Roll No. ....

24478

B. Tech. 7th Semester (ME)
Examination – May, 2019

OPERATION RESEARCH

Paper : ME-405-F

Time : Three Hours] [Maximum Marks : 100

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 : Question No. 1 is *compulsory*. Attempt total *five* questions with selecting *one* question from each Section. All questions carry equal marks.

1. (a) Define Operation Research and discuss its scope.

4×5

   (b) Distinguish between PERT and CPM. What is critical path ?

   (c) Describe a model for the process of decision making.

P. T. O.

   (d) What do you mean by dual of a problem ? Give its application.

   (e) Discuss the concept of queuing theory.

SECTION – A

2. (a) Discuss the major applications of Operation Research in Business and Industry. Also Explain the Principles of modeling in operations research.

   (b) Solve by simplex method :

   Minimize $Z = x - 3y + 2z$

   Subject to :

   $$3x - y + 2x \leq 7$$

   $$-2x + 4y \leq 12$$

   $$-4x + 3y + 8z \leq 10$$

   $$x, y, z \geq 0$$

3. (a) Solve by graphical method.

   Minimize $Z = 2x_1 + 3x_2$

   Subject to the constraints

   $$x_1 + x_2 \leq 4,$$

   $$6x_1 + 2x_2 \geq 8,$$

$$x_1 - 5x_2 \geq 4,$$

$$0 \leq x_1 \leq 3;$$

$$0 \leq x_2 \leq 3$$

(b) Use Big-M method to Solve :

Maximize $Z = 3x_1 - x_2$

Subject to :

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

$$x_1 + 3x_2 \leq 3,$$

$$x_2 \leq 4,$$

$$x_1, x_2 \geq 0$$

SECTION – B

4. (a) Enumerate the steps in MODI method to check optimality in transportation problems.   **6**

(b) Solve the following the LPP by using its dual :   **14**

Maximize $Z = 5x_1 - 2x_2 + 3x_3$

Subject to :

$$2x_1 + 2x_2 - x_3 > 2$$

$$3x_1 - 4x_2 \leq 3$$

$$x_1 + 3x_2 \leq 5$$

$$x_1, x_2, x_3 \geq 0$$

5. (a) Explain the concept of Degeneracy. How do you solve a degenerate transportation problem ?   **6**

(b) Solve the following assignment problem for optimal solution. Figure in the matrix indicate profits :   **14**

	A	B	C	D	E
1	5	11	10	12	4
2	2	4	6	3	5
3	3	12	5	14	6
4	6	14	4	11	7
5	7	9	8	12	5

SECTION – C

6. (a) Discuss the various parameters for Queuing problem.

(b) A cafeteria can seat a maximum of 50 persons. Customers arrive in a Poisson stream at the rate of 10 per hour and are 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 ?

7. A project manager has listed down the activities of a project as follows :

Activity	Predecessor	Time
A	–	5
B	–	7
C	A	5
D	B	5
E	A	6
F	CD	8
G	CDE	6
H	F	2