CBCS SCHEME

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17MN751

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Mine System Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a. A_1, A_2, A_3 are the acts and S_1, S_2, S_3 are the states of nature. Also known that $P(S_1) = 0.5$, $P(S_2) = 0.4$ and $P(S_3) = 0.1$. Determine the expected value of perfect information for the pay off table given:

State of Nature	Pay-off Table		
	A_1	A_2	A_3
S_1	30	25	22
S_2	20	35	20
S_3	40	30	35

(08 Marks)

   b.   A small ink manufacturer 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 weekend 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 Pay off table.

(06 Marks)

   c.   Explain the steps involved in operations research.   (06 Marks)

OR

2   a.   Solve the given LPP graphically

Maximize $Z = 8x_1 + 5x_2$

Subject to $2x_1 + 2x_2 \leq 500$

$x_1 \geq 150$

$x_2 \geq 250$

$x_1, x_2 \geq 0$

(10 Marks)

   b.   Using Simplex method, solve the LPP:

Maximize $Z = x_1 + x_2 + 3x_3$

Subject to $3x_1 + 2x_2 + x_3 \leq 3$

$2x_1 + x_2 + 2x_3 \leq 2$

$x_1, x_2, x_3 \geq 0$

(10 Marks)

Module-2

3   a.   Use Penalty method to Maximize $Z = 3x_1 + 2x_2$

Subject to the constraints $2x_1 + x_2 \leq 2$

$3x_1 + 4x_2 \geq 12$

$x_1, x_2 \geq 0$

(10 Marks)

   b.   Explain degeneracy and also the steps involved in resolving degeneracy.   (10 Marks)

OR

4   a.   Explain different types of inventories.   (10 Marks)

       b.   Explain the following factors involved in inventory analysis:

          (i) Demand   (ii) Lead time   (iii) Order cycle   (iv) Time horizon   (v) Recorder level

          (10 Marks)

Module-3

5   a.   Find the initial solution to the following transportation problem using VAM.

	D_1	D_2	D_3	D_4	Supply
F_1	3	3	4	1	100
F_2	4	2	4	2	125
F_3	1	5	3	2	75
Demand	120	80	75	25	

          (08 Marks)

       b.   Solve the following transportation problem and optimize by using UV method.

	D_1	D_2	D_3	D_4	Supply
O_1	2	2	2	1	3
O_2	10	8	5	4	7
O_3	7	6	6	8	5
Demand	4	3	4	4	

          (12 Marks)

OR

6   a.   Explain in detail Hungarian method for solving assignment problem.   (10 Marks)

       b.   Using the following Cost Matrix, determine:

          (i) Optimal job assignment   (ii) Cost of assignment

	1	2	3	4	5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

          (10 Marks)

Module-4

7   A project consists of the following jobs and their duration:

Activity	Precedence	Duration (in days)
A	-	10
B	A	9
C	A	6
D	B	7
E	B	5
F	C, D	9
G	E, F	8

       (i)   Draw a network diagram

       (ii)   Identify the critical path

       (iii)   Find the project duration

       (iv)   Calculate the floats – Total, free, independent and interference

       (v)   Compute slack time for each event   (20 Marks)

OR

8 The time estimation of the activities of a project is given in the following table:

Activity	Optimistic time	Most likely time	Pessimistic time
1 – 2	1	2	3
2 – 3	1	2	3
2 – 4	1	3	5
3 – 5	3	4	5
4 – 5	2	3	4
4 – 6	3	5	7
5 – 7	4	5	6
6 – 7	6	7	8
7 – 8	2	4	6
7 – 9	4	6	8
8 – 10	1	2	3
9 – 10	3	5	7

(i)   Construct a network.
(ii) Identify critical path and all the critical activities.
(iii) What is the expected completion time of project?
(iv) What is the probability of completing the project in 30 days?
(v)   What is the probability that the project will be completed 2 days earlier than expected?

(20 Marks)

Module-5

9 a. Explain in detail each characteristics of queuing system. (12 Marks)
   b. Explain pure birth and pure death models. (08 Marks)

OR

10 a. List the characteristics or features of a Game. (06 Marks)
   b. What are the assumptions made for a two person – zero sum game? (06 Marks)
   c. Solve the following game with the pay off matrix:

Player B

		B_1	B_2	B_3	B_4
	A_1	1	7	3	4
Player A	A_2	5	6	4	5
	A_3	7	2	0	3

(08 Marks)

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