

Total No. of Questions : 10]

**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.
- Q10)** a) Derive the joint p.d.f. of .  
b) Explain the distribution of non-central F.



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**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  $x_1, x_2, \dots, x_n$  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  $\alpha$  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 functions.  
b) Distinguish between point and interval estimator.
- Q4)** a) Obtain confidence limits for the parameter  $\mu$  in  $N(\mu, 1)$  with confidence coefficient  $(1 - \alpha)$   
b) Explain the method of moments in detail.
- Q5)** a) Explain the concept of monotone likelihood 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 of 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 differentiated 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.  $f_0(x) = \theta^x (1-\theta)^{1-x}$ ,  $x = 0, 1$ . Determine the SPR test for testing  $H_0: \theta = \theta_0$  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 parameter of 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 random 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.

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**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 Cochran'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.