2023
B.A./B.Sc.
Fifth Semester
DISCIPLINE SPECIFIC ELECTIVE – 1
STATISTICS
Course Code: STD 5.11
(Operations Research)

Total Mark: 70   *Pass Mark: 28*
Time: 3 hours

Answer <u>five</u> questions, taking <u>one</u> from each unit.

UNIT–I

1. (a) What do you mean by operations research? Describe the main phases of operations research. 2+6=8
   (b) Solve the following linear programming problem (LPP) by graphical method: 6

   Max. $Z = 5x_1 + 8x_2$

   Subject to constraints

   $3x_1 + 2x_2 \leq 36$

   $x_1 + 2x_2 \leq 20$

   and $x_1, x_2 \geq 0$

2. (a) What do you mean by modelling in operations research? Explain the various models in operations research. 2+6=8
   (b) Solve the following linear programming problem (LPP) by graphical method: 6

   Max. $Z = 3x_1 + 5x_2$

   Subject to constraints

   $x_1 + 2x_2 \leq 2000$

   $x_1 + x_2 \leq 1500$

   $x_2 \leq 500$

   and $x_1, x_2 \geq 0$

UNIT–II

3. (a) Define transportation problem. What is the difference between balanced and unbalanced transportation problem? 1+2=3

(b) Describe the Vogel's approximation method of obtaining feasible solution to transportation problem. 4

(c) Explain in detail the steps for solving stepping stone method for obtaining feasible solution. 4

(d) Prove the necessary and sufficient condition for existence of feasible solution in a transportation problem. 3

4. (a) With usual notation define assignment problem and give its mathematical formulation. 1+3=4

(b) Describe the north-west corner rule method of obtaining feasible solution. 3

(c) Explain the steps involved in Hungarian assignment method. 4

(d) Prove that the number of basic variables in transportation at any stage must be $(m+n-1)$. 3

UNIT–III

5. (a) Write down the characteristics of game theory. 4

(b) Describe the method for solving a 2×2 game without a saddle point. 6

(c) Solve the following game whose payoff matrix is given a s follows: 4

	Player B	
Player A	10	7
	8	9

6. (a) Define the following: 2×2=4

   (i) Competitive game and its properties

   (ii) Strategies of a game

(b) Show that a game can be formulated as a linear programming problem (LPP). 7

(c) Solve the following game with saddle point. 3

Player B

	I	II	III	IV	V
I	0	2	2	7	5
II	5	4	3	4	4
III	−2	−1	2	0	8
IV	7	5	−2	4	−4

Player A (label on left side, rows I–IV)

UNIT–IV

7. (a) Write briefly about direct inventory and indirect inventory. What are the five types of inventory models? 2+5=7

(b) What are the controlled and uncontrolled variables in inventory management? 4

(c) Write a note on ABC analysis. 3

8. (a) What is inventory problem? Why is inventory maintained? 2+3=5

(b) Write briefly about the economic lot size system with uniform demand in the EOQ model without shortage. Describe the algebraic method for determining the optimum inventory cost for this model. 2+4=6

(c) Write a note on VED analysis. 3

UNIT–V

9. (a) Briefly write about programme evaluation and review technique (PERT) and critical path method (CPM). Write down the basic steps for writing a network. 2+2+3=7

(b) Draw the diagrams of bar chart and milestone chart. 3

(c) Differentiate between PERT and CPM. 4

10. (a) Illustrate the basic rules while drawing a network. 6

(b) Write a note on different time estimates in PERT. What probability distribution is closely associated with these three time estimates? 3+1=4

(c) What are the D.R. Fulkerson's rule for numbering of events in PERT? 4

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