Roll No. .....

DD–760

M. Sc. (Fourth Semester)
EXAMINATION, 2020

CHEMISTRY

Paper Third (CH—21)

(Material and Nuclear Chemistry)

Time : Three Hours

Maximum Marks : 80

Note : Attempt all questions. All questions carry equal marks.

Unit—I

1. (a) Discuss the fundamental laws governing force-flux relation in linear and reciprocal manner in an irreversible thermodynamic process. 8

   (b) What are coupled reactions ? State some examples of coupled reactions in biological system. 8

   (c) Explain the term 'microscopic reversibility'. 4

Or

   (a) Derive mathematical equation for entropy production accompanying heat or matter flow in an irreversible thermodynamic process. 8

(b) State Onsager's theory and establish Onsager reciprocal relation. 6

(c) What is Transport Coefficient ? 6

Unit—II

2. (a) Write a note on Ceramics and their application. 8

(b) Discuss the different methods used to find the size of nanoparticles. 6

(c) Explain the electrical and magnetic properties of nanopraticles. 6

Or

(a) What is meant by top-up and top-down synthesis ? Discuss the biosynthesis of nanoparticle giving example. 8

(b) Discuss the role of SEM and TEM techniques for characterisation of nanoparticle. 6

(c) Describe the application of nanoparticle. 6

Unit—III

3. (a) What is host-guest chemistry ? How are cryptands best receptors for spherical cations ? 8

(b) Explain the role of co-receptors in multiple recognition. 6

(c) Write a note on supramolecular reactivity and catalysis giving suitable example. 6

Or

(a) Describe various intermolecular interactions in supra-molecule. 8

(b) State the principles of molecular association and organisation in supramolecules. 6

(c) What are biological macromolecules ? 6

Unit—IV

4. (a) What are magic numbers ? Discuss nuclear shell model. 8

(b) Discuss the role of tracers in analytical chemistry. 6

(c) What are prompt and delayed neutrons ? Discuss distribution of mass energy and charge distribution of fission products. 6

Or

(a) What is semi-empirical mass equation ? Discuss its application and limitations. 8

(b) Explain the significance of multiplication factor for nuclear reactor design. 6

(c) Write a note on radiochemical principle in the use of tracers. 6