

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSc.
BRANCH: CQEDS

SEMESTER : VI
SESSION : SP/2024

SUBJECT: ED313 NON PARAMETRIC METHODS AND DECISION THEORY
TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a) Find the density function of the largest order statistic in a random sample of size n from the distribution $f(x) = 3x^2$, $0 < x < 1$. [5]

Q.1(b) In continuation to the above problem, find the joint distribution of the minimum and the maximum order statistics. [5]

Q.2(a) Given the following snow cone sales data: [2]

18 43 40 16 22
30 29 32 37 36
39 34 39 45 28
36 40 34 39 52

Perform a sign test to test the conjecture that the median snow cone sales is 40 (critical value is 4).

Q.2(b) Explain Kruskal Wallis Test. [8]

Q.3(a) Consider the following data set. [5]

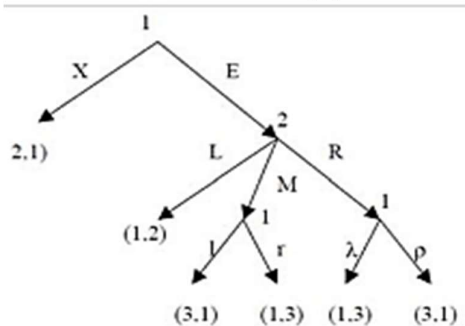
-2.1, -1.3, -0.4, 1.9, 5.1, 6.2.

Use histogram approach to estimate the density function at the data points by taking six bins each of width 2.

Q.3(b) Determine the density function for the above problem by applying the Gaussian Kernel density estimation method with mean 0 and standard deviation of 1.5. [5]

Q.4(a) Explain different representations of a game with examples. [5]

Q.4(b) Find the nominal form representation of the following game. [5]



Q.5 Assume we have a population distribution with pdf $f(x; \theta) = (\theta + 1)x^\theta$, $0 \leq x \leq 1$. [10]
Moreover, assume that θ is distributed with pdf $f(\theta) = \frac{1}{12}(3 - \theta)$, $-2 \leq \theta \leq 2$.
What is the Bayesian estimate for θ based on the sample $X_1 = 0.9, X_2 = 0.89, X_3 = 0.76, X_4 = 0.96$.

:::23/04/2024 M:::