(2½ Hours) [Total Marks : 60

N.B. : (1) **All questions are compulsory.**
(2) Use of **log table or nonprogrammable calculator is allowed.**

1. (a) Attempt any **Two** of the following : 8
(i) Discuss the precautions taken for storage of raw material and finish goods.
(ii) What are the important instructions displayed near the chemical reactor, to avoid accidents in the chemical plant?
(iii) Explain the fundamental requirements for patenting.
(iv) Discuss the importance of standard material in chemical analysis.

(b) Give significance of patented work. How is it beneficial? 4

OR

(b) What safety precautions are essential while handling highly corrosive material in the chemical industry? 4

2 (a) Attempt any **Two** of the following : 8
(i) List the limitations of conventional analysis. How the automation has overcome those limitations?
(ii) What are membrane processes? Discuss the principle and applications of ultrafiltration.
(iii) Distinguish between osmosis and reverse osmosis technique.
(iv) Explain the principle of electro dialysis. How is it used for the preparation of salt free water?

(b) What are the different membranes used in membrane separation'? 4

OR

(b) Describe flow injection analysis. How is the sample transported and detected in this technique? 4

3. (a) Attempt any **Two** of the following : 8
(i) Explain the steps taken in designing green process.
(ii) How does the atom economy help to reduce the toxicity of the reaction?
(iii) Give the advantages of supercritical fluid over other organic solvents with respect to green chemistry.
(iv) Discuss the applications of photochemical reactions?

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(b) Explain the Process Intensification (PI) and In Process Monitoring (IPM) technique with respect to green chemistry. 4

OR

(b) What are photochemical reactions? Explain the advantages of photochemical reactions. 4

4 (a) Attempt any **Two** of the following : 8

(i) Give an account of supporting media used in zone electrophoresis.

(ii) Explain capillary electrophoresis, with the emphasis on the method of detection.

(iii) Describe principle and applications of SDS page and iso-electric focusing.

(iv) What is miscellar electrokinetic capillary chromatography? Give its applications?

(b) How are nano materials classified? Explain carbon nano tubes with special reference to dimensions. 4

OR

(b) Give detailed account of instrumentation used in gel electrophoresis. 4

5 Attempt any **Four** of the following : 12

(i) Give details of care to be taken in storage of hygroscopic materials.

(ii) What is ASTM? What information it has about the material?

(iii) Differentiate between the discrete and continuous flow analyzers.

(iv) Discuss the applications of multi layer films in the determination of possium ions in serum sample.

(v) Explain the terms:
(a) Sustainable development (b) Atom economy

(vi) What are ionic liquids? List the applications of ionic liquids as a solvent.

(vii) Discuss the applications of capillary isoelectric focusing methods.

(viii) What are the applications of nano materials?