

22231

12425

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following :

10

- (a) Enlist the different types of accident.
- (b) Define Chemical kinetics and thermodynamics.
- (c) Define Rate data and its use.
- (d) Draw Hazards' symbols for Bio-Hazard and Toxic Materials.
- (e) Define Normality of solution.
- (f) Write down the formula to calculate specific gravity of solution.
- (g) Draw neat sketch of pH meter.



2. Attempt any THREE of the following : 12

- (a) Explain evolution of Chemical engineering.
- (b) Explain the importance of emergency exit route.
- (c) Air contains 21% O₂ and 79% N₂ by volume. Calculate the composition in terms percentage by weight.
- (d) Write any four applications of pH measurement in industry.

3. Attempt any THREE of the following : 12

- (a) Explain Dalton's law and Amagats law with mathematical expressions and explain the terms.
- (b) An aqueous solution of sodium chloride is prepared by dissolving 10 kg of sodium chloride in 50 kg of water. Find (a) Weight % (b) Mole % composition of solution. [At. wt. of Cl = 35.5, Na = 23]
- (c) Define Conductivity. Draw neat sketch and write working principle of conductivity meter.
- (d) Describe importance of size reduction in chemical industry.

4. Attempt any THREE of the following : 12

- (a) Explain scale up procedure of process plant.
- (b) Explain the importance of safety in chemical industry.
- (c) Draw the sketches of Personnel Protective Equipments (PPE) and their specific uses (any four).
- (d) The combination of 2.68 kg of a sample of coal yield 3.48 m³ of carbon dioxide gas measured at NTP. Find the carbon content of the sample.
- (e) Enlist different unit operations. Explain any one in detail.

5. Attempt any TWO of the following :**12**

- (a) Explain the effect of concentration and pH on solubility of solute.
- (b) Describe the following unit processes with suitable example :
 - (i) Hydrogenation
 - (ii) Nitration
 - (iii) Pyrolysis
- (c) Explain the principle of following :
 - (i) Sedimentation
 - (ii) Filtration
 - (iii) Leaching

6. Attempt any TWO of the following :**12**

- (a) What is critical angle ? Draw neat labelled sketch of Abbes ReFractometer.
 - (b) Define unit operation. Give classification of unit operations with examples.
 - (c) Draw neat sketch of electrodialysis.
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