2021
B.A./B.Sc.
Fifth Semester
DSE – 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 understand by operations research? Explain the historical background on how operations research has been developed.   2+5=7
    (b) Solve graphically the following LPP   7

$$\text{Maximize } P = 8x_1 + 7x_2$$
$$\text{such that } 3x_1 + x_2 \leq 66$$
$$x_1 + x_2 \leq 45$$
$$x_1 \leq 20, x_2 \leq 40$$
$$\text{and} \quad x_1, x_2 \geq 0$$

2. (a) Explain the main phases of operations research.   7
    (b) Solve the following LPP by simplex method: 7

$$\text{Maximize} \qquad 3x_1 + 5x_2 + 4x_3$$
$$\text{subject to the constraints } 2x_1 + 3x_2 \leq 8$$
$$2x_1 + 5x_3 \leq 10$$
$$3x_1 + 2x_2 + 4x_3 \leq 15$$
$$\text{and} \qquad x_1, x_2, x_3 \geq 0$$

UNIT–II

3. (a) What is a transportation problem? Write the mathematical formulation of a transportation problem.   3+4=7

   (b) Solve the following transportation problem by North-West corner rule and obtain the total cost of transportation (the figures in bracket in each cell denotes the cost per unit of transportation):   7

Warehouse → Factory ↓	W_1	W_2	W_3	W_4	Factory Capacity
F_1	(19)	(30)	(50)	(10)	7
F_2	(70)	(30)	(40)	(60)	9
F_3	(40)	(8)	(70)	(20)	18
Warehouse Requirement	5	8	7	14	

4. (a) What is an assignment problem? Explain it in mathematical formulation.   2+4=6

   (b) Solve the following assignment problem by Hungarian method and determine the optimal job assignment and cost of assignments.   8

		Machine				
		A	B	C	D	E
	1	10	9	7	3	9
	2	3	7	5	5	10
Job	3	3	8	6	8	9
	4	2	2	2	2	6
	5	8	7	4	4	10

UNIT–III

5. (a) What is game theory? Who were the persons behind the development of game theory? What are pure strategy and mixed strategy games?   1+1+4=6

(b) What are the steps involved in solving a game? What are the two general rules of dominance? Find the solution of the game with saddle point whose payoff matrix is given below: 2+2+4=8

		B				
		I	II	III	IV	V
A	I	-4	-2	-2	3	1
	II	1	0	-1	0	0
	III	-6	-5	-2	-4	4
	IV	3	1	-6	0	-8

6. (a) What is minimax principle? What are the assumptions made to define a game? How is the game theory classified? 1+4+2=7

(b) Illustrate the solutions to 2×2 game without saddle point. Solve the following game: 5+2=7

		Player B		
		I	II	III
Player A	I	1	9	2
	II	8	5	4

UNIT–IV

7. (a) Define inventory and inventory control. Write a short note on different types of inventories. 2+6=8

(b) Explain p-system, q-system and pq-system of inventory control. 6

8. (a) What are the different costs involved with inventory control? Explain each of them. 7

(b) Write a note on EOQ model. The demand for an item is 8000 units per annum and the unit cost is Re.1/-. Inventory carrying charges of 20% of average inventory cost and ordering cost is Rs.12.50 per order. Calculate optimal order quantity, optimal order time, optimal inventory cost and number of orders. 2+5=7

UNIT–V

9. (a) What are the two techniques in planning and scheduling the large

projects? Explain each of them.   2+6=8
   (b) Explain optimistic time, pessimistic time and likely time.   6

10. (a) List out all the activities involved in a project.   4
   (b) Write the network for the given project and find the project
     completion time.   10

Activities		Days		
I	J	T_O	T_L	T_P
10	20	5	12	17
10	30	8	10	13
10	40	9	11	12
20	30	5	8	9
20	50	9	11	13
40	60	14	18	22
30	70	21	25	30
60	70	8	13	17
60	80	14	17	21
70	80	6	9	12

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