Printed Page:-05 **Subject Code**:- B**CSBS0201**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION - (2023 - 2024)

Subject: Statistical Methods

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

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SECTION A **20**

1. Attempt all parts:-

1-a. What do we call the population value? (CO1) 1

(a) Statistic

(b) Parameter

(c) Data

(d) Variable

1-b. Out of these, which is not a probability sampling?(CO1) 1

(a) Cluster sampling

(b) Stratified sampling

(c) Quota sampling

(d) Simple random sampling

1-c. Which of the following are types of correlation? (CO2) 1

(a) Positive and Negative

(b) Simple, Partial and Multiple

(c) Linear and Nonlinear

(d) All of the above

1-d. The correlation coefficient describes (CO2) 1

(a) Only magnitude

(b) Both magnitude and direction

(c) Only direction

(d) None of the preceding options.

1-e. A distribution in which values of median, mean and mode are not equal is considered as (CO3) 1

(a) Normal distribution

(b) Symmetrical distribution

(c) Asymmetrical distribution

(d) Theoretical distribution

1-f. The connection between a sufficient statistic and maximum likelihood estimator is: (CO3) 1

(a) A sufficient statistic is always an MLE

(b) There is no connection in general

(c) All MLE's are linear combinations of sufficient statistics

(d) If an MLE is unique, then it must be a function of a sufficient statistic

1-g. Which of the following statements is true about the type two error? (CO4) 1

(a) Type two error means to accept an incorrect hypothesis

(b) Type two error means to reject an incorrect hypothesis

(c) Type two error means to accept a correct hypothesis

(d) Type two error means to reject a correct hypothesis

1-h. The Kruskal-Wallis test is the non-parametric alternative to the (CO4) 1

(a) Factorial design

(b) One-way ANOVA

(c) Two-way ANOVA

(d) None of the above

1-i. The PACF is necessary for distinguishing between (CO5) 1

(a) An AR and an MA model

(b) An AR and an ARMA model

(c) An MA and an ARMA model

(d) Different models from within the ARMA family

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1-j. What is the primary purpose of "seasonal decomposition" in time series analysis? (CO5) 1

(a) To identify seasonality in the data

(b) To remove seasonality from the data

(c) To make the data stationary

(d) To identify trends in the data

2. Attempt all parts:-

2.a. What do you mean by sampling with replacement?(CO1) 2

2.b. Define regression.(CO2) 2

2.c. What do you mean by Hypothesis? (CO3) 2

2.d. Define Neyman Pearson Lemma. (CO4) 2

2.e. What is DF-test? (CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Calculate the sampling interval according to systematic sampling technique when your sample size is 200 and your accessible population is 40,000.(CO1) 6

3-b. What are the advantages of multi-stage sampling. List any five.(CO1) 6

3-c. You are given the following data between X and Y- 6

	X	Y
Arithmetic Mean	36	85
Standard deviation	11	8
Correlation coefficient	0.66	

i. Find the two regression equations.

ii. Estimate the value of X when Y=75. (CO2)

3-d. What are the properties of regression coefficient? (CO2) 6

3.e. What do you mean by ANOVA? What are the assumptions made in Analysis of Variance? (CO3) 6

3.f. Explain critical region or rejection region with the help of diagrams at 5% level of significance. (CO4) 6

3.g. Differentiate between AR and MA process. (CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. Explain sampling with replacement and without replacement. Elaborate with the help of an example.(CO1) 10

4-b. Explain the concept of sampling and its various types with the help of an example.(CO1) 10

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5. Answer any <u>one</u> of the following:-

5-a. Ten competitors in a beauty contest are ranked by three judges in the following order: 10

Ist Judge:	1	6	5	10	3	2	4	9	7	8
IInd Judge:	3	5	8	4	7	10	2	1	6	9
IIIrd Judge:	6	4	9	8	1	2	3	10	5	7

Use the rank correlation coefficient to determine which pair of judges has the nearest approach to common tastes in beauty.(CO2)

5-b. From the following data, obtain two regression equations: (CO2) 10

X: 6 2 10 4 8

Y: 9 11 5 8 7

6. Answer any <u>one</u> of the following:-

6-a. 500 apples are taken at random from a large basket and 50 are found to be bad. Estimate the proportion of bad apples in the basket and assign limits within which the percentage most probably lies. (CO3) 10

6-b. In a survey of buying habits, 400 women shoppers are chosen at random in super market. *A* located in a certain section of Mumbai city. Their average monthly food expenditure Rs 250 with a standard deviation of Rs 40. For 400 women shoppers chosen at random in super market *B* in another section of the city, the average monthly food expenditure is Rs 220 with a standard deviation of Rs 55. Test at 1% level of significance whether the average food expenditure of the two populations of shoppers from which the samples were obtained are equal. (CO3) 10

7. Answer any <u>one</u> of the following:-

7-a. A man buys 50 electric bulbs of 'Phillips' and 50 electric bulbs of 'HMT'. He finds that 'Philips' bulbs give an average life of 1500 hours with a standard deviation of 60 hours & 'HMT' bulbs give an average life of 1512 hours with a standard deviation of 80 hours. Is there a significant difference in the mean life of the two makes of bulbs? (CO4) 10

7-b. The height of 8 males participating in an athletic championship are found to be 175,168,165,170,167,160,173 and 168 cm. Can we conclude that the avg. height is greater than 165 cm. (Test at 5% level of significance) (Use Tabulated value 1.895) (CO4) 10

8. Answer any <u>one</u> of the following:-

8-a. Explain Box-Jenkins approach in time series analysis. (CO5) 10

8-b. What are the pros and cons of ARIMA model? Explain. (CO5) 10

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