INTERNAL ASSIGNMENT QUESTIONS
M.SC. STATISTICS FINAL

ANNUAL EXAMINATIONS
(2016-2017)

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)

DIRECTOR
Prof. SHIVARAJ
Hyderabad – 7 , Telangana State

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

Dear Students,

Every student of **M.Sc.(Statistics) Final** 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. If you fail to submit Internal Assignments before the stipulated date. The candidates have to pay the examination fee and submit the Internal Assignment in the same academic year. If the candidate fails to submit the Internal Assignment after payment of the examination fee they will not be given an opportunity to submit the Internal Assignment afterwards, the Internal marks will not be added to University examination marks under any circumstances.

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   (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.

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Prof. Shivaraj
DIRECTOR

M.Sc FINAL YEAR (CDE)
ASSIGNMENT
SUBJECT : STATISTICS
Paper-I : STATISTICAL INFERENCE

I. Give the correct choice of the Answer like 'a' or 'b' etc in the brackets provided against the question. Each question carries half Mark.

1. The assumptions of most nonparametric test are

   a) Sample observations are independent b) The variable under study are continuous
   c) both (a) and(b) d) none of the above ( )

2. If n_a is the sample size for test A and n_b is the sample size for test B, the power efficiency of test B wth respect to test A is

   a) $(n_a / n_b)*100$ b) $(n_b / na)*100$ c) $(n_a n_b)*100$ d) $(n_a + n_b)*100$ ( )

3. The test statistic using LRT for testing the equality of two Normal population variances when means unknown
   a) t b) F c) χ^2 d)none of the above ( )

4 To test for the randomness of given sample we apply

   a) Mann Whitney U test b) Wilcoxon's Signed Rank test c) Sign Test d) Run test ( )

5. In SPRT the sample size is
   a) fixed b) fixed but small c) fixed but large d) random variable ( )

6. Among the class of unbiased test a test whch is UMP is called

   a) MP b) UMP c) UMPU d) UMPIT ( )

7. To decide about Ho SPRT involves

   a) One region b) two region c) three regions d) None of the above ( )

8. If the Likelihood Ratio is λ, the variable $-2\log_e\lambda$ is approximately distributed as

   a) t b) F c) χ^2 d) none of the above ( )

9. In SPRT the bounds of two constants A and B are given by

   a) $0<A<B<1$ b) 0<B<A<! c) $B<A<1$ d) none of the above ( )

10. A best confidence Interval will have its width

    a) larger b) shortest c) length is insignificant d) none of the above ( )

II. Fill in the blanks. Each question carries half Mark.

11. In SPRT Wald's Fundamental Identity is given by _____

12. The Kolmogorov and Smirnov two sample test statistic is given by_____

13. The mean of Spearmans ρ under the null hypothesis is_____.

14. In testing the equality of two Normal populations means with σ^2 unknown the test statistic is given by_____.

15. Confidence Interval is specified by _____.limits.

16. In finding the C.I for large samples, Z is _____.

17. Homogenity of several populations variances can be tested by _____.

18. The O.C. function in SPRT is _____

19. In SPRT the decision is taken after each _____observation.

20. If X is Normal (μ,σ^2) when σ^2 is known the $100(1-\alpha)\%$ C.I for μ is_____

III. Write short answers to the following. Each question carries one Mark.

21. Define Randomized test and Non randomized test give an example

22. What is power efficiency, explain

23. Give the definition of one parameter exponential family, give an example, which does not belong to one parameter exponential family

24. What is an unbiased test ,write an example

25. write the concept of Robustness

26. Obtain the Bst Critical Region for the sample with density
$f(x,\theta) = \exp(-(x-\theta)),(\theta \leq x \leq \infty)$ for testing Ho :$\theta = \theta o$ vs.H_1:$\theta = \theta_1$

27. Find MP test of size α for testing . Ho:X~N(0,1) vs. H_1 X~C(1,0)

28 State the asymptotic properties of LRT.

29. Write the LRT procedure for testing the equality of several Normal populations means

30. Write the general assumptions and procedure for testing the measure of dispersion

M.Sc. STATISTICS - FINAL
CDE ASSIGNMENT - 2017
PAPER- II: LINEAR MODELS & DESIGN OF EXPERIMENTS

I Give the correct choice of the answer like 'a' or 'b' etc in the brackets provided against the question, Each question carries ½ mark:

1. ANCOVA is a combination of

a) ANOVA and Regressionanalysis b) ANOVA and Time series analysis
c)ANOVA and Multivariate analysis d) None of these ( )

