Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UPES

End Semester Examination, Dec 2024

Course: Decision Making under Uncertainty **Semester: V**

Program: INT B.COM - MBA (E.COM) **Time : 03 hrs.**

Course Code: DSQT3002 **Max. Marks: 100**

Instructions:

SECTION A

10Qx2M=20Marks

S. No.		Marks	CO
Q1	i) Which of these techniques can help to address overfitting in Decision Trees? • A) Adding more leaves • B) Increasing tree depth • C) Pruning • D) Increasing node splits ii) What type of graph is used in Bayesian Networks? • A) Undirected Graph • B) Directed Acyclic Graph • C) Binary Tree • D) Multigraph iii) Which of the following uses probability distributions to represent uncertainty? • A) Bayesian Networks • B) Linear Regression • C) Neural Networks • D) K-means Clustering iv) In Monte Carlo simulations, convergence typically improves by: • A) Reducing the sample size • B) Increasing the sample size • C) Using deterministic sampling • D) Limiting the variables v) Which method is NOT typically used with Decision Trees?	**20**	**CO1**

	• A) Gradient Descent • B) Gini Index • C) Entropy • D) Pruning vi) Which metric is often used to decide the best split in a Decision Tree? • A) Mean Squared Error • B) Entropy or Gini index • C) Euclidean Distance • D) Accuracy vii) What is the primary purpose of a Bayesian Network? • A) Forecasting future trends • B) Representing and inferring probabilistic relationships • C) Image classification • D) Clustering data points viii) Which of these methods is used to handle missing data in Bayesian Networks? • A) Imputation • B) Inference using conditional probabilities • C) Discarding incomplete records • D) K-means clustering ix) What is the primary component in Monte Carlo simulations? • A) Random sampling • B) Gradient descent • C) Parameter tuning • D) Backpropagation x) The "Gini index" is used in Decision Trees to: • A) Measure model complexity • B) Evaluate split quality • C) Calculate model accuracy • D) Increase model depth		
SECTION B **4Qx5M= 20 Marks**			
Q2	In which cases can the monte Carlo simulation be used?	**5**	**CO2**
Q3	What is dynamic programming?	**5**	
Q4	What is Queuing Theory? Provide an example.	**5**	
Q5	Explain Chance-Constrained Stochastic Optimization with example.	**5**	
SECTION-C **3Qx10M=30 Marks**			

<table>
<tr><td>Q 6</td><td>A tutor is analyzing the relationship between the number of hours a student studies and their exam scores. Data from recent students shows:
Student Study Hours Exam Score
1 5 60
2 7 68
3 10 75
4 12 80
5 15 90
Question: Calculate the slope of the regression line to determine how much a student's exam score is expected to increase with each additional hour spent studying.</td><td>10</td><td rowspan="3">CO3</td></tr>
<tr><td>Q7</td><td>a).Explain different Optimal financial hedging strategies in detail.

Or

b). In capital budgeting, when projects have uncertain Net Present Values (NPVs) and uncertain capital usage, decision-making becomes complex. Provide a structured approach to handle such situations.</td><td>10</td></tr>
<tr><td>Q8</td><td>The outcomes of rolling two dice simultaneously is the following:

<table>
<tr><th>Trial</th><th>Die 1</th><th>Die 2</th><th>Sum of Dice</th></tr>
<tr><td>1</td><td>5</td><td>4</td><td>9</td></tr>
<tr><td>2</td><td>3</td><td>6</td><td>9</td></tr>
<tr><td>3</td><td>2</td><td>1</td><td>3</td></tr>
<tr><td>4</td><td>6</td><td>5</td><td>11</td></tr>
<tr><td>5</td><td>4</td><td>4</td><td>8</td></tr>
<tr><td>6</td><td>2</td><td>6</td><td>8</td></tr>
<tr><td>7</td><td>6</td><td>3</td><td>9</td></tr>
<tr><td>8</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td>9</td><td>5</td><td>6</td><td>11</td></tr>
</table>
</td><td>10</td></tr>
</table>

		10	4	5	9

Estimate the probability that the sum of the two rolls is greater than 8 using monte-Carlo simulation?

SECTION-D
2Qx15M= 30 Marks

Q9

a). A retail company collected the following data over four months to understand the effect of marketing spend on sales:

Month	Sales ($)	TV Ads ($)	Online Ads ($)	Radio Ads ($)
Jan	50,000	10,000	5,000	2,000
Feb	60,000	12,000	6,000	1,500
Mar	55,000	11,000	4,000	2,500
Apr	65,000	14,000	7,000	3,000

Question: Use the data to create a multiple linear regression equation to predict sales based on TV Ads, Online Ads, and Radio Ads. Then, use the equation to estimate sales if the company plans to spend $13,000 on TV ads, $6,000 on online ads, and $2,000 on radio ads.

Or

b). A company wants to predict the monthly sales (in thousands of dollars) based on the amount spent on advertising (in thousands of dollars). The following data was collected over six months:

Month	Advertising Spend (X)	Sales (Y)
1	5	14
2	10	20
3	15	28
4	20	35
5	25	40
6	30	50

1. Use the data to calculate the linear regression equation in the form Y=a+bX , where:
   - Y is the predicted sales,
   - X is the advertising spend,
   - a is the intercept,
   - b is the slope of the regression line.
2. Using the equation, predict the monthly sales if the company spends $35,000 on advertising.

15

CO4

Q10

Six different people arrive at an ATM, each at a randomly generated time within the first hour (0 to 60 minutes). Each person also has a randomly

15

	generated service time (the time they spend at the ATM), and only one person can use the ATM at a time.
	• **Arrival Times (in minutes)**:
	  ○ Person 1: 5
	  ○ Person 2: 12
	  ○ Person 3: 20
	  ○ Person 4: 33
	  ○ Person 5: 45
	  ○ Person 6: 50
	• **Service Times (in minutes)**:
	  ○ Person 1: 4
	  ○ Person 2: 6
	  ○ Person 3: 3
	  ○ Person 4: 5
	  ○ Person 5: 7
	  ○ Person 6: 6
	Using this information, calculate:
	1. **Average Idle Time of the ATM**: The average time when the ATM is not in use between each person's service.
	2. **Average Waiting Time of Each Person**: The average time each person waits if the ATM is in use when they arrive.		