

END SEMESTER EXAMINATION

Quantitative Techniques: MTQT0100

Total Marks: 100

Duration: 3 hrs

1. Answer the following questions as directed:

[1X10=10]

- i. Feasible region in the set of points which satisfy (CO1)
 - a) The objective function
 - b) Some the given constraints
 - c) All of the given constraints
 - d) None of these

- ii. Objective function of a linear programming problem is (CO1)
 - a) a constraint
 - b) function to be optimized
 - c) A relation between the variables
 - d) None of these

- iii. What is the full form HAM? (CO2)

- iv. Name any one method which is used to obtain an optimal solution of transportation problem. (CO2)

- v. A two-person zero-sum game means that the (CO7)
 - a) the sum of losses to one player is equal to the sum of gains to other
 - b) the sum of losses to one player is not equal to the sum of gains to other
 - c) no any player gains or losses
 - d) none of these

- vi. Game theory models are classified by the (CO7)
 - a) number of players
 - b) sum of all payoffs
 - c) number of strategies
 - d) all of these

- vii. What is PERT analysis based on? (CO5)
 - a) Optimistic time
 - b) Pessimistic time
 - c) Most likely time

d) All of the above

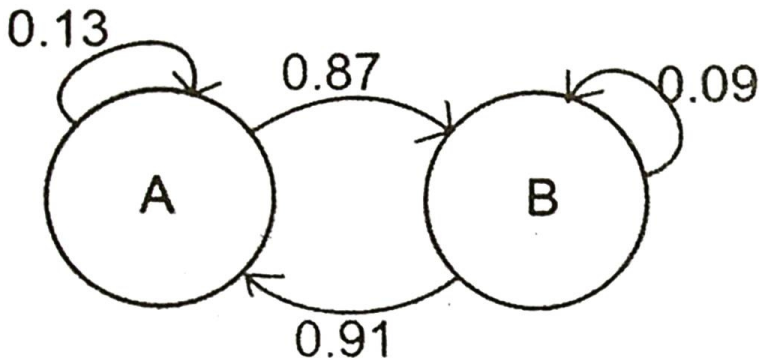
viii. What is the particular task performance in CPM known as? (CO5)

- a) Dummy
- b) Event
- c) Activity
- d) Contract

ix. Monte Carlo simulation gets its name from which of the following? (CO4)

- a) Data collection
- b) Model formulation
- c) Random-number assignment
- d) Analysis

x. Choose the correct transition matrix representing the Markov chain with state diagram shown below. (CO6)



- a) 0.13 0.87 0.91 0.09
- b) 0.13 0.91 0.87 0.09
- c) 0.13 0.91 0.09 0.87
- d) 0.87 0.09 0.13 0.91

2. Answer briefly any five of the following:

[3x5=15]

- i. What are the assumptions underlying Markov analysis? (CO6)
- ii. Explain Prisoner's dilemma. (CO7)
- iii. Give few applications of simulation. (CO4)

- iv. What are the conditions for forming a closed loop while using MODI method? (CO2)
- v. What do you understand by Markov Process? (CO6)
- vi. Explain the “saddle point” and “pure strategy”. (CO7)

3. Answer any five from the following: [7x5=35]

- i. A housewife buys three kinds of cereal C1, C2, C3. It is known that she never buys the same cereal on successive weeks. If she buys C1, then the next week she buys C2. However, if she buys C2 or C3 then the next week she is thrice as likely to buy C1 as the other brand. Obtain the transition matrix and determine how often she would buy each of the cereals in the long run. (CO4)
- ii. Maximize $z=6x_1 + 20x_2$
Subject to
 $2x_1 + x_2 \leq 32$
 $3x_1 + 4x_2 \leq 80$
 $x_1 \geq 8$
 $x_2 \geq 10$ (CO1)
- iii. Joe Klyne's three children, John, Karen, and Terri, want to earn some money to take care of personal expenses during a school trip to the local zoo. Mr. Klyne has chosen three chores for his children: mowing the lawn, painting the garage door, and washing the family cars. To avoid anticipated sibling competition, he asks them to submit (secret) bids for what they feel is fair pay for each of the three chores. The understanding is that all three children will abide by their father's decision as to who gets which chore. The table below summarizes the bids received. Based on this information, how should Mr. Klyne assign the chores? (CO3)

