(6 pages)

MAY 2023 **U/ID 32519/UEM6A**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. What is the difference between feasible solution and basic feasible solution.

2. State fundamental theorem of duality.

3. Define general LPP.

4. What is meant by non- degenerate basic feasible solution of a transportation problem.

5. Define an assignment problem?

6. Find the basic feasible solution of the following transportation problem by north west corner method

5	7	8	70
4	4	6	30
6	7	7	50
65	42	43	

7. What is sequencing?

8. What is processing time?

9. Define two person zero sum game.

10. Explain M/M/S Model.

11. Define Steady State?

12. Explain CPM.

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Solve the following LPP by graphical method

Maximize $Z = 3x + 5y$,

Subject to

$-3x + 4y \leq 12$,
$2x - y \geq -2$,
$2x + 3y \geq 12$,
$x \leq 4$,
$y \geq 2$.

14. There are four jobs to be assigned to the machine. Only one job could be assigned to one machine. The amount of time in hours required for the jobs in machine are given the following matrix.

	M_1	M_2	M_3	M_4
J_1	2	3	4	5
J_2	4	5	6	7
J_3	7	8	9	8
J_4	3	5	8	4

Find the optimum assignment of jobs to the machines to minimize the total processing time.

15. There are five jobs each of which has to go through four machines M_1, M_2, M_3, M_4 in the order $M_1 — M_2 — M_3 — M_4$ processing times are given below.

Job/Machine	1	2	3	4	5
M_1	11	13	9	16	17
M_2	4	3	5	2	6
M_3	6	7	5	8	4
M_4	15	8	13	9	11

Find the optimal sequence and the total minimum elapsed time.

16. Solve the following game

		Player B	
Player A		0	2
		-1	4

17. Trains arrived the yard every 15 minutes and the service time is 33 minutes. If the line capacity of the yard is limited to 4 trains, find

    (a) The probability that the yard is empty.

    (b) The average number of trains in the system.

18. Solve the difference equations $-(\lambda + \mu)p_n + \lambda\ P_{n-1} + \mu p_{n+1}$, if $n > 0$

    $-\lambda P_0 + \mu_{p_1}, = 0$ if $n = 0$.

19. Draw a network to represent the following project.

Activity	A	B	C	D	F	G	H	I
Preceded by	-	-	A	A	B,C	F	B,C,D	H,G

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. Solve by simplex method.

Maximize $Z = x - 3y + 2z$

Subject to

$3x - y + 2z \leq 7,$
$-2x + y \leq 12,$
$-4x + 3y + 8z \leq 10,$
$x, y, z \geq 0.$

21. For the following transportation problem find the maximum profit.

		Warehouse				Supply
Factory	F_1	90	90	100	110	200
	F_2	50	70	130	85	100
Demand		75	100	100	30	

22. There are seven jobs each of which has to go through the machines A and B in the order. AB processing time in hours.

Job	1	2	3	4	5	6	7
Machines A	3	12	15	6	10	11	9
Machines B	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elapsed time. T

23. Derive the variance of queue length.

24. The project has the following time schedule

Activity	Time in months	Activity	Time in months
1-2	2	4-6	3
1-3	2	5-6	1
1-4	1	6-9	5
2-5	4	7-8	4
3-6	8	8-9	3
3-7	5		

Construct PERT network and compute

(a) Total float for each activity

(b) Critical path and its duration
