

BBA (H) (5th Semester) Examinations, 2021**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. Discuss the scope of operations research in modern management.
2. What are the special cases in linear programming? Briefly explain each case.
3. What are the major assumptions in a linear programming model? How far are they valid?
4. Explain the Vogel's Approximation Method (VAM) of obtaining initial feasible solution to a transportation problem.
5. Construct the assignment tableau and also give its mathematical formulation.
6. Briefly state the business applications of the game theory technique.
7. Explain the steps in making a decision tree. How is it used?
8. In project management, what do you understand by earliest finish time and latest finish time? How are they calculated? Explain your answer with an example.

Group -B**Answer any five questions.**

10×5=50

9. Explain the phases and methodology of Operations Research.
10. A firm plans to purchase at least 200 quintals of scrap containing high quality metal X and low-quality Metal Y. It decides that the scrap to be purchased must contain at least 100 quintals of X-metal and not more than 35 quintals of Y-metal. The firm can purchase the scrap from two suppliers (A and B) in unlimited quantities. The percentage of X and Y metals in terms of weight in the scrap supplied by A and it is given below.

Metals	Supplier A	Supplier B
X	25%	75%
Y	10%	20%

The price of A's scrap is Rs. 200 per quintal and that of B is Rs. 400 per quintal. Use the graphical method to determine the quantities that it should buy from the two suppliers so that the total cost is minimised.

11. Use simplex method to solve the following LP problem.

$$\text{Minimize } Z = 5x_1 + 3x_2$$

Subject to the constraints

$$2x_1 + 4x_2 \leq 12$$

$$2x_1 + 2x_2 = 10$$

$$5x_1 + 2x_2 \geq 10$$

and $x_1, x_2 \geq 0$

Please Turn Over

12. A transportation problem involves the following costs (in Rs.), supply, and demand:

From	To (cost)				Supply
	D ₁	D ₂	D ₃	D ₄	
S ₁	500	750	300	450	100
S ₂	650	800	400	600	180
S ₃	400	700	500	550	200
Demand	95	125	110	150	

Find the optimal solution of the transportation problem.

13. (a) Write down the mathematical model of the assignment problem.
 (b) What do you mean by 'Unbalanced Assignment Problems'? How do you solve such problems? Explain with an example.
14. (a) Define 'saddle point'. Is it necessary that a game should always possess a saddle point?
 (b) Determine the best strategies for players A and B for the game with following pay-off matrix:

Player A	Player B		
	B ₁	B ₂	B ₃
A ₁	-1	2	-2
A ₂	6	4	-6

Also determine the value of the game.

15. Write short notes on any two:
- Time estimates in PERT
 - Decision making under uncertainty
 - Degeneracy in linear programming
 - Critical Path Analysis