

Total No. of Questions : 10]

SEAT No. :

P3700

[5561]-337

[Total No. of Pages : 3

B.E. (Chemical)

PROCESS ENGINEERING COSTING AND PLANT DESIGN
(2012 Course) (Semester-II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

Q1) Explain the significance of laboratory data in processes development. **[10]**

OR

Q2) Illustrate the concept of capitalized cost with suitable example. **[10]**

Q3) The annual direct production cost for a plant operating at 70% capacity is Rs.2,80,000 while the sum of the annual fixed charges, overhead costs, and general expenses is Rs.2,00,000. What are the break even points in units of production per year if total annual sales are Rs. 5,60,000 and the product sells at Rs.40 per unit? What were the annual gross earnings and net profit for this plant at 100% capacity when corporate income taxes required are 15% tax on first Rs.50,000 of annual gross earnings, 25% on annual gross earning of Rs.50,000 to Rs.75,000. Additionally, 34% on annual gross earnings above Rs.75,000 and 5% on annual gross earnings from Rs. 1,00,000 to Rs.3,35,000. **[10]**

OR

Q4) Draw and explain the tree diagram showing the cumulative cash position of cash flow for an industrial operation. **[10]**

Q5) a) The following shows the effect of the variable x and y in the total cost for a particular operation: $C_T = 2.33x + (11900/xy) + 1.86y + 10$
Determine the values of x and y. **[8]**

P.T.O.

- b) Explain the optimum conditions in batch and cyclic operation. [8]

OR

- Q6) a)** Calculate the iterative solution of an LP Problem and solve for the maximum using Simplex method. [8]

$$\text{Maximize : } f = x_1 + 3x_2$$

$$\text{Subject to } -x_1 + x_2 + x_3 = 1$$

$$x_1 + x_3 + x_4 = 2$$

$$x_i > 0 ; i = 1, \dots, 4$$

Where x_3, x_4 are slack variables.

- b) Explain breakeven chart for optimization with significances. [8]

- Q7) a)** Write the steps for determination of height and diameter of different process equipment's at the conditions of optimum cost. [8]

- b) Derive the following equation for optimum insulation of a pipe for maximum loss. [8]

$$D_{\text{opt}} = 2K_m / (h_c + h_r)_c$$

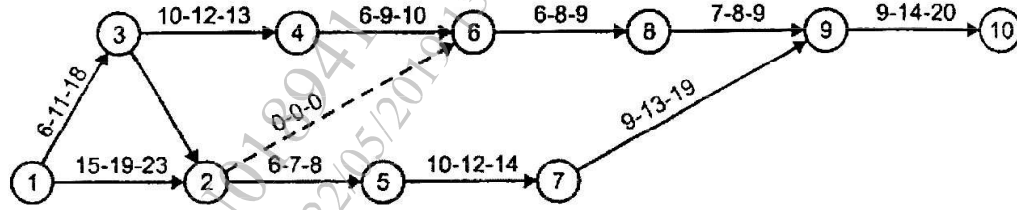
OR

- Q8) a)** Write a detail note on the preparation of techno economic feasibility report. [8]

- b) Write a note on Pinch technology. [8]

- Q9) a)** Illustrate the importance of start up and shut downs procedures in a large scale project. [9]

- b) Determine the expected time and variance for each activity of the diagram shown below. [9]



OR

- Q10)** a) Explain the role of Project Engineering in any chemical plant. [9]
 b) Explain organization of design report for any chemical plant. [9]

