



BCA 402

B.C.A. (PART-II) EXAMINATION, 2023-24

(Fourth Semester)

Paper : II

BCA - 402 : Operation Research

5489

Time : Three Hours]

[Maximum Marks : 70

- Note:** (i) Answer **Five** Questions in all.
- (ii) Question No.-1 is **Compulsory**.
- (iii) Answer remaining **four** questions, selecting **two** questions from each Section 'A' and 'B'.
- (iv) All questions carry equal marks.
- (v) Symbols have their usual meaning.
1. Answer **all** parts of the following :
- (a) What is operations Research ?
- (b) Define slack and surplus variable in linear programming problem.
- (c) What is meant by unbalanced transportation problem ?
- (d) Define pure and mixed strategy ?

Section-A

2. Discuss the historical back ground of OR.
3. Solve the following L.P.P.
Minimize : $Z = 40x + 24y$
Subject to : $20x + 50y \geq 4800$
 $80x + 50y \geq 7200$
and $x, y \geq 0$
4. Give a mathematical formulation of the assignment problem. Explain the difference between a transportation problem and an assignment problem.
5. A certain project is composed of nine activities where time estimates are given below :

Activity	Expected duration (week)		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	3	5	7
1-4	2	2	8
2-5	1	1	1
3-5	3	6	9
4-6	2	5	8
5-6	4	6	14
5-7	3	7	11
6-7	6	8	10

Draw the project network and trace all the possible paths from it. What is the expected project length ?

Section-B

6. (a) What is linear programming problem (LPP) ? How can formulate a given problem into LPP ?

(b) Write the dual of the problem :

$$\text{Mini } Z = 40x + 24y$$

$$\text{s.t. } 2x + 3y \geq 2$$

$$x + y \geq 1$$

$$\text{and } x, y \geq 0$$

7. (a) Determine an initial basic feasible solution to the following transportation problem using north west corner rule.

Source	Destinations				Capacity
	D1	D2	D3	D4	
01	6	4	1	5	14
02	8	9	2	7	16
03	4	3	6	2	5
Demand	6	10	15	4	35

- (b) Find the optimal assignment for the given assignment :

		Machine		
		1	2	3
Job	1	5	7	9
	2	14	10	12
	3	15	13	16

8. (a) A and B play game in which each has three coins, a 5p, a 10p, and a 20p. Each player selects a coin without the knowledge of other choice. If the sum of coin is an odd amount, A wins B's coin : if the sum is even, B wins A's coin. Find the best strategy for each player and the value of game.
- (b) Write short notes on PERT and CPM techniques.
9. Write notes on any two of the following :
- (a) Unbalanced Assignment Problem
- (b) Dominance Property in the solution of rectangular games.
- (c) Matrix minima method for solving transportation problem.

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