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

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(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

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(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