INTERNAL ASSIGNMENT QUESTIONS
M.Sc (STATISTICS) PREVIOUS

2022

PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION
(RECOGNISED BY THE DISTANCE EDUCATION BUREAU, UGC, NEW DELHI)
OSMANIA UNIVERSITY
(A University with Potential for Excellence and Re-Accredited by NAAC with "A" + Grade)

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PROF.G.RAM REDDY CENTRE FOR DISTANCE EDUCATION
OSMANIA UNIVERSITY, HYDERABAD – 500 007

Dear Students,

Every student of M.Sc. Statistics Previous Year has to write and submit **Assignment** for each paper compulsorily. Each assignment carries **20 marks.** The marks awarded to you will be forwarded to the Controller of Examination, OU for inclusion in the University Examination marks. The candidates have to pay the examination fee and submit the Internal Assignment in the same academic year. If a candidate fails to submit the Internal Assignment after payment of the examination fee he will not be given an opportunity to submit the Internal Assignment afterwards, if you fail to submit Internal Assignments before the stipulated date the Internal marks will not be added to University examination marks under any circumstances.

You are required to **pay Rs.300/-** towards the Internal Assignment Fee through Online along with Examination fee and submit the Internal Assignments along with the Fee payment receipt at the concerned counter.

ASSIGNMENT WITHOUT THE FEE RECEIPT WILL NOT BE ACCEPTED

Assignments on Printed / Photocopy / Typed papers will not be accepted and will not be valued at any cost.

Only hand written Assignments will be accepted and valued.

Methodology for writing the Assignments:

1. First read the subject matter in the course material that is supplied to you.
2. If possible read the subject matter in the books suggested for further reading.
3. You are welcome to use the PGRRCDE Library on all working days including Sunday for collecting information on the topic of your assignments.
   (10.30 am to 5.00 pm).
4. Give a final reading to the answer you have written and see whether you can delete unimportant or repetitive words.
5. The cover page of the each theory assignments must have information as given in FORMAT below.

FORMAT

1 NAME OF THE COURSE :
2. NAME OF THE STUDENT :
3. ENROLLMENT NUMBER :
4. NAME OF THE PAPER :
5. DATE OF SUBMISSION :

6. Write the above said details clearly on every assignments paper, otherwise your paper will not be valued.
7. Tag all the assignments paper-wise and submit
8. Submit the assignments on or before **8th July, 2022** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

DIRECTOR

M.Sc. STATISTICS - PREVIOUS

CDE ASSIGNMENT - 2022

PAPER- I: MATHEMATICAL ANALYSIS AND LINEAR ALGEBRA: MARKS: 20

Name of the Candidate........... Roll No:.................................

Sign of the invigilator:................. Time:

I. Select the correct alternatives out of given ones **$10\times1/2=5$**

1. a matrix P is said to be unitary, if
  a) $P^*P=I$ b) $P^1P=I$ c) $PP^1=I$ d) All of the above

2. If, the vector $X=(2,4,4)^1$ then , the normal vector, $Z=X/||X||$....
  a) 6 b) 8 c) 9 d) 12

3. Let A be a (mxn) matrix. If a matrix A^+ exist that following conditions
  a) AA^+ is symmetric b) AA^+ is symmetric
  c) AA^+ is symmetric d) AA^+ is symmetric

4. For any conditional inverse (C-inverse) A^- of an (mxn) matrix a, the matrices A^-A and AA^- are each idempotent
  a) $(A^-A)^2= A^-A$ b) $(AA^{-1})^2= AA^-$ c) both d) none

5. If the system AX=b is consistent, where A is an (mxn) matrix, then the system has a unique solution iff.......
  a) $\rho(A) = n$ b) $\rho(A) = m$ c) $\rho(A) = m+n$ d) $\rho(A) = n-m$

6. Any non-zero vector X is said to be a characteristic vectore of a matrix A. if there exists a number λ, such that
  a) $(A-\lambda I)X=0$ b) $(A-\lambda X)I=0$ c) $(X-\lambda I)A=0$ d) $(A-\lambda I)=0$

7. A be the (nxn) matrix and A has at least one characteristic root equal to zero then
  a) λ satisfies $|A-\lambda I|$ b) $|A|=0$ c) both d) None

8. Find the matrix for the Q.F $2X+5X_1X_2+3X_1X_2+6X$

  a) $\begin{bmatrix} 2 & 3 \\ 5 & 6 \end{bmatrix}$ b) $\begin{bmatrix} 2 & 5 \\ 3 & 6 \end{bmatrix}$ c) $\begin{bmatrix} 2 & 3 \\ 6 & 5 \end{bmatrix}$ d) $\begin{bmatrix} 3 & 2 \\ 5 & 6 \end{bmatrix}$

