CBCS SCHEME

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18MN71

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
Mine System Engineering

Time: 3 hrs. Max. Marks: 100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. Missing data, if any, may be suitably assumed.

Module-1

1 a. Justify system engineering, system analysis and operations research are all the same or different. **(10 Marks)**

b. You are in a situation of decision making under uncertainty. As a decision maker, compare being an optimistic person and pessimistic person with example. **(10 Marks)**

OR

2 a. Minimize the given objective function using graphical method :

Min $Z = 20x_1 + 10x_2$

Subject to the constraint $x_1 + 2x_2 \leq 40$

$3x_1 + x_2 \geq 30$

$4x_1 + 3x_2 \geq 60$

$x_1, x_2 \geq 0$ **(10 Marks)**

b. Using Simplex Method, find non-negative values of x_1, x_2 and x_3 which maximize :

$z = 15x_1 + 6x_2 + 9x_3 + 2x_4$

subject to $2x_1 + x_2 + 5x_3 + 6x_4 \leq 20$

$3x_1 + x_2 + 3x_3 + 25x_4 \leq 24$

$7x_1 + x_4 \leq 70$

$x_1, x_2 x_3, x_4 \geq 0.$ **(10 Marks)**

Module-2

3 a. Using Big-M method solve the following LPP

Max $Z = 4x_1 + 5x_2 - 3x_3$

Subject to $x_1 + x_2 + x_3 = 10$

$x_1 - x_2 \geq 1$

$2x_1 + 3x_2 + x_3 \leq 40$

$x_1, x_2 x_3 \geq 0.$ **(10 Marks)**

b. Solve the following LPP using Two phase method :

max $Z = -4x_1 - 3x_2 - 9x_3$

subject to $2x_1 + 4x_2 + 6x_3 \geq 15$

$6x_1 + x_2 + 6x_3 \geq 12$

$x_1, x_2 x_3 \geq 0.$ **(10 Marks)**

OR

4 a. Do you think it is necessary to maintain inventory in mining industry? State the reason. **(06 Marks)**

b. Explain the following terms :

i) Demand
ii) Lead time
iii) Order cycle
iv) Time Horizon. **(04 Marks)**

c. Explain different types of inventories. **(10 Marks)**

Module-3

5 a. A coal mine has 3 production face located at F_1, F_2, F_3 which supply coal to 2 railway shedding and 2 processing plants which are located at different places. Each production face can supply 60, 10 and 100 truckload daily respectively. The daily requirements are 70, 50, 30 and 20 truckloads respectively. The transportation cost per truck load of a coal is given in Table.Q5(a). Find the optimum distribution schedule and cost. **(12 Marks)**

2	3	11	7
1	0	6	1
5	8	15	9

Table.Q5(a)

b. Differentiate between transportation problem and assignment problem. **(08 Marks)**

OR

6 a. Determine the initial basic feasible solution of the transportation problem given in Table Q6(a) and compare the solutions by different method :
i) NWCR ii) Matrix Minima Method iii) VAM.

	D_1	D_2	D_3	D_4	Supply
O_1	6	4	1	5	14
O_2	8	9	2	7	16
O_3	4	3	6	2	5
Demand	6	10	15	4	

Table Q6(a) **(10 Marks)**

b. Four different jobs can be done on four different machines and take down costs are prohibitively high for change overs. The matrix in Table.Q6(b) gives the cost in rupees of producing Job I on Machine J. How should the jobs be assigned to the various machine so that the total cost is minimized.

	M_1	M_2	M_3	M_4
J_1	5	7	11	6
J_2	8	5	9	6
J_3	4	7	10	7
J_4	10	4	8	3

Table. Q6(b) **(10 Marks)**

Module-4

7 A project consists of jobs and their duration as given in TableQ7.
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.

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

Table Q7 **(20 Marks)**

OR

8 The time estimate of the activities of a project is given in Table.Q8.

i) Construct a networks
ii) Identify the critical path and all critical activities
iii) What is the expected completion time of the project?
iv) What is the probability of completing the project in 30 days?
v) What due date has 90% chance of being met?

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

Table Q8

(20 Marks)

Module-5

9 a. In a game of matching coins, player A wins R_{8-8} if both coins how heads and Rs.1 if both are tails player B wins Rs. 3 when the coins do not match. Given the choice of being player A or player B, which would you choose and what would be your strategy? **(10 Marks)**

b. Use dominance principle to solve the given game in TableQ9(b).

	Player B			
Player A	3	2	4	0
	2	4	3	4
	4	2	4	0
	0	4	0	8

Table Q9(b)

(10 Marks)

OR

10 a. Explain the characteristics of queuing system. **(10 Marks)**

b. Explain the classification of queuing model. **(10 Marks)**

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