DMSTT01

M.Sc. DEGREE EXAMINATION, , JUNE/JULY - 2019

(First Year)

STATISTICS

Probability and Distribution Theory

Time : 3 Hours   **Maximum Marks : 70**

Answer any Five questions.
All questions carry equal marks.

Q1) a)   State and prove Borel-Cantelli lemma.

   b)   What is mathematical expectation? Explain.

Q2) a)   What is distribution functions? Explain.

   b)   State and prove inversion theorem.

Q3) a)   Explain chebyshev and khintchin's laws.

   b)   Discuss about the kolmogorov's strong law of large numbers for independent random variables.

Q4) a)   Explain the types of convergence with inter relations.

   b)   State and prove of central limit theorem of Levy and Lindeberg.

Q5) a)   What is m-g-t? Explain its characteristics.

   b)   What is compound binomial? Explain.

Q6) a) Explain the properties of interrelations of multinomial.

b) Discuss about the characteristics of discrete distribution.

Q7) a) What is log normal distribution? Explain?

b) What is laplace distribution? obtain its mean and variance.

Q8) a) Derive m-g-f of log normal distribution.

b) What is m-g-f ? Explain.

Q9) a) Explain the distribution of non-central chi-square.

b) Explain about the order statistic distribution function.

a) Derive the joint p.d.f. of $\left| X_{(1)}, X_{(2)}, \ldots, X_{(n)} \right|$.

Q10)

b) Explain the distribution of non-central F.

DMSTT02

M.Sc. DEGREE EXAMINATION, JUNE/JULY - 2019

(First Year)

STATISTICS

Statistical Inference

Time : 3 Hours   Maximum Marks : 70

Answer any Five questions.
All questions carry equal marks.

Q1) a) Explain the terms and give an example in each.

    i)   Consistent statistic

    ii)   Sufficient statistic.

   b)   State and prove factorization theorem.

Q2)

   a)   Let $x_1, x_2, \ldots x_n$ be a random sample from the distribution with p.d.f $f_\theta(x) = \frac{1}{\beta - \alpha}$, if $\alpha < x < \beta$ when $\theta = (\alpha, \beta)$ and $0 < \alpha < \beta$ obtain MVU estimators of $\frac{\alpha + \beta}{2}$ and $(\beta - \alpha)$.

   b)   State and prove Lehmann - Scheffe theorem.

Q3) a) Obtain the m.l. estimate of the binomial parameter P and show that it actually provides a supremum of the likelihood funtions.

   b)   Distinguish between point and interval estimator.

Q4) a) Obtain confidence limits for the parameter μ in $N(\mu, 1)$ with confidence coefficient $(1-\alpha)$

   b)   Explain the method of moments in detail.

Q5) a) Explain the concept of monotone likelyhood Ratio.

   b)   State and prove Neyman - Pearson lemma.

Q6) a) Explain critical functions MP lists.

b) Discuss about the relationship between testing and interval of estimation.

Q7) a) State and prove Wald-Wolfowitz run test.

b) What are the applications of Wilcoxon test?Explain its procedure.

Q8) a) Using the number or runs above and below the median, test for randomness the following set of a table of 2-digit numbers.

15,77,01, 65,69,69,58,40,81,16,16,20,00,84,22
28,26,46,66,36,86,66,17,43,49,85,40,51,40,10

b) Explain how median list is differentiate in testing two means? Also write the procedure of median list.

Q9) a) Explain the sequential procedure of testing of hypothesis. Let X be a random variable having the p.m.f. $f_0(x)$ $\theta^{(x)}$ $(1-\theta)^x$, $x = 0$, 1. Determine the SPR test for tyting $H_0: \theta = \theta_0$ against $H_1 : \theta = \theta_1$. Obtain the expression for its OC and ASN functions.

b) Explain Wald's SPR test and its OC and ASN functions.

Q10) a) Define OC and ASN functions of the SPRT.

b) Derive SPR test to test the parameterof a poisson distribution, obtain its OC and ASN functions.

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DMSTT03

M.Sc. DEGREE EXAMINATION, JUNE/JULY - 2019

(First Year)

STATISTICS

Sampling Theory

Time : 3 Hours   Maximum Marks : 70

Answer any Five questions.
All questions carry equal marks.

Q1) a)   Explain sampling and non-sampling errors.

b)   What is the difference between enumeration survey and sample survey? Explain the features of sample survey?

Q2) a)   What are the important aspects should be considered at planning sample survey?

b)   What is a simple random sample? Mention the various methods of drawing a random sample.

Q3) a)   Define simple randam process. Explain its merits and drawbacks.

b)   Explain fully the concepts of (i) sampling with replacement and (ii) sampling without replacement.

Q4) a)   Why stratification is important in sample determination? Explain?

b)   How do you determine sample by Neyman allocation method.

Q5) a)   How do you determine sample by proportional allocation method.

b)   How do you estimate mean and variance with systematic sampling.

Q6) a)   Explain cluster sampling with equal cluster sizes.

b)   What are the features of cluster sampling? Explain?

Q7) a)   What is systematic sampling ? Give illustrations where such sampling is usual.

b)   Describe 'circular systematic sampling'.

Q8) a)   Write the merits and draw backs of multi-stage sampling.

b)   Discuss about the Two-stage sampling with equal number of second stage units.

Q9) a)   What are the biases of ratio - estimator ? Explain.

b)   Explain the comparison of the ratio estimate with the mean per unit.

Q10) a)   What is the differences between ratio estimate and regression estimate.

b)   What is the conditions for optimum ratio estimate? Explain.

DMSTT04

M.Sc. DEGREE EXAMINATION, JUNE/JULY - 2019

(First Year)

STATISTICS

Design of Experiments

Time : 3 Hours   **Maximum Marks : 70**

Answer any Five questions.
All questions carry equal marks.

Q1) a) Explain the characteristic roots and vectors of a matrix.
     b) State and prove Cayley - Hamilton theorem.

Q2) a) Determine the inverse of the matrix A =
     b) Explain Coehran's theorem for quadratic form.

Q3) a) Explain the basic principles of experimentation. Examine how far these principles are met with in the LSD.
     b) Explain in the test of a additivity of data.

Q4) a) State and prove generalized Gauss-Markov theorem.
     b) What is best linear unbiased estimate? Explain.

Q5) a) Explain the ANOVA of three way classification with equal number of observations per cell.
     b) Explain about the analysis of Co-variance of one way and two way classification.

Q6) a) What are the objectives of ANOVA? Explain its practical applications.
     b) Describe the analysis of factorial experiment involving three factors at three levels.

Q7) a) Explain the principles of RBD.
     b) Carry out the analysis of split plot design.

Q8) a) What is meant by mutually orthogonal latin squares? Explain its procedure.
     b) Describe missing plot technique? Explain its applications.

Q9) a) Describe the factorial method of experimentation. Explain the situation where it could be used.
     b) Explain the analysis of 3^2 factorial experiment.

Q10) a) Define BIBD. Derive its parametric relations and point out different types of BIBD.
     b) Explain the concept of association scheme. Explain in detail about the analysis of PBIBD.