MAY 2024 **U/ID 32519/UEM6A**

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer any TEN questions.

1. What is linear programming problem?
2. Define Optimization.
3. Define Constraints.
4. What is meant by degeneracy in a transportation model?
5. What is an unbalanced case in an Assignment model?
6. List some application of the assignment model.
7. Define mixed strategy in a game.
8. Define Zero sum game.
9. What is a Queue?
10. Write any three components of queuing system.
11. Define Critical Path.
12. What are the limitations of PERT/CPM?

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Solve the following linear programming problem graphically:
Maximise $Z = 4x + y$
Subject to the constraints:
$x + y \leq 50$
$3x + y \leq 90$

14. Write down the steps for solving linear programming problem.

15. What are the methods to solve transportation problem and show its basic structure.

16. Solve the following assignment problem shown in Table using Hungarian method. The matrix entries are processing time of each man in hours.

	I	II	III	IV	V
1	20	15	18	20	25
2	18	20	12	14	15
3	21	23	25	27	25
4	17	18	21	23	20
5	18	18	16	19	20

17. Consider a two-person zero-sum game matrix which represents payoff to the player A. Find the optimal strategy, if any

Player B

Player A	I	II	III	IV	V
I	–2	0	0	5	3
II	4	2	1	3	2
III	–4	–3	0	–2	6
IV	5	3	–4	2	–6

18. Briefly explain the behaviours of customer in a queuing model.

19. List the steps involved for interactive procedure of determining the critical path.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

20. Determine graphically the minimum value of the objective function

$Z = -50x + 20y$

Subject to the constraints:

$2x - y \geq -5$

$3x + y \geq 3$

$2x - 3y \leq 12$

$x \geq 0,\ y \geq 0$

21. Explain the steps for Hungarian Method of Solving an Assignment Problem.

22. Suppose that in a game of matching coins with two players, one player wins Rs. 2 when there are 2 heads, and gets nothing when there are 2 tails and looses Re 1 when there are one head and one tail. Determine the best strategies for each player and the value of the game.

23. Show that for an M/M/1 queueing system $E[Nq \setminus Nq > 0] = 1/(1 - p)$.

24. Draw the network diagram and determine the critical path for the following project.

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