

**B.Tech 7th Semester (ME) F-Scheme Examination,
May-2017**

OPERATION RESEARCH

Paper-ME-405-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt five questions in total, selecting one question from each section. Question no. 1 is compulsory.

1. (a) List different types of models used in operations Research.
- (b) Construct the dual of the problem
 Minimize $Z = 3x_1 - 2x_2 + 4x_3$,
 Subject to $3x_1 + 5x_2 + 4x_3 \geq 7$,
 $6x_1 + x_2 + 3x_3 \geq 4$,
 $7x_1 - 2x_2 - x_3 \leq 10$,
 $x_1 - 2x_2 + 5x_3 \geq 3$,
 $4x_1 + 7x_2 - 2x_3 \geq 2$,
 $x_1, x_2, x_3 \geq 0$.
- (c) Give some applications of queueing theory in industries.
- (d) What is simulation ?

Section-A

2. What is the role of operations research in decision making explain in detail ?
3. Food X contains 6 units of Vitamin A per gram and 7 units of Vitamin B per gram and costs 12 paise per gram. Food Y contains 8 units of Vitamin A per gram 12 units of Vitamin B per gram and costs 20 paise per gram. The daily minimum requirement of vitamin A and Vitamin B is 100 units and 120 units respectively. Find the minimum cost of product mix by the Big-M method.

Section-B

4. What is degeneracy in transportation problem ? How is it resolved ?
5. Solve the problem :
 Maximize $Z = 5x_1 + 12x_2 + 4x_3$
 subject to $x_1 + 2x_2 + x_3 \leq 5$,
 $2x_1 - x_2 + 3x_3 = 2$,
 $x_1, x_2, x_3 \geq 0$.
 and (i) discuss the effect of changing the

requirement vector from $\begin{bmatrix} 5 \\ 2 \end{bmatrix}$ to $\begin{bmatrix} 7 \\ 2 \end{bmatrix}$ on the optimum solution.

- (ii) Which resource should be increased and how much to achieve the best marginal increase in the value of the objective function ?

Section-C

6. Trains arrive at the yard every 15 minutes and the service time is 33 minutes. If the line capacity of the yard is limited to 4 trains, find (i) the probability that the yard is empty, (ii) the average number of trains in the system.
7. (a) Define float. Explain its different types and their importance.
 (b) Explain crashing of project networks.

Section-D

8. How can you use Monte-Carlo simulation for industrial problems ? Explain with suitable examples.
9. What is decision-making ? Explain and differentiate this under the conditions of certainty and uncertainty in detail.