USN ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚ **18MN71**

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. Justify system engineering, system Analysis and operations research are all some or different. **(06 Marks)**

    b. Explain Decision making under Risk with examples. **(10 Marks)**

    c. Define : i) Acts   ii) Redundant constraint   iii) Payoff table   iv) Feasible solution. **(04 Marks)**

OR

2 a. Solve by graphical method.

Max $Z = 3x_1 + 5x_2$

Subject to the constraint

$x_1 + x_2 \leq 2000$

$x_1 + x_2 \leq 1500$

$x_2 \leq 600$

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

    b. Solve the given LPP by simplex method.

Max $Z = 15x_1 + 6x_2 + 9x_3 + 2x_4$

Subject to the constraint

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

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

$7x_1 + x_4 \leq 70$

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

Module-2

3 a. Use Big-M method to Mining the given object function

Min $Z = 2x_1 + x_2$

Subject to the constraint

$3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 3$

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

    b. Solve the given LPP by Two phase method

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

Subject to the constraint

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

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

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

OR

4 a. Explain Monte – Carlo Simulation Technique. **(08 Marks)**

    b. Define inventory. List out the reasons for maintaining inventories. **(07 Marks)**

    c. Define the following :

i) Order cycle   ii) Lead time   ii) Demand   iv) Recorder level   v) Time Horizon. **(05 Marks)**

Module-3

5 a. Determine initial basic feasible solution by i) NWCR ii) Matrix Minima Method iii) VAM. and compare the solutions by different method for the transportation matrix given below :

	P	Q	R	Supply
A	5	7	8	70
B	4	4	6	30
C	6	7	7	50
Demand	65	42	43	

(10 Marks)

b. Determine the optimum distribution arrangement and the total cost in the following transportation matrix. All the cost elements are in Rs. Unit.

	D_1	D_2	D_3	
S_1	8	5	6	120
S_2	15	10	12	80
S_3	3	9	10	80
	150	80	50	

(10 Marks)

OR

6 a. A mining project has four major tasks to be done, for which four contractors have submitted tenders. The tenders amounts quoted in lakhs of rupees are given in the matrix below. Find the assignments by Hungarian method which minimizes the total cost of project. Each contractors has to be assigned at least and at most one task

		A	B	C	D
	1	10	24	30	15
Contractors	2	16	22	28	12
	3	12	32	10	20
	4	9	26	34	16

(10 Marks)

b. Solve the following assignment problem, if it is treated as a salesman problem and the cell entries represent cost in rupees. Find the least cost route such that salesman does not visit any city twice find an alternate solution also.

	A	B	C	D	E
A	-	2	5	7	1
B	6	-	3	8	2
C	8	7	-	4	7
D	12	4	6	-	5
E	1	3	2	8	-

(10 Marks)

Module-4

7 a. Define project and explain steps involved in project scheduling. **(08 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	6–7	5–8	7–8
a (days)	1	2	2	2	7	5	5	3	8
m (days)	7	5	14	5	10	5	8	3	17
b (days)	13	14	26	8	19	17	29	9	32

Draw the project network and find the probability that the project is completed in 40 days.

(12 Marks)

<div align="center">**OR**</div>

8 a. Explain the following :   **(08 Marks)**
   i) Network   ii) Event   iii) Total float   iv) Activity.
   b. A project schedule has the following characteristics

Activity	1–2	1–3	2–4	3–4	3–5	4–9	5–6
Time (days)	4	1	1	1	6	5	4

Activity	5–7	6–8	7–8	8–10	9–10
Time (days)	8	1	2	5	7

   From the above information
   i) Construct a Network diagram
   ii) Compute the earliest event time and latest event time
   iii) Determine the critical path and total project duration
   iv) Compute total, free float for each activity.   **(12 Marks)**

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Module-5

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9 a. In detail, explain the characteristics of Queuing system.   **(12 Marks)**
   b. Classify and explain the queuing models.   **(08 Marks)**

<div align="center">**OR**</div>

10 a. Explain the following terminologies related to Game theory.
   i) Strategy   ii) Two person zero sum game   iii) Payoff matrix
   iv) Saddle point   v) Optimal strategy   vi) Game.   **(12 Marks)**
   b. Solve the following game with the payoff matrix.

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Player B

		B₁	B₂	B₃	B₄
Player A	A₁	1	7	3	4
	A₂	5	6	4	5
	A₃	7	2	0	3

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                                                                                         (08 Marks)

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