9. For any two (nx1) real coloun vectors X and Y , we have $(X^1Y)^2 \leq$.........
  a) $(X^1X)(Y^1Y)$ b) $(Y^1Y)(X^1X)$ c) $(X^1Y)(Y^1X)$ d) All

10. if the matrix Ais congruent to the matrix b and b is congruent to c then
  a) A is congruent to C b) C is congruent to A
  c) B is congruent to A d) None of the all

II. Fill the suitable word in the blanks **$10 \times 1/2 = 5$**

1. A function f is said to be continuous at a point x=c, if $\lim_{x \to a} f(x) =$....................
2. f is said to be increasing on S if for every pair of points x and y in S,

   $x < y \to$.................... ....
3. A function α defined on [a, b] is called a step function if there is a partition

   ....
4. The Jacobian of $u_1, u_2, u_3, \ldots u_n$ w.r.t $x_1, x_2, x_3, \ldots\ldots x_n$ is denoted by ....
5. If $f(z)$ is analytic with derivate $f(z)$ which is continuous at all points inside and on a simple closed curve C, then ....
6. Let f: (a,b) $\to$IR and assume that C $\in$(a,b), then f is said to be differentiable art C whenever the limit...................
7. Let P={ $x_1, x_2, x_3, \ldots\ldots x_n$ } be a partition of [a, b] and let $t_k \in [x_{k-1}, x_k]$. A sum of the form.....................is called a Reimann-Stieltjes Sum of f w.r.t α
8. Let f be a real valued function defined on (a,b). If f is differentiable on (a,b) then .... And .... both exist.
9. Let x=x(u,v), y= y(u,v); furthure u=u(p,q) and v=v(p,q); then ....
10. Let f be a continuous function on $[a,b]x[c,d] \subset R^2$. If $f(y)$ also exist and is continuous on [a,b] x [c,d], then integral Φ, then Leibnitz Rule is.............

III. write the answers for following questions **$10 \times 1 = 10$**

1. Write definition of linearly dependent and independent sets of vectors.
2. Define unitary matrix.
3. Write the Gram -Schmidt orthogonalization process.
4. Write stem by procedure of Moore Penrose invert.
5. State and proof Couchy-schwartz Inequality.
6. Explain relation between derivability and continuity.
7. Define Riemann-Stieltjes Integral
8. First mean value theorem for R-S integral
9. Explain Taylor's theorem.
10. Define L'Hospital's Rule

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Msc (Previous) Statistics
paper-II: Probability Theory

I

Name of the Candidate........... Roll No:.................................

Sign of the invigilator:................. Time:

I. Select the correct alternatives out of given ones **10×1/2=5**

1. Statistical definition of probability is developed by
a) R.Von Mises b) Pearson c) Laplace d) Bernoulli

2. If A and b are mutually exclusive events and P(A).P(B) > 0, then A and B are...
a) disjoint b) independent c) not independent d) all

3. Let X be a Binomial *r v with probability of success as p* and $p(x,p) = p^x(1-p)^{n-x}$, x=0,1,2... then E(X)=
a) npp b)q c) np d) nq

4. Let (X,Y) be a two dimensional *r v.* if the conditional expected values E[Y/X = *y*] and E[X/Y = *x*] exist, then E[E(X/Y =*y*)]=
a)E(X) b)E(Y) c) E[X/Y] d) E[Y/X]

5. Let X have a poison distribution with parameter μ then probability generating function (PGF)of X
a) $p(S)=e^{-\mu+\mu s}$ b) $p(S)=e^{\mu-\mu s}$ c) $p(S)=e^{+\mu s}$ d) $p(S)=e^{\mu+\mu s}$

6. Convergence almost sure implies convergence in.............
a) in probability b) in Law c) in general d) all

7. Let $\{X_n;n\geq1\}$ be a sequence of independent random varailble defined by $P[X_n=-2^n]= P[X_n=+2^n]=$...
a)1/2 b) -1/2 c) 4^n d) 2

8. The characteristic function of Cauchy distribution is
a) e^{-t} b)$e^{-|t|}$ c)e^{-t} d)$e^{-|t\mu|}$

9. Let X be a random variable and *f(x)* is convex function of X then $f(E(X))\leq E\{f(X)$ is .....inequality
a) Liapounov's b) Jensen's c) Chernoff bounds d)Holder's

10. Let X and Y be two random variables with $E(X)^2 < \infty$ $E(Y)^2 < \infty$. Couchy schwartz inequality holds....
a) $[E(XY)]^2 \leq E(X).E(Y)$ b) $[E(XY)]^2 \leq E(X)^2.E(Y)^2$
c) $[E(XY)]^2 \geq E(X).E(Y)$ d) $[E(XY)]^2 \geq E(X)^2.E(Y)^2$

II. Fill the suitable word in the blanks **10×1/2=5**

1. Mathematical definition of probability is developed by................
2. Suppose A and B are two independent events then $P(A\cap B)$ = ...

