

**BBA (H) (5<sup>th</sup> Semester) Examinations, 2020**

**Subject: Operations Research**

**Paper: BBA-5.2**

**Time: 3 Hours**

**Full Marks: 80**

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**Group - A**

**Answer any six questions.**

5×6=30

1. What is Operations Research (OR)? Briefly explain its significance.
2. What do you understand by linear programming (LP)? What is an infeasible solution and how does it occur?
3. What is a redundant constraint? What does it imply? Does it affect the optimal solution to an LPP?
4. What is degeneracy in transportation problems? How is a transportation problem solved when demand and supply are not equal?
5. Give the mathematical formulation of an assignment problem. How does it differ from a transportation problem?
6. Briefly discuss the theory of dominance in the solution of rectangular games.
7. The demand pattern of the cake made in a bakery is as follows:  
No. of cakes demanded:    0     1     2     3     4     5  
Probability:                0.05   0.10   0.25   0.30   0.20   0.10  
If the preparation cost is Rs. 3 per unit and selling price is Rs. 4 per unit, how many cakes should the baker bake to maximize his profit?
8. Elucidate total, independent and free floats in the context of network analysis.

**Group -B**

**Answer any five questions.**

10×5=50

9. Discuss the applications and scope of Operations Research in modern management.
10. Using simplex method solve the following LPP:  
Maximize  $Z = 3x_1 + 4x_2 + x_3 + 7x_4$   
Subject to  
 $8x_1 + 3x_2 + 4x_3 + x_4 \leq 7$   
 $2x_1 + 6x_2 + x_3 + 5x_4 \leq 3$   
 $x_1 + 4x_2 + 5x_3 + 2x_4 \leq 8$   
 $x_1, x_2 \geq 0$
11. Goods have to be transported from sources  $S_1, S_2$  and  $S_3$  to destinations  $D_1, D_2$  and  $D_3$ . The transportation costs per unit, capacities of the sources and requirements of the destinations are given in the following table.

**Please Turn Over**

		Destinations			Supply
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	
Sources	S <sub>1</sub>	8	5	6	120
	S <sub>2</sub>	5	10	12	80
	S <sub>3</sub>	3	9	10	80
Demand		150	80	50	

12. (a) Make a Comparison between the assignment model and the transportation model.  
 (b) A department has five employees with five jobs to be performed. The time (in hours) each man will take to perform each job is given in the effectiveness matrix below.

		Employees				
		I	II	III	IV	V
Jobs	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

13. (a) What is a game in game theory? What do you understand by 'zero-sum' in this context?  
 (b) Determine the best strategies for players A and B for the game with following pay-off matrix:

Player A	Player B		
	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
A <sub>1</sub>	-1	2	-2
A <sub>2</sub>	6	4	-6

Also determine the value of the game.

14. (a) What do you understand by decision theory? In this context define the following terms:  
 (i) Decision alternatives  
 (ii) Nature of states  
 (iii) Payoff  
 (b) Distinguish between CPM and PERT.
15. Write short notes on any two:  
 (a) Advantages of OR models  
 (b) North-West Corner Method  
 (c) Time estimates in PERT