(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.

B.Tech 6th Semester (IT) F-Scheme Examination, May–2017

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 $2x_1 + x_2 \le 18$, $x_1 + 2x_2 = 26$, $3x_1 + 2x_2 \ge 30$, $x_1, x_2 > 0$

(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.

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		
		1	2	3	4
Areas	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.