15354

BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(CSE)-DS-2021/B.Tech.(CSE)-DS-2022
Course Name – Data Modeling and Simulation
Course Code - PEC-CSD602B
(Semester VI)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Choose the random variate from following in the context of data modeling.
a) A constant value
b) A variable generated using a deterministic algorithm
c) A variable generated using a random process
d) A predefined database attribute

(ii) Choose the correct purpose of the inverse transform method in random variate generation.
a) To transform deterministic data
b) To transform non-uniform distributions to uniform distributions
c) To transform non-uniform distributions to uniform distributions
d) To transform discrete data to continuous data

(iii) Select what is the primary goal of artificial intelligence (AI)?
a) Replicating human intelligence entirely
b) Replacing human intelligence with machine intelligence
c) Automating repetitive tasks to enhance efficiency
d) Developing robots capable of performing human-like tasks

(iv) Select which technique involves training algorithms to learn from data and make predictions or decisions without being explicitly programmed?
a) Supervised learning
b) Unsupervised learning
c) Reinforcement learning
d) Deep learning

(v) Write which application of artificial intelligence involves teaching computers to understand and respond to human language?
a) Speech recognition
b) Sentiment analysis
c) Language translation
d) Chatbots

(vi) Identify which technique involves algorithms making decisions by maximizing rewards and minimizing penalties based on feedback from the environment?
a) Supervised learning
b) Unsupervised learning
c) Reinforcement learning
d) Deep learning

(vii) Identify which application of artificial intelligence involves analyzing and interpreting patterns in large datasets to extract meaningful insights?
a) Data visualization
b) Data mining
c) Robotics
d) Virtual assistants

(viii) Select which of the following is NOT a measure of central tendency?
a) Mean
b) Median

c) Mode d) Variance

(ix) Select which measure of dispersion is the most affected by extreme values?
a) Range b) Variance
c) Standard deviation d) Mean absolute deviation

(x) Identify which probability distribution is used to model the number of successes in a fixed number of independent Bernoulli trials?
a) Normal distribution b) Poisson distribution
c) Binomial distribution d) Exponential distribution

(xi) Select in a binomial distribution, what are the parameters "n" and "p" used to represent?
a) n is the mean and p is the standard deviation b) n is the number of trials and p is the probability of success
c) n is the probability of success and p is the number of trials d) n is the sample size and p is the proportion of successes

(xii) Select which statistical test is used to determine the association between two categorical variables?
a) T-test b) Chi-square test
c) ANOVA d) Regression analysis

(xiii) Write what is the main difference between a one-tailed and a two-tailed hypothesis test?
a) A one-tailed test only considers one direction of the effect, while a two-tailed test considers both directions. b) A one-tailed test is more conservative than a two-tailed test.
c) A one-tailed test has a higher significance level than a two-tailed test. d) A one-tailed test requires a larger sample size than a two-tailed test.

(xiv) Write what is the primary purpose of conducting hypothesis tests in statistics?
a) To summarize data b) To make predictions
c) To infer population parameters from sample data d) To describe patterns and trends

(xv) Select in data modeling, choose the correct option for the term "entity" refer to.
a) A physical object or concept in the real world b) A variable in a programming language
c) A type of simulation algorithm d) A database management system

Group-B
(Short Answer Type Questions) 3 x 5=15

2. Discuss what is a random variable? (3)
3. Explain how to use a random variate generator in data modeling. (3)
4. Explain the purpose of validation in simulation modeling. (3)
5. Write an example of a real-world application where probability and statistics are used together. (3)
6. Explain the role that sensitivity analysis plays in a simulation study. (3)

OR

Explain some common techniques used for presenting the results of a simulation study. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Illustrate the key components and steps involved in setting up a single-server queue simulation using SIMLIB. (5)
8. Explain the definition of event list in data modeling. (5)

9. A tourist car operator finds that during the past few months, the car's use has varied so much that the cost of maintaining the car varied considerably. During the past 200 days, the demand for the car fluctuated as below: (5)

Trips per week	Frequency
0	16
1	24
2	30
3	66
4	40
5	30

Simulate the demand for a 10-week period.

Simulate the demand for a 10-week period.

Use the random numbers:

82, 96, 18, 96, 20, 84, 56, 11, 52, 03

10. Write down the key components involved in event scheduling within the context of data modeling. (5)
11. Illustrate the process of contribution of event scheduling to the optimization of business processes and decision-making. (5)
12. An anti-aircraft gun can take a maximum of four shots at an enemy plane moving away from it. The probabilities of hitting the plane at the first, second, third, and fourth shots are 0.4, 0.3, 0.2, and 0.1 respectively. What is the probability that the gun hits the plane? (5)

OR

A bag contains one black ball and two white balls. A drawing from a bag consists of taking a ball from the bag and keeping it out of it if it is white but putting it back if it is black. Calculate the probabilities that: (5)

(a) the first drawing is a white ball.
(b) the second drawing is a white ball.
(c) the third drawing is a white ball.

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