efficient polymer. 6
   (b) Write a note on each of the following: 2×2=4
   (i) Molecular weight distribution
   (ii) Chain statistics
   (c) What is the importance of molecular weights in an inorganic polymer? Explain the types of molecular weight. 2+2=4

UNIT–II

3. (a) What is portland cement? Mention the raw materials of cement. 1+2=3
   (b) Explain the manufacture of cement with the reactions involved. 5
   (c) Write a note on any two of the following: 3×2=6
   (i) Slag cement (ii) White cement
   (iii) Curing of concrete

4. (a) Explain the ingredients of a paint. 5
(b) What are varnishes? Discuss the components of a varnish. 1+4=5
(c) Give the difference between paint and varnish. 4

UNIT–III

5. (a) Write a short note on the classification of nanomaterials. 3
(b) Discuss the synthesis of Pd nanoparticles between reverse micelles. 5
(c) Explain the application of nanoparticles in mediated gene transfer. 6

6. (a) What is nanotechnology? 1
(b) Explain with diagrams, the synthesis of semiconductors, nanowires, and nanorods by electroplating method. 7
(c) Explain the different types of nanoimprint lithography (NIL). 6

UNIT–IV

7. (a) Define radioactivity. Write the difference between ordinary chemical reactions and nuclear reactions. 1+3=4
(b) Write a note on each of the following: 3×2=6
(i) Radiation sterilisation
(ii) Uranium series
(c) Describe the principle of nuclear reactor. 4

8. (a) Discuss the group displacement law with an example. 4
(b) Write a note each on the following: 3×2=6
(i) Synthetic elements (ii) Hot atom chemistry
(c) What do you mean by nuclear binding energy? Calculate the BE per nucleon of helium atom $_2He^4$, which has a mass of 4.00260 a.m.u. 1+3=4

UNIT–V

9. (a) How are soils classified? 4
(b) What are laterite soils? 4
(c) Write a note on each of the following: 3+3=6
(i) Soil texture (ii) Soil temperature

10. (a) What are fumigants? Give an example. 3
(b) Write a short note on complex and mixed fertilizers. 3+3=6
(c) What are herbicides? Are there any adverse effects of its use? 2+3=5