CBCS SCHEME

15MN751

Seventh Semester B.E. Degree Examination, July/August 2021
Mine System Engineering

Time: 3 hrs.

Max. Marks: 80

Note: *Answer any FIVE full questions.*

1 a. Explain decision making under risk. **(10 Marks)**

   b. A small ink manufactures produces a certain type of ink at a total average cost of Rs.3 per bottle and sells at a price of Rs. 5 per bottle. The ink is produced over the week-end and is sold during the following week. According to the past experience the weekly demand has never been less than 78 or greater than 80 bottles in his place. Formulate the pay off table. **(06 Marks)**

2 a. Explain the following :

   i)   Optimal solution

   ii) Unbounded solutions

   iii) Basic variables

   iv) Standard form of LPP. **(08 Marks)**

   b. Solve the following LPP by graphical method :

   Max $z = x_1 + x_2$

   Subject to the constraint $x_1 + x_2 \leq 1$

   $-3x_1 + x_2 \geq 3$

   $x_1, x_2 \geq 0.$ **(08 Marks)**

3 a. Use Simplex method the solve the LPP

   Max $z = 3x_1 + 2x_2$

   Subject to $x_1 + x_2 \leq 4$

   $x_1 - x_2 \leq 2$

   $x_1, x_2 \geq 0.$ **(08 Marks)**

   b. Solve by Big-M method

   Max $z = x_1 + 2x_2 + 3x_3 - x_4$

   Subject to $x_1 + 2x_2 + 3x_3 = 15$

   $2x_1 + x_2 + 5x_3 = 20$

   $x_1 + 2x_2 + 3x_3 + x_4 = 10.$ **(08 Marks)**

4 a. Explain managing mining activities by simulation techniques. **(08 Marks)**

   b. Explain different types of inventory. **(08 Marks)**

5 a. Find the initial basic feasible solution for the following transportation problem by VAM.

	D_1	D_2	D_3	D_4	Supply
O_1	11	13	17	14	250
O_2	16	18	14	10	300
O_3	21	24	13	10	400
Demand	200	225	275	250	950

(06 Marks)

   b. Solve the following transportation problem and check for optimality.

	P	Q	R	S	Supply
A	21	16	25	13	11
B	17	18	14	23	13
C	32	17	18	41	19
Demand	6	10	12	15	43

(10 Marks)

6 a. Differentiate between transportation problem and assignment problem.   (08 Marks)
   b. Using the following cost matrix determine (i) optimal job assignment (ii), cost of assignment.

$$
\text{Mahcine}
\begin{array}{c}
\quad\quad\quad\quad \text{Job} \\
\quad\quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \\
\begin{bmatrix}
10 & 3 & 3 & 2 & 8 \\
9 & 7 & 8 & 2 & 7 \\
7 & 5 & 6 & 2 & 4 \\
3 & 5 & 8 & 2 & 4 \\
9 & 10 & 9 & 6 & 10
\end{bmatrix}
\end{array}
$$

(08 Marks)

7 a. Define the following terms :
      i) Network
      ii) Activity
      iii) Event
      iv) Dummy activity.   (08 Marks)
   b. Explain network scheduling and steps involved in it.   (08 Marks)

8 a. Define the following terms :
  i) Critical path
  ii) Total float
  iii) Earliest starting time
  iv) Optimistic time
  v) Pessimistic time
  vi) Most likely time. **(06 Marks)**

 b. The following table shows the jobs of a network along with their time estimates.

Job	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
a	3	2	6	2	5	3	1	3	4
m	6	5	12	5	11	6	4	9	19
b	15	14	30	8	17	15	7	27	28

  i) Draw the project network
  ii) Find the critical path. **(10 Marks)**

9 a. Explain customers behavior in a queue. **(08 Marks)**
 b. Explain the classification of queuing models. **(08 Marks)**

10 a. Solve the game whose pay off matrix is given by :

$$
\text{Player A} \quad \begin{array}{c} A_1 \\ A_2 \\ A_3 \end{array}
\begin{array}{c} \text{Player B} \\ \begin{array}{ccc} B_1 & B_2 & B_3 \end{array} \\
\begin{pmatrix} 1 & 3 & 1 \\ 0 & -4 & -3 \\ 1 & 5 & -1 \end{pmatrix} \end{array}
$$

(08 Marks)

 b. Determine the optimal strategies and the value of game.

$$
A \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix}.
$$

(08 Marks)

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