2. $V(e_{1.23}) =$

a) σ_1^2 b) $\sigma_1^2 - \sigma^2_{1.23}$ c) $\sigma^2_{1.23}$ d) $\sigma_1^2 + \sigma^2_{1.23}$ ( )

3. The contrast coefficients for estimating the quadratic effect in a 3^2 factorial experiment are
a) -1,2,1 b) 1,-2,1 c)-1,0,-1 d) -1,0,1 ( )

4.The correlation between two sets of variables is called _____ correlation

a) multiple b) partial c)canonical d)None ( )

5. The degrees of freedom for the effect AB in a 3^2 factorial experiment is

a) 2 b) 4 c) 1 d) 8 ( )

6. The estimate of an effect in a 2^2 factorial experiment with r-replicates is

a) $(\text{contrast})/2^2.r$ b) $(\text{contrast})^2/2^2.r$ c)$(\text{contrast})/2^{2-1}.r$ d) $(\text{contrast})^2/2^{2-1}.r$ ( )

7. The sum of coefficients in a contrast is

a) positive b) negative c) zero d) none ( )

8. In a 2^3factorial design with 3 replicates in 2 blocks each, if the effect AB is confounded in replicate I and II the effect AC is confounded in replicate III, then the design is

a) Partially confounded b) Completely confounded
c) Balanced partially confounded d) None ( )

9. Which of the following is a multiple comparison test

a) t-test b) LSD test c) ANOVA d) None ( )

10. In the Analysis of covariance one way the estimate of regression parameter β is

a)E_{YY}/E_{XX} b) E_{YY}/E_{XY} c) E_{XY}/E_{XX} d) None of the above( )

II. Fill in the blanks. Each question carries half Mark.

1. A factorial experiment with equal number of levels of all factors is called _____ factorial experiment.

2. In the ANCOVA two-way classification, if the regression coefficient β is insignificant then the model reduces to_____.

3. The one-way classification model is _____.

4. The partial corrrelation coefficient $r_{12.3}$= _____.

5. The technique of arranging 2^kfactorial experiment in two blocks is known as_____.

6. The relation between multiple and partial correlation coefficients is given by _____.

7. The linear statistical model for Yourden square design is _____.

8. The treatment combinations of 2^3 factorial experiment with factors A, B, C are_____.

9. Gauss Markov model assumes variance –covariance matrix of error vector of the form _____.

10. In Generalized least squares method V(Є) = _____.

III. Write short answers to the following. Each question carries ONE Mark.

1. Explain fisher's least significant difference test.
2. Give the normal equation for estimating the regression coefficient β in the analysis of covariance one-way classification model.
3. Give the estimates of main effects and interaction effect of a 2^2 factorial experiment with two replicates.
4. Give the layout of 2^4 factorial experiment.
5. Explain Balanced partial confounding technique.
6. Explain Simple lattice design.
7. Define a BIBD.
8. Give the differences between BIBD and PBIBD.
9. What is fractional replication.
10. Define a Split plot design

M.Sc. STATISTICS - FINAL

CDE ASSIGNMENT - 2017

PAPER- III: OPERATIONS RESEARCH

I Give the correct choice of the answer like 'a' or 'b' etc in the brackets provided against the question, Each question carries ½ mark:

1. If the primal problem has an unbounded solution then the dual problem has

a) Unbounded solution (b) feasible solution
c) No Feasible solution (d) Optimum solution ( )

2. In which method, we use the formula $\min\{x_{bi}\,;\, x_{bi} < 0\}$ to obtain the leaving variable

a) Dual simplex b) Duality c) Simplex d) Big M ( )

3. The cost coefficient of the Gomory's variable is taken as

a) 0 b) 1 c) -1 d) –M ( )

4. Assignment problem is a particular case of

a) Travelling Salesman Problem b) Linear Programming Problem
c) Transportation Problem d) Dynamic Programming Problem ( )

5. Travelling Salesman Problem is a particular case of

a) Assignment problem b) Linear Programming Problem
c) Transportation Problem d) Dynamic Programming Problem ( )

6. In Critical Path Method we can obtain a path which has

a) Minimum Distance b) Maximum Distance
c) Constant Distance d) cannot be said ( )

7. The number of allocations in Transportation Problem are

a) m + n b) m + n - 1 c) m d) n ( )

8. Dynamic programming problem is a _____ decision system.

a) Single stage b) Two stage c) Multi stage d) Cannot be said ( )

9. In the single goal model the coefficient of d_i^+ and d_i^- is

a) (+1, -1) b) (-1, +1) c) (-1, -1) d) (+1, +1) ( )

10. If x is the number of units in inventory and s, S are the minimum and maximum stock levels and if x< s then order _____ number of units.

a) S-x b) S+x c) s-x d) s+x ( )

(b) Fill up the blanks, Each question carries ½ mark:

11. If the primal problem is to minimize the objective function then the dual problem will be to _____ the objective function.