3. The *cdf* F(X) of a *r.v* X is pure jump function (or step function) then the *r.v* X is called.........
4. Let X be a random variable with *pdf* $f(x)$. if x=c, where c is constant, then E(X)=.........
5. If X is a random variable that takes only non-negative values, then for any value $a > 0$. $P[X \geq a] \leq$..........
6. Let $X_1, X_2, X_3, \ldots X_n$ be a random sample from $N(\mu, \sigma^2)$, then mean of X follows.........
7. Let $\{X_n; n \geq 1\}$ be a sequence of i.i.d *r.v.s* with $E(X_1) = \mu < \infty$ then this sequence of WLLN's called..............
8. Let $\{\{X_n; n \geq 1\}$ be a sequence of i.i.d Bernouli *r.v.s* defind as P[Xn =1}=p and P[Xn= 0]=1-p=q for all $n \geq 1; 0<p<1$. Then...........
9. Chapman-kolmogorov equation for two states I and j in S, and any two positive integers m and n, then $p_{ij}^{(m+n)}=$ ....
10. A recurrent state i belongs to S is called a null-recurrent state if μ_i equals to...............

III. write the answers for following questions **10×1=10**

1. If P(A)= 0.9, P(B)= 0.8 show that $P(A \cap B) \geq 0.7$.
2. Let X be a normally distributed *r.v* with parameters μ and σ^2. Find the expected value of the variate h(X)= ½.X-5.
3. If X and Y are any two *r.v's* and $U=a_1X + b$, $V=a_2Y+b$, then find Cov(U,V).
4. State Chebyshev's Inequality.
5. Let X be a Bernoulli *rv* with probability of success *p*. find characteristic function of X.
6. Let $\{X_n, n=1,2,\ldots\}$ be a sequence of *rv's* , define Convergence almost surely.
7. Define Weak law of large numbers (WLLNs).
8. State Borel's Strong Law of Large Numbers
9. Write statement of Bayes theorem.
10. Define Positive Recurrent state and Null recurrent state.

M. KANAKA REDDY, Previous PAPER - III DT & MDA

Name of the Candidate..................... **Roll No....................**

Sign of the invigilater........................ **Time:**

I. Choose the correct answer [10x½=5Marks]

1. A Wishart distribution is: [ ]
   a) A multivariate generalization of the χ^2 -distribution
   b) A multivariate generalization of the t-distribution
   c) A multivariate generalization of the f-distribution
   d) A multivariate generalization of the log normal-distribution
2. The Wishart distribution is a family of distributions for ________ matrices [ ]
   a) Symmetric positive definite c) symmetric negative definite
   b) Asymmetric positive definite d) asymmetric negative definite
3. Wishart distribution is named in honour of John Wishart first formulated the distribution in ______year. [ ]
   a)1927 b) 1929 c)1926 d) 1928
4. The assumption of Multinomial distribution are________________ [ ]
   a) Independent trial b) more than two outcomes. c) range 0 to 1 d) all the above
5. The sum of the two independent multinomial vector is also a [ ]
   a) Multinomial b) Multinormal c) both a &b d) none
6. if P=1, then the Wishart distribution reduces to ______________ [ ]
   a) Normal b) non-normal c) χ^2 -distribution d) Binomial
7. The Wishart distribution is used to derive the distributions__________ [ ]
   a) Hotelling's T^2 b) Mahala Nobis D^2 c) Both a & b d) None of these.

8. Truncated binomial distribution at x=___. [ ]
   a)0 b)1 c)p d)n
9. Order statistics is particularly used in____. [ ]
   a) Parametric inference b) non-Parametric inference c) Sampling d) Both a & b
10. Let x be a r.v.with pdf/pmf, the distribution of x is said to be truncated at___ [ ]
   a)x=a b)x=b c)Both a & b c)x=0

II. Fill in the blanks: [10x½=5Marks]

1.Multinomial distribution is a generalization of _______________ distribution.

