(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

SIXTH SEMESTER [B.TECH] MAY-JUNE 2016

Paper Code: ETIT-302 Subject: Decision Science

Time: 3 Hours Maximum Marks: 75

Note: Attempt any five questions. All questions carry equal marks.

Q1 A company possesses two manufacturing plants, each of which can produce three products x, y and z from a common raw material. However, the proportions in which the products are produced are different in each plant and so are the plant's operation costs per hour. Data on production per hour and costs are given below, together with current orders in hand for each product.

Products			
	X	Y	Z
Plant A	2	4	3
Plant B	4	3	2
Orders on Hand	50	24	60

Operating Cost per hour
Rs
9
10

You are required to use the simplex method to find the number of production hours needed to fulfill the orders in hand at minimum cost.

Q2 What do you understand by measures of Central Tendency? Discuss them with examples giving their merits and demerits.

Q3 A physician purchases a particular vaccine on Monday of each week. The vaccine must be used within the week following, otherwise it becomes worthless. The vaccine costs Rs. 2 per dose and the physician charges Rs. 4 per dose. In the post 50 weeks the physician has administered the vaccine in the following quantities:

Doses per week:	20	25	40	60
Number of weeks:	5	15	25	5

Determine how many doses the physician should buy every week.

Q4 The ABC company is faced with four decision alternatives relating to investment in a capital expansion programme. Since these investment are made in future the company forseen different market conditions as expressed in the form of states of nature. The following table summarizes the decision alternatives the various states of nature and the rate of return associated with each state of nature:

Decision	States of Nature		
	θ_1	θ_2	θ_3
D_1	17%	15%	8%
D_2	18%	16%	9%
D_3	21%	14%	9%
D_4	19%	12%	10%

P.T.O.

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If the company has no information regarding the probability of the occurrence of the three states of nature, give the recommended decision for the decision criteria listed below:

(a) Maximax
(b) Maximin
(c) Minimax regret
(d) Rational/Laplace/Equally likely.

Q5 Explain the principle of dominance in Game Theory and solve the adjoining game:

$$\begin{bmatrix} 8 & 10 & 9 & 14 \\ 10 & 11 & 8 & 12 \\ 13 & 12 & 14 & 13 \end{bmatrix}$$

Q6 A supermarket has a single cashier. During the peak hours, customers arrive at a rate of 20 customers per hour. The average number of customers that can be processed by the cashier in 24 per hour. Calculate:

(a) The probability that the cashier is idle.
(b) The average number of customer in the queuing system
(c) The average time a customer spends in the system.
(d) The average number of customer in the queue.
(e) The average time a customer spends in the queue waiting for service.

Q7 Given the following information:

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration	2	8	10	6	3	3	7	5	2	8

(a) Draw the arrow diagram.
(b) Identify critical path and find the total project duration.
(c) Determine total, free and independent floats.

Q8 The departmental head has four subordinates and four tasks to be performed. The subordinates differ in efficiency and the tasks differ in their intrinsic difficulty. His estimates of the times each man would take to perform each task in given below in the matrix.

	Tasks			
Subordinates	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	19
D	19	26	24	10

How should the tasks be allocated to subordinates so as to minimize the total man-hours?

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