OPERATION RESEARCH

Paper–MATH-302-F

Time allowed : 3 hours] [*Maximum marks : 100*

Note : Question no. 1 is compulsory. Attempt total five questions with selecting one question from each unit. All questions carry equal marks.

Unit-I

1. (a) Define Operations Research. 2.5×8

(b) Write the dual of the problem.

Maximize $Z = 2x_1 + 4x_2$, subject to $2x_1 + x_2 \leq 18$, $x_1 + 2x_2 = 26$, $3x_1 + 2x_2 \geq 30$, $x_1, x_2 > 0$

(c) What are different methods of solving assignment problem?

(d) Discuss basic elements of waiting line.

(e) What do you understand by channel capacity efficiency?

(f) What is a replacement problem?

(g) Discuss encoding process in communication system?

(h) Discuss some of the important factors affecting reliability.

(b) What is the significance of the bath tub curve for hardware reliability?

Unit-V

8. (a) State and prove uniqueness theorem.

(b) Define the different entropies for a two part communication system and calculate them for a discrete channel with independent input-output.

9. (a) A cafeteria can seat a maximum of 50 persons. Customer arrives in a Poisson stream at the rate of 10 per hour and served one at a time at the rate of 12 per hour. Determine :

(i) What is the probability that an arriving customer will not eat in the cafeteria because it is full?

(ii) What is the probability that an arriving customer will be served immediately?

(iii) What will be the waiting time in the system?

(b) How to measure the capacity of a telecommunication channel for measurement of information.

Unit-II

2. (a) Explain the principles of modeling in operations research.

(b) Use the graphical method to solve the following LP problem.

Minimize $Z = 20x_1 + 10x_2$

Subject to the constraints

$x_1 + 2x_2 \leq 40$,
$3x_1 + x_2 \geq 30$,
$4x_1 + 3x_2 \geq 60$,
$x_1, x_2 \geq 0$

3. Use simplex method to solve the following problem :

Maximize $Z = 6x_1 + 4x_2$

Subject to : $-4x_1 + 5x_2 \leq 10$
$3x_1 + 2x_2 \leq 9$
$8x_1 + 3x_2 \leq 12$
$x_1 \geq 0, \ x_2 \geq 0$

Unit-III

4. (a) Solve the following minimization transportation problem

	W_1	W_2	W_3	available
F_1	16	19	12	14
F_2	22	13	19	16
F_3	14	28	8	12
Required	10	15	17	

(b) Find the optimum assignment for the following Cost-matrix :

		Salesman			
Areas		1	2	3	4
	A_1	11	17	8	16
	A_2	9	7	12	10
	A_3	13	16	15	12
	A_4	14	10	12	11

5. (a) Write short notes on the following :
(i) Group Replacement
(ii) Staffing problem

(b) The cost of a machine is Rs 6100 and its scrap value is only Rs 100. The maintenance costs are found from experience to be as follows :

Year :	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.) :	100	250	400	600	900	1250	1600	2000

When should be machine be replaced ?

Unit-IV

6. (a) Explain reliability of series system and parallel system. Also, explain Series-Parallel Systems.

(b) Write short notes on :
(i) Standby redundant arrangement
(ii) Methods of assuring reliability

7. (a) Define Software reliability and write short on Software reliability improvement techniques.