	Mow	Paint	Wash
John	₹15	₹10	₹9
Karen	₹9	₹15	₹10
Terri	₹10	₹12	₹8

iv. Reduce the following game into a 2*2 game. (CO7)

	B1	B2	B3
A1	12	-8	-2
A2	6	7	3
A3	-10	-6	2

- v. Activity A precedes D and E, activities B and D precede activity F, activity C precede activity G, activities B and G precede H and activities F and G precede activity I, draw the network . (CO5)

vi. Reduce the following game into a 2*2 game. (CO7)

	B1	B2	B3
A1	12	-8	-2
A2	6	7	3
A3	-10	-6	2

4. Answer **any four** of the following questions:

[10x4=40]

- i. The Funny Toys Company has four men available for work on four separate jobs. Only one man can work on any one job. The cost of assigning each man to each job is given in the following table. The objective is to assign men to jobs in such a way that the total cost of assignment is minimum. Find out the minimum cost after the correct assignment by HAM. (CO3)

Job				
Person	1	2	3	4
A	20	25	22	28
B	15	18	23	17
C	19	17	21	24
D	25	23	24	24

- ii. A small project consisting of eight activities has the following characteristics:(CO5)

Activity	Immediate predecessor	Most optimistic	Most likely	Most pessimistic
A	-	2	4	12
B	-	10	14	26
C	A	8	9	10
D	A	10	15	20
E	A	6	7.5	11
F	B,C	9	9	9
G	D	2	3.5	7
H	E,F,G	5	5	5

- a) Draw the PERT network
 b) Find out the expected completion time.

- c) If a 35-week deadline is imposed, what is the probability that the project will be finished within the time limit?

- iii. Solve the following 2x2 game algebraically: (CO7)

Player B	Player A	
	2	5
	8	4

- iv. Ashok chemicals manufacture two chemicals A and B which are sold to the manufacturers of soap and detergent. On the basis of next month's demand, the management has decided that the total production for chemicals A and B should be at least 350 kgs. Moreover, a major customer's order for 125 kg of product A must also be supplied. Product A require 2 hours of processing timer per kg and product B requires 1 hour of processing time per kg. For the coming month, 600 hours of processing is available. The company wants to meet the above requirements at the minimum total production cost. The production cost costs are ₹ 2 per kg for product A and ₹3 per kg for product B. The company wants to determine its optimal product A and total minimum cost relevant thereto: (CO1)
- Formulate above as an LPP.
 - Solve the problem with simplex method.
 - Does the problem have multiple optimal solutions? Why?
- v. A retired person wants to invest up to an amount of ₹ 30,000 in fixed income securities. His broker recommends investing in two bonds: Bond A yields 7% and bond B yields 10%. After some consideration, he decides to invest at most ₹12,000 in bond B and at least ₹6,000 in bond A. He also wants the amount invested in bond A to be at least equal to the amount invested in bond B. what should the broker recommend if the investor wants to maximize his returns on investment? Formulate the LPP and solve graphically. (CO1)
- vi. Suppose that new razor blades were introduced in the new market by three companies at the same time. When they introduced in the market by three companies at the same time. When they were introduced, each company had an equal share of the market , but during the first year the following changes took place : (CO6)
- Company A retained 90 % of its customers , lost 3% to B and 7 % to C
 - Company B retained 70%, lost 10 % to A and 20% to C.
 - Company C retained 80 % , lost 10 % to A and 10 % to B
- Assuming that no changes in the buying habit of customer occurs, what are the market shares of the three companies at the end of first year and second year?