Total No. of Questions : 8]

SEAT No. :

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S.E. (Computer Science and Engineering) (Data Science)

MATHEMATICAL FOUNDATION FOR DATA SCIENCE - I

(2019 Pattern) (Semester - III) (210641)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Define with example: i) Probability ii) Independent Events iii) Dependent Events **[6]**

b) A throw is made with two dice. Find probability of getting a score of i) 10 points ii) At least 10 points iii) At most 10 points. **[6]**

c) Assuming that the diameter of 1000 plugs taken from machine form a normal distribution with mean 0.3515cm and standard deviation 0.0020cm. How many of the plugs are likely to be approved if the acceptable diameter is 0.752 ± 0.004 cm? (Given : for $z = 2.25$, $A = 0.4878$, for $z = 1.75$, $A = 0.4599$) **[6]**

OR

Q2) a) State the following: i) Law of Large Number ii) Central Limit Theorem **[6]**

b) Probability of man aged 60 years will live for 70 years is 1/10. Find probability of 5 men selected at random 2 will live for 70 years. Also Find mean, standard deviation & variance of Binomial probability distribution. **[6]**

c) What are the applications of Probability Theory in data science? **[6]**

Q3) a) i) Define Point Estimation.

ii) Calculate the mean for the following data set

{0, 2, 9, 10, 12, 15, 18, 21, 24, 36, 43, 59, 68, 72, 81, 99} **[6]**

b) What is Parametric and Non-Parametric Test? What are the types of Parametric and Non-parametric tests. **[6]**

c) What are the applications of Statistical Inference in data science? **[5]**

OR

P.T.O.

Q4) a) Among 64 offspring's of a cross between pigs 34 were red, 10 were black & 20 were white which are in ratio 9:3:4. Are the data consistent with the model at 5% level? (*Chi - square tabulated Value = 5.991*) **[6]**

b) Define : i) Interval Estimation ii) Confidence Level iii) Margin of Error **[6]**

c) What are the steps of Hypothesis Testing? Explain Types of Hypothesis Testing. **[5]**

Q5) a) Use Euler's method to solve the equation $\frac{dy}{dx} = 1 + xy$ subject to the condition at $x = 0$, $y = 1$ and tabulate y for $x = 0\ (0.1)\ 0.5$. **[6]**

b) Define Interpolation & Extrapolation? And explain their applications in data science **[6]**

c) Find a real root of $x^3 - x = 1$ by using Bisection method up to 3 decimals. **[6]**

OR

Q6) a) Explain the root finding methods which are frequently used in data science applications. **[6]**

b) Evaluate the following integral using i) Trapezoidal rule & ii) Simpson's ⅓ rule $I = \int_0^2 (2x^2 - 1)\,dx$ *with 4 interval.* **[6]**

c) What are the applications of numerical methods in data science? **[6]**

Q7) a) What is Set? Explain its types & set operations with example. **[6]**

b) Find the coefficient of x^n in the expansion $(2 - x)^n$. **[6]**

c) What are the applications of graph theory in data science? **[5]**

OR

Q8) a) Prove the following statement **[6]**

$[(A \to B) \wedge A] \to B$ is a tautology

$(A \vee B) \wedge [(\sim A) \wedge (\sim B)]$ is a contradiction

b) What is Function? Explain their types with example. **[6]**

c) What are the applications of discrete mathematics in data science? **[5]**

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