

Roll No.

24478

**B. Tech. 7th Semester (ME)
(Common with Special Chance
Examination – December, 2019
OPERATION RESEARCH**

Paper : ME-405-F

[Maximum Marks : 100

Time : Three Hours]

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*.

1. (a) Explain standard form of linear programming problem. $5 \times 4 = 20$
- (b) Explain North-West corner rule for finding initial solution for a transportation problem.
- (c) Explain the term PERT.
- (d) What is simulation ? Describe its advantages in solving the problems.

SECTION – A

2. (a) Define operation research. What is the role of operation research in decision making ? 10

24478-4400-(P-3)(Q-9)(19)

P. T. O.

(b) Discuss the various phases in solving an operation research problem. 10

3. Maximize $z = 3x_1 - x_2$, subject to constraints:

$$2x_1 + x_2 \leq 2,$$

$$x_1 + 3x_2 \geq 3,$$

$$x_2 \leq 4,$$

$$x_1, x_2 \geq 0$$

SECTION - B

4. Find the optimum solution to the following transportation problem in which the cells contain the transportation cost in rupees. 20

	W_1	W_2	W_3	W_4	W_5	Available
F_1	7	6	4	5	9	40
F_2	8	5	6	7	8	30
F_3	6	8	9	6	5	20
F_4	5	7	7	8	6	10
Required	30	30	15	20	5	100

5. (a) Explain the primal dual relationships. 5

(b) Using dual simplex method, maximize $z = -3x_1 - x_2$, subject to constraints: 15

$$x_1 + x_2 \geq 1,$$

$$2x_1 + 3x_2 \geq 2,$$

$$x_1, x_2 \geq 0$$

SECTION - C

6. (a) Discuss basic elements of waiting line situations. 10

(b) Describe the applications of queuing theory. 10

7. A project schedule has the following characteristics: 20

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Time	2	8	10	6	3	3	7	5	2	8

- (a) Construct the network.
- (b) Compute earliest occurrence time and latest occurrence time for each event.
- (c) Find the critical path.
- (d) Determine total, free and independent floats.

SECTION - D

8. (a) Explain Monte Carlo method and its applications in industries. 10

(b) Using mixed congruential method, generate a sequence of five three digit random numbers such that:

$$x_{n+1} = (21x_n + 53)(\text{modulo } 100) \text{ and } x_0 = 46.$$

9. (a) Describe the steps involved in the process of decision making. 10

(b) What is decision making under uncertainty? Name commonly used criteria for solving problems under condition of uncertainty. Explain any two of them. 10