12. In IPP, if the values of the variables are restricted to be either zero or one, then the IPP is known as _____ programming problem.

13. An activity A which must be completed before the start of another activity B, then activity A is known as _____ activity.

14. In PERT the expected activity time t_e = _____.

15. Loops in a Transportation Problem should have _____ number of cells.

16. Perishable products have _____ limit for selling them in the market.

17. Graphical method is used for games of order _____

18. According to the Poisson postulates, the probability of no arrival during small time interval h is _____

19. If a waiting customer leaves the queue due to impatience then the behavior of the customer is known as _____.

20. Cost slope = _____.

III. Write short answers to the following. Each question carries ONE Mark.

21. Define Linear Programming Problem.
22. Obtain the dual problem of Max. $Z = 4x_1 + 2x_2$ Subject to the conditions $x_1+x_2 \geq 3$, $x_1-x_2 = 2$, $x_1, x_2 \geq 0$.
23. Define a Critical Path.
24. Explain (M/ M/ 1): (∞/ FIFO) notation.

25. Define Bellman's Principle of Optimality:-
26. Explain briefly about various time estimates involved in PERT:-
27. Explain about unbalanced Assignment Problem:-
28. Explain about the Mathematical form of Transportation problem:-
29. Difference between LPP and GPP
30. Obtain saddle point and value of the game to the following game

	B_1	B_2	B_3	B_4	B_5
A_1	9	3	1	8	0
A_2	6	5	4	6	7
A_3	2	4	4	3	8
A_4	5	6	2	2	1

M.Sc. STATISTICS - FINAL

CDE ASSIGNMENT - 2017

PAPER- IV: STATISTICAL QUALITY AND PROCESS CONTROL & TIME SERIES ANALYSIS

I Give the correct choice of the answer like 'a' or 'b' etc. in the brackets provided against the question, Each question carries ½ mark:

1. Average Run Length is given by

   a) $1-P_a$ b) $1/(1 - P_a)$ c) $1/(1 - \alpha)$ d) none of the above ( )

2. The EWMA is defined as Y_t =

   a) $\beta x_i - (1 - \beta) Y_{t-1}$ b) $\alpha x_i + (1 - \alpha) Y_{t-1}$
   c) $\alpha x_i - (1 - \beta) Y_t$ d) None of the above ( )

3. V-Mask procedure is proposed by

   a) Duncun, 1950 b) Dodge, 1930 c) Bernard, 1959 d) None ( )

4. If the items are selected one by one from the lot and the accumulated number of defective items at every stage are compared with a sequence of numbers for a decision, such plans are called

   a) Acceptance plans b) Sequential sampling plans
   c) Continuous sampling plans d) None of the above ( )

5. Psycological dis-satisfaction of giving the lot a second chance is an advantage of

   a) SSP b) DSP c) VSP d) None ( )

6. Relation between ψ weights and $\prod$ weights is

   a) $\prod(B) = \psi(B)$ b) $\prod(B) = \psi^{-1}(B)$ c) $\prod^{-1}(B) = \psi(B)$ d) $\prod^{-1}(B) = \psi^{-1}(B)$ ( )

7. Variance of MA(1) process is

   a) $\gamma_0 = (1 + \theta_1)\sigma_a^2$ b) $\gamma_0 = (1 - \theta_1)\sigma_a^2$ c) $\gamma_0 = (1 + \theta_1^2)\sigma_a^2$ d) $\gamma_0 = (1 - \theta_1^2)\sigma_a^2$ ( )

8. ARMA(1,1) process is given by

   a) $Z_t - \phi_1 Z_{t-1} = a_t - \theta_1 a_{t-1}$ b) $Z_t + \phi_1 Z_{t-1} = a_t + \theta_1 a_{t-1}$
   c) $Z_t + \phi_1 Z_{t-1} = a_t - \theta_1 a_{t-1}$ d) $Z_t - \phi_1 Z_{t-1} = a_t + \theta_1 a_{t-1}$ ( )

