21. Analyze the advantages and limitations of various models in operations research.

22. Solve the following LPP using simple method

Maximize $z = 80x_1 + 90x_2$

Subject to $2x_1 + 3x_2 \leq 1500$

$$3x_1 + 2x_2 \leq 1500$$

$$x_1 \leq 450$$

Where $x_1, x_2 \geq 0$.

23. Explain the different types of decision theory with examples.

24. Given the following project characteristics, construct the network and find the critical path and the project duration.

Activity	Predecessors	Duration (days)
A	None	6
B	None	7
C	A, B	4
D	A, B	5
E	C	4
F	C, D	6
G	F	3

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer any TEN questions.

1. What is artificial variable?

2. Define objective function in linear programming

3. What is degeneracy in transportation problem?

4. When does redundancy occurs in network diagram?

5. How do you differentiate primal with dual programme?

6. Define project.

7. State the assumptions of individual replacement policy.

8. Write down the concept of interfering float and negative float.

9. How do you calculate the average number of customers in the waiting line system?

10. What is saddle point?

11. What are the benefits of studying decision theory?

12. Define game theory.

SECTION B — (5 × 5 = 25 marks)

Answer any FIVE questions.

13. Discuss the steps in detail to solve linear programming problem through graphical method.

14. Using graphical method, obtain the values of x_1 and x_2:

   Minimize $Z = 5x_1 + 4x_2$,

   Subject to $4x_1 + x_2 \geq 40$

   $2x_1 + 2x_2 \geq 90$

   Where $x_1, x_2 \geq 0$

15. Enumerate the procedure involved in solving a transportation problem through VAM.

16. A company has four machines on which to do three jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given in the following table, what are the job assignments which will maximize the cost?

		Machine			
		W	X	Y	Z
Job	A	18	24	28	32
	B	8	13	17	19
	C	10	15	19	22

17. Discuss the procedure to determine slack of events and the critical path in PERT

18. Summarize the applications of quantitative methods in production planning.

19. Following is the payoff matrix for player A. Obtain the optimum strategies for both the players and determine the value of the game.

		Player B				
		B1	B2	B3	B4	B5
Player A	A1	9	3	1	8	0
	A2	6	5	4	6	7
	A3	2	3	3	4	8
	A4	5	6	2	2	1

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

20. Solve the following transportation problem by identifying the feasible solution through VAM

	A	B	C	Supply
F1	10	9	8	8
F2	10	7	10	7
F3	11	9	7	9
F4	12	14	10	4
Demand	10	10	8	