

312341

23242

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) List end-use industries for basic chemicals.
  - b) Define first-aid.
  - c) Define normality and molarity.
  - d) Define viscosity and specific gravity.
  - e) Define distillation and give its two examples.
  - f) Define ductility and malleability.
  - g) Define factor of safety.

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- 2. Attempt any THREE of the following: 12**
- a) Write in brief on evolution of chemical engineering.
  - b) Draw hazard symbols for bio-hazard, corrosive material, flammable material and toxic chemical.
  - c) Give a procedure to measure specific gravity by hydrometer.
  - d) Explain size separation by screening.
- 3. Attempt any THREE of the following: 12**
- a) List job roles that chemical engineer performs.
  - b) Write in brief first-aid measures in case of eye injury.
  - c) 98 grams of sulfuric acid ( $\text{H}_2\text{SO}_4$ ) are dissolved in water to prepare one litre of solution. Find the normality and molarity of the solution.
  - d) Write importance of safety in a chemical laboratory.
- 4. Attempt any THREE of the following: 12**
- a) Write salient features of unit operations.
  - b) Explain hydrogenation process with suitable examples.
  - c) Air contains 21%  $\text{O}_2$  and 79%  $\text{N}_2$  by volume. Calculate the composition in terms of percent by weight.
  - d) Give criteria for selecting material of construction for chemical process plant.
  - e) Give any four properties and uses of SS-316.

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

- a) Write any six properties of FRP and list its uses.
- b) Explain in detail chlorination process with example.
- c) A gas mixture contains 0.274 kmol of HCl, 0.337 kmol of N<sub>2</sub> and 0.089 kmol of O<sub>2</sub> at a total pressure of 405.3 kpa. Calculate the partial pressure of each component at the prevailing total pressure of 405.3 kpa.

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

- a) A solution of caustic soda is prepared by adding 40 g NaOH to 1000 ml of water. Find the mole % and weight % NaOH in the final solution. Density of water is 1 g/ml.  
(At. wt. of Na = 23, O = 16, H = 1)
  - b) Explain different modes of heat transfer with examples.
  - c) Explain in brief gas absorption and drying.
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