Section–D

8. Explain Monte-Carlo method. Give its use in industrial problems.

9. (a) What are the different environments in which decisions are made ?

   (b) What is the significance of utility as a basis of decision-making ?

B.Tech. 7th Semester (ME) Examination,
December–2015

OPERATIONS 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) What is operations research ?

   (b) Construct the dual of the problem

   Maximize $Z = 3x_1 + 17x_2 + 9x_3$,

   subject to $x_1 - x_2 + x_3 \geq 3$,

   $-3x_1 + 2x_3 \leq 1$,

   $x_1, x_2, x_3 \geq 0$.

   (c) Explain the queue parameters.

   (d) What are the reasons for using simulation.

Section–A

2. Describe Applicatons of operations research in industry.

3. Maximize $Z = 3x_1 - x_2$,

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

$x_1 + 3x_2 \geq 3$,

$x_2 \leq 4$,

$x_1, x_2 \geq 0$,

by using Big-M method.

Section–B

4. What do you understand by a balanced and an unbalanced transportation problem ? How an unbalanced problem is tackled ?

5. A company wants to produce three products A, B and C. The unit profits on these products are Rs. 4, Rs. 6 and Rs. 2 respectively. These products require two types of resources– man-power and material. The following L.P. model is formulated for determining the optimal product mix :

Maximize $Z = 4x_1 + 6x_2 + 2x_3$,

subject to $x_1 + x_2 + x_3 \leq 3$, (man power)

$x_1 + 4x_2 + 7x_3 \leq 9$, (material)

$x_1, x_2, x_3 \geq 0$,

where x_1, x_2, x_3 are the number of products A, B and C produced.

(i) Find the optimal product mix and the corresponding profit to the company.

(ii) Find the range on the values of non-basic variable coefficient C_3 such that the current optimal product mix remains optimal.

(iii) Find the effect of charging the objective function to $Z = 2x_1 + 8x_2 + 4x_3$ on the current optimal product mix.

Section–C

6. If for a period of 2 hours in a day (8 A.M. to 10 A.M.) trains arrive at the yard every 20 minutes but the service time is 36 minutes, calculate for this period

(i) the probability that the yard is empty,

(ii) the average number of trains at the yard.

Line capacity of the yard is limited to 4 trains only.

7. (a) Explain the rules of network construction.

(b) Discuss the critical path method.