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II/IV B.Tech. DEGREE EXAMINATION.

Second Semester

Computer Science and Engineering

OPERATIONS RESEARCH

(Effective from the admitted batch of 2010–2011)

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.   Write short notes on the following :

(a) Artificial variables

(b) Two phase method

(c) Slack variables

(d) Degeneracy

(e) North West corner rule

(f) Mixed strategy

(g) Critical path.

2. (a) Describe the applications of O.R. Techniques in brief.

(b) Solve the following LPP using Simplex method.

Minimize $z = x_1 - 3x_2 + 2x_3$

Subject to

$$3x_1 - x_2 + 2x_3 \leq 7$$
$$-2x_1 + 4x_2 \leq 12$$
$$-4x_1 + 3x_2 + 8x_3 \leq 10$$
$$x_1, x_2, x_3 \geq 0.$$

3. (a) Using dual Simplex method, solve following L.P.P.

Minimize $z = 2x_1 + 2x_2 + 4x_3$

Subject to

$$2x_1 + 3x_2 + 5x_3 \geq 2$$
$$3x_1 + x_2 + 7x_3 \leq 3$$
$$x_1 + 4x_2 + 6x_3 \leq 5$$
$$x_1, x_2, x_3 \geq 0.$$

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(b) Solve by using Big-M method

Minimize $z = 5x_1 + 6x_2$

Subject to

$2x_1 + 5x_2 \geq 1500$

$3x_1 + x_2 \geq 1200$

$x_1, x_2 \geq 0.$

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

From	To			Availability
	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.

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

Jobs

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

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

(b) Use Branch and Bound algorithm solve the following integer program (IPP).

Maximize $z = 7x_1 + 9x_2$

Subject to

$$-x_1 + 3x_2 \leq 6$$
$$7x_1 + x_2 \leq 35$$
$$x_1, x_2 \geq 0 \text{ and are integers.}$$

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6. (a) Explain Forward and backward recursion dynamic programming.

   (b) Consider the game having following pay off table. Determine the optimal strategy for each player.

Strategy	Player			
	1	2	3	4
Player 1	2	-3	-1	1
2	-1	1	-2	2
3	-1	2	-1	3

7. (a) What are the differences between CPM and PERT and explain briefly.

   (b) The utility data for a network are given below. Determine the critical path.

   Activity :   0-1   1-2   1-3   2-4   2-5

   Duration :   2   8   10   6   3

   Activity :   3-4   3-6   4-7   5-7   6-7

   Duration :   3   7   5   2   8

8. (a) Explain clearly the various costs that are involved in inventory problems. How they are interrelated?

(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.