2054

B.E. (Mechanical Engineering)
Eighth Semester
MEC-802: Operation Research

Max. Marks: 50

Time allowed: 3 Hours

NOTE: Attempt _five_ questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

Q1. (a) What do you understand by proportionality and continuity in L.P. models?   2*5=10

(b) Define slack variable and what is its physical significance?

(c) Explain the following customer behavior: Balking, Reneging and Jockeying.

(d) Why 3-time estimate is used in PERT model?

(e) Write the difference between iconic model and schematic model.

Section A

Q2. (a) Discuss various phases in solving an OR problem.   5

(b) Explain approximations in OR models. Also, discuss characteristics of a good model.   5

Q3. Solve the following LP problem using simplex method: 10

$$\text{Maximize} \quad Z = 2x_1 + x_2$$
$$\text{subject to} \quad 4x_1 + 3x_2 \leq 12,$$
$$4x_1 + x_2 \leq 8,$$
$$4x_1 - x_2 \leq 8,$$
$$\text{and} \quad x_1 \geq 0, \; x_2 \geq 0$$

Q4. Use Big-M method to Minimize $Z = 2x_1 + 3x_2$ 10

$$\text{Subject to} \quad x_1 + x_2 \geq 5,$$
$$x_1 + 2x_2 \geq 6,$$
$$\text{and} \; x_1 \geq 0, \; x_2 \geq 0$$

Section B

Q5. Solve the following assignment problem using Hungarian method.   10
The matrix below shows the time (in hours) that each employee takes to perform each job.

	E_1	E_2	E_3	E_4
J_1	12	30	21	15
J_2	18	33	9	31
J_3	44	25	24	21
J_4	23	30	28	14

Q6. Data pertaining to requirement at distribution centres, production capacities of factories and cost of transportation (in Rs. per unit) is given in the following matrix. Find the optimal solution of the problem.   10

	C_1	C_2	C_3	C_4	Capacity
F_1	6	5	8	8	30
F_2	5	11	9	7	40
F_3	8	9	7	13	50
Requirement	35	28	32	25	

Q7. A project has following activities with their duration: 10

	Activity	A	B	C	D	E	F	G
(i)	Duration	3	6	2	5	2	7	4
(ii)	Immediate Predecessor	--	--	--	A	C	A	B,D,E

Draw a network to represent the project and determine the critical path.

Evaluate the total float, free float and independent float of each activity.

x-x-x