2.The MGF of Multinomial distribution is ______________.

3.The MGF of Multivariate normal distribution is_____________.

4.The characteristic function of Wishart distribution is _______________.

5. The mgf of power series distribution is________________.

6. The marginal probability density function of r^{th} order statistics is _______________________.

7. Order statistics is study of_____________________________.

8. Pmf of generalized power series distribution is given by______________________.

9. The mean & variance of compound binomial distribution is_______________.

10. Compound Poisson distribution is widely used in a___________________.

III. Answer the following: [5x1=5Marks]

1.Write any 2 properties of Multivariate Normal Distribution?

2.Define of Multivariate Normal Distribution?

3.Define of Wishart distribution?

4.Define lognormal distribution and state its properties?

5.Write an example for Multivariate Analysis?

6.Explain the canonical variables and correlation?

7.Explain cluster analysis and discriminant analysis?

8.Explain single linkage method?

9. Define truncated poison and normal distribution? Give one example in each place.

10.Define principal component and factor analysis?

I

M.Sc. STATISTICS - PREVIOUS

CDE ASSIGNMENT - 2022

PAPER- IV: SAMPLING TECHNIQUES AND ESTIMATION THEORY: MARKS: 20

I.Give the correct choice of the answer like 'a' or 'b' etc. in the brackets provided against The question. Each question carries ½ marks. 1/2x10=5M

1. The Number of possible Samples of size n out of N Population units without Replacement is

a. Ncn b. nN c. n2 d. n! ( )

2. The maximum likelihood estimates, which are obtained by maximizing the function of joint density of random variables, are generally.

A. unbiased and inconsistent B. unbiased consistent ( )

C. consistent and invariant D. unbiased and invariant

3. Under equal allocation in stratified sampling the Sample form each stratum is

A. Proportional to Stratum size B. Of same size from each Stratum

C. In proportion to the per unit cost of survey of the Stratum D. All the above ( )

4. The errors emerging out of faculty planning of surveys are categorized as

A. Non– Sampling errors B. Non – response errors

C. Sampling errors D. Absolute errors ( )

5. A statistic whose variance is as small as possible when compared to any other unbiased estimator is called

A. MVUE B. BLUE C. MVB D. None of the above ( )

6. A resampling technique which consists of drawing "n" resamples of size m=n-1 each time from the original sample by deleting one observation at a time and uses for estimation of functional of F is called

A. Bootstrapping B. Sampling C. Jack-knifing D. None of the above ( )

7. Unpublished sources data as.

A. Primary data B. secondary data C. Both a & b D. None of the these ( )

8. A functional parameter for which there exists a functional statistic that is unbiased is called

A. Non estimable functional parameter B. Non parametric estimation

C. Parametric estimation D. Estimable functional parameter ( )

9. A random function of X and Θ whose distribution does not depend on Θ is called

A. Pivot B. Confidence Interval C. Random Variable D. None of the above ( )

10. Let Θ be an unknown parameter T1 be an unbiased estimator of Θ: if $Var(T1) \leq Var(T2)$, for T2 to be ant other unbiased estimator , then T 1 is known as :

A .minimum variance unbiased estimator B. unbiased and efficient estimator ( )

C. consistent and efficient estimator Unbiased and consistent, minimum variance estimator

II. Fill in the blanks. Each question carries half Mark. 1/2x10=5M /

1. Any sample constants is called a ____________________

2. Statistical data published already is known as_______________

3. Any population constant is called a _____________ .

4. Optimum allocation is also known as __________________ allocation.

5. The precision of an estimator is defined as the reciprocal of its mean square error______________

6 .The process of making decisions about either the form of distribution or parameters involved in it, on the basis of observed sample data set is called _________________________.

7. A statistic which is a function of all other sufficient statistics for Θ is called ____________________.

8. It is the process of estimating the parameters of the population using statistics is called______________

9. The ratio of the standard error of the estimator to the expected value of the estimator is known as the _______________________

10. The difference between a parameter and its estimator is known as the sampling error in the estimation of the parameter by its estimator____________________

III. Write short answers to the following. Each question carries ONE Mark. 1x10=10M

1. Find Number of possible samples of size 2 from a population of 4 units under SRSWR method.

2. Define of simple random sampling without replacement.

3. Give the Ratio estimator of population mean.

4. What is the Efficiency statistic?

5. Statement of Hurwitz – Thomson estimator..

6. State Neyman Factorization Theorem.

7. State Lower bounds for variances.

8. State methods of movements.

9. Define Fisher information.

10. Define BAN estimator.

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