

1482/IV

B.C.A. (PART-II) EXAMINATION, 2022-23

(Fourth Semester)

Paper : II

BCA-402 : Operation Research

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) Describe the objective of Operations Research.
(b) What is meant by linear programming problem ?
(c) Define Assignment problem.
(d) What is two person zero sum game ?

SECTION - A

2. What is Operations Research ? State the areas of its applications.

3. A resourceful home decorator manufactures two types of lamps say A and B. Both lamps go through two technicians first a cutter, second a finisher.

Lamp A requires 2 hours of the cutter's time and 1 hour of the finisher's time. Lamp B requires 1 hour of cutter's time and 2 hours of finisher's time. The cutter has 104 hours and finisher 76 hours of available time each month. Profit on one lamp A is Rs. 6.00 and on one B lamp is Rs. 11.00. Assuming that he can sell all that, he produces, how many of each type of lamps should he manufacture to obtain the best return ?

4. Determine an initial basic feasible solution to the following transportation problem using North-West corner rule and Vogel's approximation method.

	Destination				Available	
	D ₁	D ₂	D ₃	D ₄		
Origin	O ₁	1	2	1	4	20
	O ₂	3	3	2	1	40
	O ₃	4	2	5	9	20
	O ₄	5	3	6	10	20
Requirement	20	40	30	10		

5. What is critical path ? State the necessary and sufficient conditions for the critical path. Can a project have multiple critical path ?

SECTION - B

6. (a) What do you understand by Graphical method ? Give its limitations.
 (b) Give a mathematical formulation of a transportation problem.
7. (a) Solve the following assignment problem

		Man			
		I	II	III	IV
Task	A	2	3	4	5
	B	4	5	6	7
	C	7	8	9	8
	D	3	5	8	4

- (b) Using rule of dominance, solve the game whose pay-off matrix is :

		B		
		I	II	III
A	I	-1	-2	8
	II	7	5	-1
	III	6	0	12

8. (a) Explain Hungarian method for solving an assignment problem.

- (b) A certain project is composed of mini activities whose time estimates are given below :

Activity	Duration
1 - 2	1
1 - 3	3
1 - 4	2
2 - 5	1
3 - 5	3
4 - 6	2
5 - 6	4
6 - 7	6
5 - 7	3

Draw the project network and find out the critical path.

9. Write notes on any two of the following :
- (a) Historical Development of OR.
 - (b) Simplex Method
 - (c) Main Components of LPP.

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BCA 402

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

(Fourth Semester)

Paper : II

BCA - 402 : Operation Research

Time : Three Hours]

[Maximum Marks : 70

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- 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
3. Discuss the historical back ground of OR.

Solve the following L.P.P.

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

$$\text{Subject to : } 20x + 50y \geq 4800$$

$$80x + 50y \geq 7200$$

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

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 :

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

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

$$x + y \geq 1$$

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

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 :
- Unbalanced Assignment Problem
 - Dominance Property in the solution of rectangular games.
 - Matrix minima method for solving transportation problem.

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