

Total No. of Questions : 10]

SEAT No. :

P171

[Total No. of Pages : 3

[5871]-692

B.E. (Chemical Engineering)

PROCESS ENGINEERING COSTING & PLANT DESIGN

(2015 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer 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) Figures to the right indicate full marks.
- 3) Draw suitable diagrams wherever necessary.
- 4) Use of scientific calculators is allowed.
- 5) Assume suitable data, if necessary.

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

OR

Q2) With specific example explain concept of capitalized cost. **[10]**

Q3) The annual direct production cost for a plant operating at 70 percent capacity are Rs. 2,80,000 while the sum of the annual fixed charges, overhead costs, and general expenses is Rs 2,00,000. What is 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 percent capacity when corporate income taxes required a 15 percent tax on first Rs. 50,000 of annual gross earning, 25 percent on annual gross earning of Rs. 50, 000 to 75,000, 34 percent on annual gross earnings above Rs. 75,000 and 5 percent on annual gross earnings from Rs. 1,00,000 to 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: **[8]**

$$C_T = 2.33x + (11900/xy) + 1.86y + 10$$

Determine the values of x and y.

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

P.T.O.

OR

- Q6)** a) Obtain the iterative solution of 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 to determine height and diameter of different process equipment's at conditions of optimum cost. **[8]**

- b) Derive the following equation for optimum insulation and write for maximum loss. **[8]**

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

OR

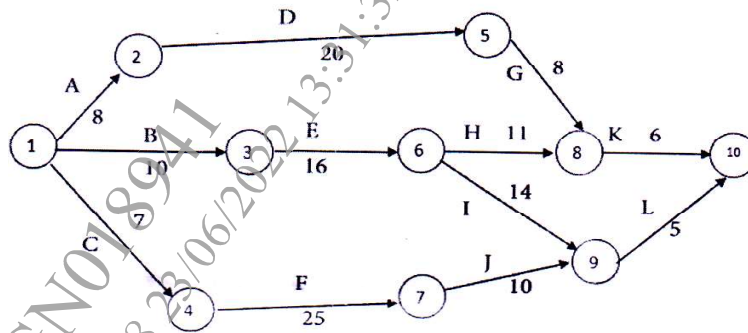
- Q8)** a) Write the steps for preparation of techno economic feasibility report. **[8]**

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

- Q9)** a) Draw the network diagram and determine the critical path for the following project. **[9]**

Activity	Time (Week)
1-2	5
1-3	6
1-4	3
2-5	5
3-6	7
3-7	10
4-7	4
5-8	2
6-8	5
7-9	6
8-9	4

- b) Find out the completion time and the critical activities for the following project. [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]

