

N.B.: (1) Question No 1 is compulsory

(2) Attempt any three questions out of remaining five questions

(3) Assume suitable data if necessary and indicate it clearly.

(4) Figures to the right indicate full marks.

- Q.1. Solve any four questions; each question carries equal marks. **20**
- (a) Explain the basic functions of Process Engineering.
 - (b) Explain the various types of interest.
 - (c) What is Profitability? Explain rate of return on investment.
 - (d) Differentiate Packed tower & Tray tower distillation column.
 - (e) What is P & ID? Explain its significance.
- Q.2. (a) What is Break Even analysis? Explain with graphical representation. **10**
- (b) Explain the Hierarchy of Chemical Process with suitable example. **10**
- Q.3. (a) Explain the concept of cost index and six tenth rule of cost estimation. A glass lined reactor of 150 gal. capacity purchased in 2001 has cost of Rs. 50000. Cost index in 2001 is 237.3. Calculate the cost of the reactor of 450 gal. capacity in 2008 if cost index in 2008 is 248.5. **10**
- (b) Explain the shortcut method of sizing and costing (Guthrie's method) of Heat Exchanger. **10**
- Q.4. (a) Calculate the number of theoretical stages for an absorption column used to recover acetone from the mixture of 9 gmol/sec of air & 1 gmol/sec of acetone using water as the solvent. Recovery of acetone is 95% at temperature of 300K & column pressure of 10 bar. The vapour pressures of acetone & water are 0.337 & 0.032 bar respectively. Also determine the solvent flowrate & absorption factors for all components. **10**

- (b) For the case of a nominal annual interest rate of 20% for capital of Rs. 2000, **10** determine:
- i) Total amount accumulated after one year (365 days) with daily compounding.
 - ii) Total amount accumulated after 6 years with continuous compounding.
 - iii) The effective annual interest rate if compounding is continuous.

Q.5. (a) A material testing machine was purchased for Rs. 200000 & was to be used **10** for 5 years with an expected residual salvage value of Rs. 5000. Calculate the depreciation & year-end book value after 1 year using:

- i) Straight Line Method
- ii) Declining Balance Method

(b) Discuss the importance of safety & environmental aspects in process **10** engineering.

Q.6. (a) Discuss in detail about features of Batch and Continuous process. **10**

(b) Explain different types of flow-meters used in process industries. **10**
