[07 – 2221]

II/IV B.Tech. DEGREE EXAMINATION.

Second Semester

Computer Science and Engineering

OPERATIONS RESEARCH

(With effective from the admitted batch of 2010–2011)

(Common with Dual Degree)

Time : Three hours Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

Answer all parts of any question at one place.

1. (a) Describe the applications of O.R. techniques in brief.

   (b) Write at least three applications in the area of linear programming.

   (c) What is infeasible solution? How is it identified in the simplex table?

   (d) Define an artificial variable. Explain its use in the linear programming.

(e) What is transportation problem?

(f) Describe the basic characteristics of an inventory system.

(g) Explain the concept of value of a game.

(h) Explain various basic steps in PERT/CPM technique.

2. (a) Solve the following LPP by Simplex method.

Maximize $z = 2x_1 + x_2$

Subject to :

$$4x_1 + 3x_2 \le 12$$
$$4x_1 + x_2 \le 8$$
$$4x_1 - x_2 \le 8$$

and $x_1, x_2 \ge 0$.

(b) Solve the following LPP by artificial variable technique.

Minimize $z = 4x_1 + 3x_2$

Subject to :

$$2x_1 + x_2 \ge 10$$
$$-3x_1 + 2x_2 \le 6$$
$$x_1 + x_2 \ge 6$$

and $x_1 \ge 0; x_2 \ge 0$.

3. (a) Solve the following LPP by two-phase method.

Minimize $z = 12x_1 + 18x_2 + 15x_3$

Subject to :

$$4x_1 + 8x_2 + 6x_3 \geq 64$$
$$3x_1 + 6x_2 + 12x_3 \geq 96$$
$$x_1, x_2, x_3 \geq 0.$$

(b) Solve the following LPP by using dual problem.

Maximize $z = 5x_1 + 2x_2 + 3x_3$

Subject to :

$$x_1 + 5x_2 + 2x_3 = 30$$
$$x_1 - 5x_2 - 6x_3 \leq 40$$
$$x_1, x_2, x_3 \geq 0.$$

4. (a) Consider the following transportation problem with cell entries denoting unit costs.

	To			Availability
From	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	14
Requirement	7	9	18	34

Find an optimal solution by finding the initial basic feasible solution using the Vogel's approximation method.

(b) Solve the following assignment problem using the Hungarian algorithm.

		Jobs				
		I	II	III	IV	V
	A	45	30	65	40	55
	B	50	30	25	60	30
Machines	C	25	20	15	20	40
	D	35	25	30	30	20
	E	80	60	70	70	50

5. (a) What is the need for integer programming? Give the examples in which we needed integer solution values.

(b) Using Branch and Bound technique find the integer solution (optional) to the following linear programming problem.

Maximize $z = 10x_1 + 20x_2$

Subject to :

$6x_1 + 18x_2 \geq 48$

$x_1 + x_2 \geq 12$

and $x_1, x_2 \geq 0$ and integers.

6. (a) Derive economic order quantity model for an inventory problem, when shortages of costs are not allowed.

(b) In a certain manufacturing company the annual requirement is 24 units, the supply is instantaneous and shortage per units the cost of order each time is Rs. 350. The cost of carrying inventory is Rs. 0.10 per unit per month. The cost of shortage is Rs. 0.12 per unit per month. Find the economic quantities to be procured and the total cost of inventory in such case.

7. A project has the following time schedule :

Activity :	1-2	1-3	2-4	3-4	3-5	4-9	5-6
Time in weeks :	4	1	1	1	6	5	4
Activity :	5-7	6-8	7-8	8-9	8-10	9-10	
Time in weeks :	8	1	2	1	8	7	

Construct PERT network, critical path and its duration.

8. (a) Explain forward and backward recursion dynamic programming.

(b) Reduce the following two person zero sum game to 2 × 2 order and obtain the optimal strategies for each player and the value of the game.

Player B

		B_1	B_2	B_3	B_4
	A_1	3	2	4	0
Player A	A_2	3	4	2	4
	A_3	4	2	4	0
	A_4	0	4	0	8