

# 17325

**21314**

**3 Hours / 100 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 TEN of the following:**

**20**

- a) Define Molarity and Molality.
- b) Convert 80°C to °K.
- c) Name any two unit operation required to separate liquid - liquid mixture.
- d) Define Heat and Temperature.
- e) Define Fluid and write two examples.
- f) Write statement of Dalton's law.
- g) Write one reaction each for Hydration and Dehydration.
- h) Define conversion.

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- i) Write two properties and uses of Nitric acid.
- j) Define unit operation and give any two features.
- k) State working principle of mercury thermometer.
- l) Draw symbols of:
  - i) Pressure filter
  - ii) Rotary Dryer
- m) Define molecular weight of a compound.
- n) Who is the father of chemical engineering? Where did he start chemical engineering discipline?

**2. Attempt any FOUR of the following:**

**16**

- a) What is the normality of 2 molar HCL solution?
- b) Categorize chemical industries according to nature of industries.
- c) Explain the procedure to measure level by Bob and Tape method.
- d) Explain unit operation distillation with example.
- e) Draw the symbols of:
  - i) Packed column
  - ii) Drum dryer
  - iii) Jaw crusher
  - iv) Stripper
- f) What is a block diagram? Explain its use.

**3. Attempt any FOUR of the following:****16**

- a) Write unit of each term:
  - i) Temperature
  - ii) Heat
  - iii) Density
  - iv) Volume
- b) Spent acid from a nitrating plant contain 35%  $\text{HNO}_3$ , 35%  $\text{H}_2\text{SO}_4$  and 30% water by weight. Express composition in mole %.
- c) Calculate weight % and mole % of composition in a solution of 25kg of sodium chloride ( $\text{NaCl}$ ) in 100kg of water.
- d) Explain modes of heat transfer with example.
- e) Define oxidation and reduction with reactions.
- f) Draw the block diagram for production of sulphuric acid.

**4. Attempt any FOUR of the following:****16**

- a) State Rittinger's law and kik's law of size reduction with equation.
- b) Define vapour pressure and how it is related to boiling point.
- c) Explain in brief Esterification.
- d) Explain the principle involved in Gas absorption. Can it be useful to control pollution?
- e) Define pressure and give its different units.
- f) Explain Nitration and Chlorination with reaction.

**5. Attempt any FOUR of the following: 16**

- a) Explain Hydrogenation with reactions.
- b) A certain crusher accepts a feed material having volume-surface mean dia. of 19mm and gives a product of dia. 5mm. The power required to crush 15 tonnes per hr is 7.5kW. What will be the power consumption for 12 tons per hr?
- c) Draw process flow diagram for Nitric Acid manufacturing.
- d) Write two uses and two properties and reaction involved in manufacturing of sulphuric acid.
- e) A solution of acetic acid in water contains 30% by weight acetic acid  $[\text{CH}_3\text{COOH}]$ . Calculate the mole% of acetic acid in the solution.
- f) Distinguish between sedimentation and filtration unit operation.

**6. Attempt any FOUR of the following: 16**

- a) Explain density measurement by using specific gravity bottle.
  - b) Distinguish between conversion and yield.
  - c) With neat sketch describe working of rotameter.
  - d) Enlist four personal protective equipments with their functions.
  - e) With neat sketch describe construction and working of red wood viscometer.
  - f) State Dalton's law and Amagat's law with equation.
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