(DMSTT01)

Total No. of Questions : 10]   [Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DECEMBER – 2018
First Year
STATISTICS
Probability and Distribution Theory

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

__Answer any Five questions__   *[5 × 14 = 70]*

__All questions carry equal marks__

Q1) a)   What is Discrete and Continuous Distribution functions? Explain.

    b)   State and prove Borel-Cantelli lemma.

Q2) a)   What is Statistical Independence? Explain.

    b)   State and prove Kolmogorov theorem.

Q3) a)   Explain the concept of convergence of sequence of random variables.

    b)   Explain Kolomogorov's Strong law of large numbers for Independent random variables.

Q4) a)   State and prove De-Moivre's theorem.

    b)   Explain Lyapunov's form of Central Limit theorem.

Q5) a)   What is Probability Generating Function? Explain its characteristics.

    b)   What is Discrete Distribution? Write its features.

Q6) a)   What is Compound Poisson? Explain in brief.

    b)   What is Compound Binomial? Explain in brief.

Q7) a)   What is Continuous Distribution? Explain.

    b)   State and prove Laplace principle.

Q8) a)   Prove Weibull theorem in brief.

b)   Write about Logistics Regression in brief.

Q9) a)   Derive the joint Distribution of jth and K^{th} Order Statistics of $1 \le j < K \le 4$.

b)   Obtain the joint pdf of Jth and K^{th} Order Statistics. Also find the marginal p.d.f. of rth order statistics.

Q10) a)   Derive the p.d.f of F-statistics with (m,n) degrees.

b)   Write about Chi-square distribution. List out its applications and properties.

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(DMSTT02)

M.Sc. DEGREE EXAMINATION, DEC. – 2018
First Year
STATISTICS
Statistical Inference

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

Answer any Five questions   *[5 × 14 = 70]*
All questions carry equal marks

Q1) a)   State and prove Cramer-Rao inequality theorem.

b)   What is Sufficiency? If X_1, X_2, ……..X_n is a random variable from
$f(x:\theta)=\theta^x(1-\theta)^{1-x}$, $x = 0,1, 0 < \theta < 1$. Obtain a sufficient Statistic for θ.

Q2) a)   State and prove Lehmann-Scheffe theorem.

b)   What is Exponential Class? Explain.

Q3) a)   What is Consistency? Explain in detail.

b)   Explain the concepts of CAN, CAUM estimators. Explain the construction of CAN estimators based on moments.

Q4) a)   What is Efficiency? Explain in detail.

b)   For a given sample of 250 items drawn from a large population, the Mean is 65 and S.D. is 5. Find the 95% confidence limits for the Population Mean.

Q5) a)   Find UMP tests for testing $H_0 : \theta = \theta_0$ against one sided alternatives in $N(\theta, \sigma^2)$, where σ^2 is unknown.

b)   What is the difference between Testing and Interval Estimation? Explain.

Q6) a) What is Monotone Likelyhood ratio? Explain in brief.

b) Let $X_1, X_2 \ldots X_n$ be a random sample from a Poisson Distribution with parameter λ. Derive the Likelyhood ratio tests for $H_0 : \lambda = \lambda_0$ against $H_1 : \lambda > \lambda_0$ and $H_1 : \lambda < \lambda_0$. Then show that they are identical with UMP tests.

Q7) a) Explain Signed-Rank Sum test with an example.

b) How can you Check Randomness for a given data? Explain in brief.

Q8) a) Write the procedure of Median test for large samples.

b) What are the applications of Kolmogorov-Smirnov test? How this test is different to Chi-Square test?

Q9) a) Describe SPRT in the case of Poisson Distribution.

b) Derive SPR test to test the Mean of $N(\mu, \sigma^2), \sigma^2$ is known. Obtain OC and ASN functions.

Q10) a) Explain SPR test and show that it terminates with Probability one.

b) A random variable X has $N(\mu, \sigma^2)$, where σ^2 is known. Develop an SPR test for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta < \theta_1$. If $\alpha = B$ then prove that the ASN under H_0 and H_1 are equal.

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M.Sc. DEGREE EXAMINATION, DEC. – 2018
First Year
STATISTICS
Sampling Theory

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

__Answer any Five questions__   *[5 × 14 = 70]*
__All questions carry equal marks__

Q1) a) What are Sampling Errors? Explain it's sources also write few examples to Errors in Sampling.

     b) What is Complete Enumeration Surveys? Write its advantages.

Q2) a) What are the important aspects to be considered while planning Sample Survey?

     b) What is the structure of National Sample Survey Organisation?

Q3) a) Explain the Determination of a sample by Neyman allocations method?

     b) What is stratified Random Sampling? Explain its procedure.

Q4) a) What is Simple Random Sampling? Explain its merits and drawbacks.

     b) How do you estimate Population Mean and proportion?

Q5) a) Explain the procedure of Cluster Sampling? Also write its advantages.

     b) How do you estimate Mean and Variance with Systematic Sampling?

Q6) a) Write the few applications of Cluster Sampling in Social Science.

     b) Explain Optimum Cluster size for fixed cost.

Q7) a) Explain PPS Sampling with replacement also write its procedure.

     b) What is two-stage Sampling? Write its drawbacks.

Q8) a) Explain the applications of Multi-stage Sampling in Research.

b) How do you estimate Mean and Variance with two-stage Sampling.

Q9) a) What are the conditions required for Optimum ratio estimate?

b) What is Stratified Sampling? Explain its features and drawbacks.

Q10) a) What is Ratio Estimation? Explain in brief.

b) What is Regression Estimates? Explain in brief.

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(DMSTT04)

Total No. of Questions : 10]   [Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DECEMBER – 2018
First Year
STATISTICS
Design of Experiments

Time : 3 Hours   Maximum Marks : 70

Answer any Five questions   *[5 × 14 = 70]*
All questions carry equal marks

Q1) a) What is a Determinant? Explain its properties with examples.

b) Find the Rank and Inverse of a Matrix $A = \begin{bmatrix} 1 & 3 & 4 \\ 3 & -1 & 6 \\ -1 & 5 & 1 \end{bmatrix}$

Q2) a) State and prove Coehran's theorem.

b) Explain the terms, "Orthogonal Matrix", "idempotent Matrix" and "Rank of a Matrix".

Q3) a) What is Linear Estimation? Explain its Applications.

b) State and prove Gauss-Markov theorem.

Q4) a) What is Generalized Linear Model? State and prove necessary and sufficient conditions for estimating a linear parametric functions.

b) State and prove Atken's theorem.

Q5) a) Write the procedure of one-way ANOVA with equal number of observations.

b) Explain the procedure of Analysis of Co-variance of two-way classification.

Q6) a) What is the difference between Random and Mixed effect models? Explain.

b) Write the procedure of ANOVA with three-way classification.

Q7) a) Derive the Statistic associated with testing the Equality of K treatment Effects in CRD.

b) Explain Latin Square Design model. Also write its practical applications.

Q8) a) Explain the analysis of LSD with a missing Row and a Missing column.

b) Determine the efficiency of RBD over CRD.

Q9) a) What are Factorial Experiments? Explain 3^3 Factorial Experiment.

b) Describe Balanced incomplete block Design. Write its procedure.

Q10) a) Explain the analysis of 2^2 Factorial Experiment.

b) Explain Yate's Method in 2^3 Factorial Experiment.

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