Code: ME6T3

III B.Tech-II Semester–Regular/Supplementary Examinations–March 2019

OPERATIONS RESEARCH
(MECHANICAL ENGINEERING)

Duration: 3 hours   Max. Marks: 70
PART – A
Answer *all* the questions.   All questions carry equal marks
$$11x\ 2 = 22\ M$$

1. a) State the standard form of LPP.

   b) Define Artificial variable.

   c) What is degeneracy in LPP?

   d) Define unbalanced transportation problem.

   e) State the assignment problem.

   f) Define Two – person, Zero – sum game.

   g) Define Economic Order Quantity.

   h) Name the types of Replacement models.

   i) Write any two applications of Simulation

   j) What is Dynamic Programming?

   k) Explain $(M \mid M \mid 1) : (\infty \mid FCFS)$ queuing model.

PART – B

Answer any *THREE* questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. Solve the following LPP by Two- Phase Simplex method.

   Maximize $Z = 2x_1 + 2x_2 - 10x_3$

   Subject to the constraints: $2x_1 + 20x_2 + 4x_3 \leq 15$

   $$6x_1 + 20x_2 + 4x_3 = 20$$

   and $x_1, x_2, x_3 \geq 0$ 16 M

3. Find the initial basic feasible solution for the following transportation problem by VAM and Optimal solution by U-V method.   16 M

Warehouse → Factory ↓	W_1	W_2	W_3	W_4	Capacity
F_1	21	16	25	13	11
F_2	17	18	14	23	13
F_3	32	27	18	41	19
Requirement	6	10	12	15	43

4. For a 2x2 person zero sum game without any saddle point having the pay off matrix for Player A as follows, find optimum mixed strategies S_A and S_B and the value of the game.   16 M

$$\begin{array}{cc} & \text{Player B} \\ & \begin{array}{cc} B_1 & B_2 \end{array} \\ \text{Player A} \quad \begin{array}{c} A_1 \\ A_2 \end{array} & \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \end{array}$$

5. a) Explain the various costs that are involved in the inventory control.　　　　　　　　　　　　　　　　8 M

   b) A company uses annually 12000 units of a raw material costing Rs.1.25 per unit. Placing each order costs 45 paise and the carrying costs are 15 % per year per unit of the average inventory. Find the economic order quantity and total minimum inventory cost.　　　　　　　8 M

6. a) Maximize $Z = y_1^2 + y_2^2 + y_3^2$
   Subjected to $y_1 + y_2 + y_3 = 15$
   $$y_1, \ y_2, \ y_3 \geq 0$$
   Using Bellman's principle of optimality　　　　10 M

   b) List out the advantages and disadvantages of Simulation Languages.　　　　　　　　　　　　　　6 M