Aliah University

End-Semester Examination (Spring Semester) - 2025

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

Paper Name: Professional Elective–IV [Operations Research] **Full Marks: 80**

Paper Code: CSEUGPE22 **Time: 3 hrs**

Group - A

(Answer all questions) **5 × 2 = 10**

1. What are the methods used for solving operations research models? [CO1, Remember] 2
2. Define a feasible solution Linear Programming Problems (LPP). [CO1, Remember] 2
3. Define the optimal solution to a Transportation Problem. [CO1, Remember] 2
4. What is the objective of the travelling salesman problem? [CO2, Remember] 2
5. What do you mean by an activity of a project? [CO3, Understand] 2

Group - B

(Answer any six questions) **6 × 5 = 30**

6. Write down some characteristics of a good model. [CO1, Understand] 5
7. State the characteristics of standard form and write the standard form of LPP in matrix form? [CO1, Remember] 5
8. Explain an unbounded solution in a linear programming problem. [CO2, Understand] 5
9. Describe the Vogels approximation method for solving transportation problems. [CO2, Understand] 5
10. State the difference between the Transportation and Assignment Problems. [CO2, Understand] 5
11. How do you convert an unbalanced assignment problem into a balanced one? Explain using a suitable example [CO2, Apply] 5
12. Distinguish between PERT and CPM. [CO4, Analyze] 5
13. Distinguish between Pure and Mixed strategies. [CO3, Analyze] 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.

    Minimize $z = 20x + 10y$

    subject to $x + 2y \leq 40$,

    $3x + y \geq 30$,

    $4x + 3y \geq 60$

    and $x, y \geq 0$ [CO2, Apply] 10

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

    Maximize $z = x + y + z$

    subject to $3x + 2y + z \leq 3$

    $2x + y + 2z \leq 2$

[Please Turn Over]

$x, y, z \geq 0$

[CO2, Apply] 10

16. Determine the initial basic feasible solution for the following transportation problem whose cost and rim requirement table is given below, using North West Corner Rule method:

Origin\Destination	D_1	D_2	D_3	D_4	Supply
O_1	21	16	25	13	11
O_2	17	18	14	23	13
O_3	32	17	18	41	19
Demand	6	10	12	15	43

[CO2, Apply] 10

17. There are five 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. What is the total processing time to complete all the jobs?

Jobs	Machines				
	A	B	C	D	E
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	15

[CO2, Apply] 10

18. (a) State the maximin-minimax principle. [CO3, Remember] 4

(b) Determine the optimal minimax strategies for each player in the following game.

		Player B			
		B_1	B_2	B_3	B_4
Player A	A1	−5	2	0	7
	A2	5	6	4	8
	A3	4	0	2	−3

[CO3, Apply] 6

19. (a) A project schedule has the following characteristics.
A < C, D, I; B < G, F; D < G, F; F < H, K; G, H < J; I, J, K < E.
Construct a network diagram from the above precedence relations. [CO3, Apply] 6

(b) Describe forward pass computations for the earliest event time. [CO3, Understand] 4