

Aliah University

End-Semester Examination (Spring Semester) - 2024

(For 4th Year 8th Semester BTech (CSE) Programme)

Paper Name: Professional Elective-IV [Operations Research]

Paper Code: CSEUGPE22

Full Marks: 80

Time: 3 hrs

Group - A

(Answer all questions)

5 × 2 = 10

1. What is a symbolic model?
2. Define an optimal solution Linear Programming Problems (LPP).
3. Give two examples of assignment problems.
4. What is a dummy activity?
5. Compare mixed strategy and pure strategy in game theory.

2
2
2
2
2

Group - B

(Answer any six questions)

6 × 5 = 30

6. What are the main characteristics of operations research?
7. What are the limitations of Linear Programming Problems?
8. Write a short note on the Big M method or penalty cost method in linear programming.
9. Describe the North West Corner Rule method for solving transportation problems.
10. How do you convert an unbalanced transportation problem into a balanced one? Explain using a suitable example.
11. Write down the different phases of a project.
12. What are the basic characteristics of a queueing system?
13. Write down a short note on a two-person zero-sum game.

5
5
5
5
5
5
5
5

Group - C

(Answer any four questions)

4 × 10 = 40

[All parts of the same questions should be written together]

14. Solve the following linear programming problem graphically.

Maximize $z = 5x + 7y$

subject to $x + y \leq 4$,

$3x + 8y \leq 24$,

$10x + 7y \leq 35$

and $x, y \geq 0$

10

15. Solve the following linear programming problem using the Simplex method.

Maximize $z = 2x + y$

subject to $x - y \leq 10$

$2x - y \leq 40$

$x, y \geq 0$

10

[Please Turn Over]

✓ Determine the initial basic feasible solution for the following transportation problem whose cost and rim requirement table is given below, using least cost method:

Origin/Destination	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

10

✓ There are four jobs to be assigned to five machines. Only one job can assigned to one machine. The amount of time in hours required for the jobs per machine are given in the following matrix. Find an optimum assignment of jobs to the machines to minimize the total processing time and also find out for which machine no job is assigned. What is the total processing time to complete all the jobs?

Jobs	Machines				
	A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	6

10

4

✓ 18. (a) State the maximin-minimax principle.

(b) For what value of λ , is the game with following pay-off matrix strictly determinable?

		Player B		
		B ₁	B ₂	B ₃
Player A	A ₁	λ	6	2
	A ₂	-1	λ	-7
	A ₃	-2	4	λ

6

19. A project schedule has the following characteristics.

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

a) Construct a network diagram.

b) Compute the earliest event time and latest even time.

c) Determine the critical path and total project duration.

[3+4+3]

~~10+8+8+2~~

10+3+0+2+6 21