(6 pages)

DECEMBER 2024 **U/ID 32519/UEM6A**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. When can the dual Simplex method be applied?

2. Define degenerate solution in Linear Programming Problem.

3. Write the formulation of LPP steps.

4. List the methods used to arrive at an initial basic feasible solution in a transportation model.

5. What are the transient nodes in a transportation problem?

6. Define unbalanced transportation problem.

7. What is a game?

8. Define Saddle point.

9. Define the main characteristics of the queueing system.

10. What is meant by queue length?

11. Define Activity.

12. Write any two advantages of PERT/CPM.

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Solve the following linear programming problem graphically:

Minimize $Z = 200x + 500y$

Subject to the constraints :

$x + 2y \geq 10$

$3x + 4y \leq 24$

$x \geq 0, y \geq 0$

14. Solve the following problem by simplex method.

Maximise $6x_1 + 2x_2 + 4x_3$

Subject to :

$2x_1 + 3x_2 + x_3 \leq 28$

$3x_1 + x_2 + 2x_3 \leq 24$

$x_1 + 2x_2 + 3x_3 \leq 35$

$x_1, x_2, x_3 \geq 0$

15. A computer centre has four expert programmers and needs to develop four application programmes. The head of the computer centre, estimates the computer time (in minutes) required by the respective experts to develop the application programmes as follows:

Programmer	Programmes A	B	C	D
1	120	100	80	90
2	80	90	110	70
3	110	140	120	100
4	90	90	80	90

16. Distinguish Transportation problem and Assignment Problem.

17. Solve the game whose payoff matrix is given below.

Player - A \ Player - B	I	II	III
I	–2	15	–2
II	–5	–6	–4
III	–5	20	–8

18. List and Explain the components of queuing system.

19. Draw a network diagram of the following schedule of activities and find its critical path. Also calculate slack time for each event.

Activity :	1-2	1-3	1-4	2-6	3-7	3-5
Duration (in days)	2	2	1	4	5	8
Activity :	4-5	5-9	6-8	7-8	8-9	
Duration (in days)	3	5	1	4	3	

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. Solve the following problem graphically :

Minimize and Maximise $Z = 3x + 9y$

Subject to the constraints.

$x + 3y \leq 60$

$x + y \geq 10$

$x \leq y$

$x \geq 0, y \geq 0$

21. Solve the following transportation problem using Least Cost method.

Destination

		D_1	D_2	D_3	D_4	Supply
Source	O_1	3	1	7	4	300
	O_2	2	6	5	9	400
	O_3	8	3	3	2	500
Demand		250	350	400	200	1200

22. Explain the iterative procedure for determining the optimum sequence for n jobs on 2 machines.

23. Show that, for an M/M/1 queueing system, $Var[Nq] = p\ 2\ (1 + p - p2)/(1 - p)^2$.

24. The following are the time estimates and the precedence relationships of the activities in a project network. Draw the project network diagram. Determine the critical path and the project completion time.

Activity	Immediate predecessor Activity	Time estimate (weeks)
A	–	4
B	–	7
C	–	3

Activity	Immediate predecessor Activity	Time estimate (weeks)
D	A	6
E	B	4
F	B	7
G	C	6
H	E	10
I	D	3
J	F,G	4
K	H,I	2

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