

N.B.: (1) All questions are compulsory.

(2) Use of log table or nonprogrammable calculator is permitted.

Q.1 (a) Attempt any Two of the following :

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- (i) What are the precautions to be taken while working in the chemical laboratory ?
- (ii) What do you understand by the term hazardous codes ? Give symbols of any two hazardous codes.
- (iii) Explain various steps involved in the process of patenting.
- (iv) What are chemical standards and reference materials ? What is their importance in chemical analysis ?

(b) What is the importance of the first aid ? What first aid treatment is to be given for the burns due to hot concentrated acid ? **4**

OR

(b) What are the basic requirements to be fulfilled before applying for the patent ? **4**

Q.2 (a) Attempt any Two of the following :

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- (i) Discuss the principle and applications of microfiltration.
- (ii) Describe the technique of ultrafiltration with suitable example. How does it differ from other techniques ?
- (iii) What is reverse osmosis ? With the help of neat labelled diagram, explain how is it used for the purification of brackish water.
- (iv) Differentiate between dialysis and electro dialysis with respect to separation mechanism.

(b) Discuss the advantages of automatic analysis. **4**

OR

(b) Describe the operation of Flow Injection Analysis system for the determination of chloride in water. **4**

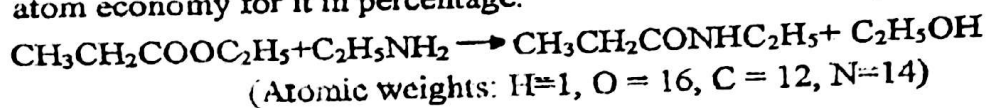
Q.3 (a) Attempt any Two of the following :

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- (i) Explain the concept of Green Chemistry. Why is it mandatory to adopt green chemistry ?
- (ii) Explain electrochemical synthesis with suitable example.
- (iii) Why super critical fluids are preferred as solvents in green chemistry ?
- (iv) What are photochemical reactions ? Give the advantages of photochemical reactions.

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- (b) Why is atom economy calculated ?
N-ethyl propanamide is synthesized using the following reaction. Calculate atom economy for it in percentage.



OR

- (b) What do you understand by the terms Inherently Safer Design (ISD) and Process Intensification (PI)? Describe in details with example.

Q.4 (a) Attempt any Two of the following :

- (i) What is meant by electrophoretic and electro osmotic flow in zone electrophoresis ? Describe the basic instrumentation of this technique.
- (ii) What are the detectors used in capillary electrophoresis? Explain any one in detail.
- (iii) Discuss the principle and applications of SDS page and iso-electric focusing.
- (iv) Explain miscellar electrokinetic capillary chromatography.

- (b) How are nano materials classified? What are the different analytical techniques used for their characterization ?

OR

- (b) With suitable block diagram explain the working of gel electrophoresis.

Q.5 Attempt any Four of the following :

- (i) What care should be taken while storing the highly inflammable material ?
- (ii) What is pharmacopoeia? How is it important in chemical analysis ?
- (iii) Discuss the applications of multilayer films in analysis of glucose in blood.
- (iv) What are gas monitoring equipments ?
- (v) Define the terms :
(a) Sustainable development (b) Zero Waste
- (vi) Explain the use of ionic liquids in synthetic chemistry.
- (vii) Give an account of various supporting media used in zone electrophoresis.
- (viii) Give the instrumental methods used for the determination of the particle size of nano material.

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