Total No. of Questions : 12]

SEAT No. :

P9479

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[6182]-798

M.E. (Computer Engg.)/(Data Science)/(Artificial Intelligence and Data Science)

MATHEMATICAL FOUNDATION FOR DATA SCIENCE

(2017 Pattern) (Semester - I) (510301)

Time : 3 Hours] *[Max. Marks : 50*

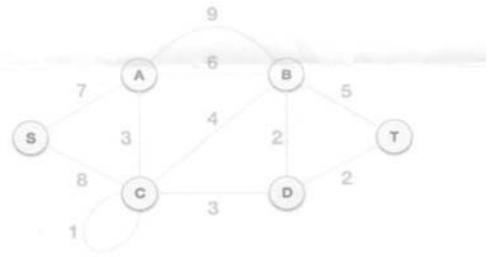
Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q.12.***
2) ***Assume Suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***

Q1) Write Difference between B tree & B+tree. Explain B + tree with example. **[8]**

OR

Q2) Represent given graph using adjacency list. Explain any shortest path algorithm and using same find the shortest path from vertex S to Vertex T using shortest path algorithm. **[8]**



Q3) a) Compare Poisson distribution and Binomial distribution. **[5]**

b) Explain two central tendency and dispersion measures of numerical data with example. **[4]**

OR

Q4) Bag A contains 10 marbles of which 2 are red and 8 are black. Bag B contains 12 marbles of which 4 are red and 8 are black. A ball is drawn at random from each bag. Find the probability that: **[9]**

a) both are red

b) both are black

c) one black and one red

d) at least one red

P.T.O.

Q5) Explain Chi-Square Tests and t-test with example. **[9]**

OR

Q6) Explain ANOVA Coefficient with example. **[9]**

Q7) Discuss different methods of to calculate Karl Pearson's Coefficient of Correlation. **[8]**

OR

Q8) a) Use these methods to normalize the following group of data: **[4]**

200, 300, 400, 600, 1000

i) z-score normalization

ii) z-score normalization using the mean absolute deviation instead of standard deviation.

b) Find covariance for following data set x = {2, 5, 6, 8, 9} y = {4, 3, 7, 5, 6} Comment on the movement of X and Y values with respect to covariance. **[4]**

Q9) What is Jacobian? Let *x* (u, v) = $u^2 - v^2$, y (u, v) = 2 uv. **[8]**

Find the Jacobian J (u, v).

OR

Q10) Solve the system of equation $x_1 + x_2 + x_3 = 1$, $3x_1 + x_2 - 3x_3 = 5$ and $x_1 - 2x_2 - 5x_3 = 10$ by LU decomposition method. **[8]**

Q11) Suppose we have the following dataset with one response variable y and two predictor variables X1 and X2. Fit a mutliple linear regression model to this dataset. **[8]**

X1	60	62	67	70	71	72	75	78
X2	22	25	24	20	15	14	14	11
Y	140	155	159	179	192	200	212	215

OR

Q12) Explain any one probabilistic model with example. **[8]**