BAIM42 A — OPERATIONS RESEARCH

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1.   What are the general methods for solving the O.R models?

2.   Write a characteristic of OR.

3.   Write the canonical form of LPP.

4.   Define degenerate basic solution.

5.   What do you mean by unbalanced transportation problems?

6.   Define an unbalanced assignment problem and describe the steps involved in solving it.

7.   What is mean by network?

8.   Define Floats.

9.   Define graphical solution of the game

10. Define dominance property.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain the Scope of research.

Or

(b) Write a short essay explaining usefulness of O.R in various fields.

12. (a) Use the graphical method to solve the following L.P.P.

Maximize $Z = 2x_1 + 4x_2$

Subject to constraints

$x_1 + 2x_2 \le 5$

$x_1 + x_2 \le 4$

and $x_1, x_2 \ge 0$

Or

(b) A company produces two types of Model M_1 and M_2. Each model of the type M_1 requires 4 hours of grinding and 2 hours of Polishing. Each model of a M_2 requires 2 hours of grinding and 6 hours of polishing. The company has 3 grinders and 5 polishers. Each grinder works 100 hours a week and each polisher for 150 hours a week. Profit of model M_1 is Rs. 50 and M_2 is Rs. 80. whatever is produced in a week is sold in a market. Show that we make the maximum profit in a week. Formulate LPP.

14. (a) Write the detailed note on the different types of float.

Or

(b) Compute the earliest start, earliest finish, latest start and latest finish of each Activity of the project given below and compute the total, free and independent floats of each activity and critical path the project duration.

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Duration	8	4	10	2	5	3

15. (a) Solve the game problem

	X	Y	Z
P	-1	2	1
Q	1	-2	2
R	3	4	-3

Or

(b) Discuss the graphical method for 2 × n or m × 2 games.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the features of Operations research.

17. Use Two-Phase simplex method to solve

Maximize $Z = 5x_1 + 8x_2$

Subject to constraints

$$3x_1 + 2x_2 \geq 3$$
$$x_1 + 4x_2 \geq 4$$
$$x_1 + x_2 \leq 5$$
$$\text{and } x_1, x_2 \geq 0$$

18. Explain an initial solution to transportation problem by Vogel's approximation method.

19. Explain the basic steps in PERT/CPM techniques.

20. Use the notion of dominance to simplify the rectangular game with the following pay-off and solve it graphically.

Player K

$$\text{Player L} \begin{pmatrix} 18 & 4 & 6 & 4 \\ 6 & 2 & 13 & 7 \\ 11 & 5 & 17 & 3 \\ 7 & 6 & 12 & 2 \end{pmatrix}$$

13. (a) Solve the following transportation problem to minimize the cost of transportation use LCM

	A	B	C	D	E	Supply
	4	1	2	6	9	100
	6	4	3	5	7	120
	5	2	6	4	8	120
Demand	40	50	70	90	90	

Or

(b) Solve the assignment problem:

$$M_1 \quad M_2 \quad M_3 \quad M_4$$

$$\text{Job} \begin{pmatrix} 5 & 7 & 11 & 6 \\ 8 & 5 & 9 & 6 \\ 4 & 7 & 10 & 7 \\ 10 & 4 & 8 & 3 \end{pmatrix}$$