Code No. 6186 / O

FACULTY OF ENGINEERING

B. E. 4/4 (Mech./Prod.) I-Semester (**Old**) Examination, July 2010

Subject : **Operations Research**

Time : 3 Hours Max. Marks: 75

Note: Answer all questions from Part-A. Answer any Five questions from Part-B.

Part – A (25 Marks)

1. What is OR?
2. What are the limitations of LPP?
3. Define Duality
4. Explain Hungarian method of transportation model.
5. Explain Bellman's Principle of optimality
6. In net work analysis define Node and Critical path
7. What is unbalanced transporation problem?
8. Explain minimal spanning tree algorithm
9. Give characteristics of Games
10. Explain decision making under risk

PART – B Marks: 5 X 10 = 50

11 Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 paise per gram. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and costs 20 paise per gram. The daily minimum requirement of vitamin A and vitamin B is 100 units and 120 units respectively. Find the minimum cost of product mix by the simplex method?

12 Five wagons are available at stations 1, 2, 3, 4 and 5. These are required at five stations I, II, III, IV and V. The mileages between various stations are given by the table below. How should the wagons be transported so as to minimize the total mileage covered?

	I	II	III	IV	V
1	10	5	9	18	11
2	13	9	6	12	14
3	3	2	4	4	5
4	18	9	12	17	15
5	11	6	14	19	10

13 Solve the following integer linear programming problem

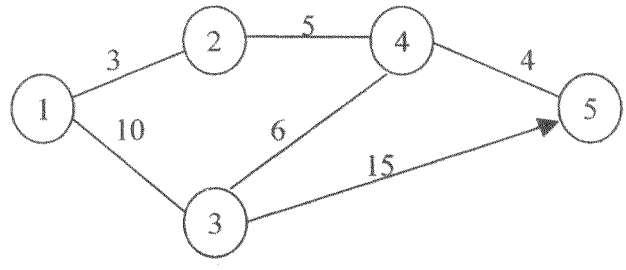
Maximize $Z = -4x_1 + 5x_2$,

Subject to $-3x_1 + x_2 \leq 6$,

$2x_1 + 4x_2 \leq 12$,

x_1, x_2 are non-negative integers.

14 For the network in the below figure, find the shortest routes between every two nodes. The distances (in miles) are given on the arcs. Arc(3,5) is directional so that no traffic is allowed from node 5 to node 3. all the other arcs allow traffic in both directions.



15 A business man has two independent investments A and B available to him but he lacks the capital to undertake both of them simultaneously. He can choose to take A first and then stop, or if A is successful then take B, or vice versa. The probability of success for A is 0.7 while for B it is 0.4. Both Investments require an initial capital outlay of Rs. 2,000; and both return nothing if the venture is unsuccessful. Successful completion of A will return Rs.3,000 (over cost), and successful completion of B will return Rs.5,000(over cost). Draw the decision tree and determine the best strategy

16 a) Solve the game whose pay off matrix

		B	
		B_1	B_2
	A_1	-6	7
	A_2	4	-5
A	A_3	-1	-2
	A_4	-2	5
	A_5	7	-6

b) There is congestion on the platform of a railway station. The trains arrive at the rate of 30 trains per day. The waiting time for any train to hump is exponentially distributed with an average of 36 minutes. Calculate the following:

i) The mean queue size.

ii) The probability that queue size exceeds 9.

17 Use Charne's penalty method to

Minimize $Z = 2x_1 + x_2$

Subject to the constraints:

$$3x_1 + x_2 = 3$$
$$4x_1 + 3x_2 \geq 6$$
$$x_1 + 2x_2 \leq 3$$
$$x_1, x_2 \geq 0.$$