9. Estimates of Partial autocorrelations in AR(2) are given by

a) $\hat{\phi}_{21} = r_1(1+r_2)/1-r_1^2 and\ \hat{\phi}_{22} = r_2 + r_1^2/1-r_1^2$

b) $\hat{\phi}_{21} = r_1(1-r_2)/1-r_1^2 and\ \hat{\phi}_{22} = r_2 + r_1^2/1-r_1^2$

c) $\hat{\phi}_{21} = r_1(1+r_2)/1-r_1^2 and\ \hat{\phi}_{22} = r_2 - r_1^2/1-r_1^2$

d) $\hat{\phi}_{21} = r_1(1-r_2)/1-r_1^2 and\ \hat{\phi}_{22} = r_2 - r_1^2/1-r_1^2$

10. In time series forecasting procedure Z_{t+l}

a) $\hat{e}_t(l) + z_t(l)$ b) $e_t(l) + \hat{z}_t(l)$ c) $\hat{e}_t(l) - z_t(l)$ d) $e_t(l) - \hat{z}_t(l)$ ( )

II. Fill in the blanks. Each question carries half Mark.

11. P-chart is _____ sensitive than $\overline{X}$ and P-charts.
12. The highest peak of Average Outgoing Quality curve is known as _____ .
13. In designing a control chart _____ size is the most important factor.
14. The moving average of span 'w' at time 't' is defined as $M_{t=}$ _____ .
15. _____ is defined as number of items inspected on an average and rectifying sampling plans where rejected lots are inspected 100%.
16. Auto Regressive process is always _____.
17. Autocorrelation function of ARMA process is _____ for $k \geq q+1$.
18. No. of significant partial autocorrelations will define order of _____ process.
19. In ARIMA(1,d,1) model p_1 decays exponentially from _____ Lag.
20. In time series models a_t is known as _____ Process.

III. Write short answers to the following. Each question carries ONE Mark.

21. What are CUSUM control charts.
22. Explain TQM.
23. Define double sampling plan for attributes.
24. Write about Dodge's continuous sampling plan - I.
25. Give the control limits of $\overline{X}$ and R charts.
26. Define Stationary Time Series.
27. Define the two general linear processes. State their properties.
28. Define the three explicit forms of ARIMA process.
29. Explain the role of autocorrelations and partial autocorrelations in model identification.
30. State the rules to obtain the forecasts $\hat{Z}_t(l)$ in any of the three explicit forms.

INTERNAL ASSIGNMENT QUESTIONS
M.Sc. SATISTICS PREVIOUS

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DIRECTOR

M.Sc. STATISTICS - PREVIOUS
CDE ASSIGNMENT - 2017
PAPER- III : DISTRIBUTION THEORY AND MULTIVARIATE ANALYSIS

I Give the correct choice of the answer like 'a' or 'b' etc in the brackets provided against the question, Each question carries ½ mark:

1. The Moment Generating function of Binomial Distribution is

a) $(q+pe^{it})^n$ b) $(q+pe^{t})^{-n}$ c) $(q+pe^{t})^n$ d) $(q+pe^{t})^{1/n}$ ( )

2. The Moment Generating function of Cauchy Distribution is

a) $\lambda e^{\mu t}$ b) $\lambda/e^{\mu t}$ c) $e^{\mu t}/\lambda$ d) Does not exists ( )

3. If X ~ B(n, p) and n ~ P(λ) then the compound distribution of X follows

a) P(λp) b) B(nq, p) c) P(λ/p) d) B(np, q) ( )

4. The characteristic function of Poisson distribution is

a) $e^{-\lambda(e^{it}-1)}$ b) $e^{\lambda(e^{it}+1)}$ c) $e^{\lambda(e^{it}-1)}$ d) $e^{-\lambda(e^{it}+1)}$ ( )

5. Suitable Distribution to study the income levels of the people living in a particular place

a) Pareto b) log normal c) Normal d) Weibull ( )

6. The Moment generating function of Multivariate Normal distribution is

a) exp { t'μ + ½ t'Σt} b) exp{ t'μ - ½ t'Σt}
c) exp { t'μ + ½ t'Σt} d) None ( )

7. The Moment generating function of Wishart distribution is

a) $\{ |\Sigma|/ |\Sigma-2t|\}^{n/2}$ b) $\{ |\Sigma^{-1}|/ |\Sigma^{-1}+2t|\}^{n/2}$ c) $\{ |\Sigma^{-1}|/ |\Sigma^{-1}-2t|\}^{n/2}$ d) None ( )

8. If $X_1 \sim B(n_1,P_1)$, and $X_2 \sim B(n_2,P_2)$ then X_1+X_2 follows _____ distribution

a) Binomial b) Multinomial c) Chi-square d) None ( )

9. The MGF of Multinomial distribution is

a) $n!\ \Pi\ P_i^{Xi}/X_i!$ b) $n!(\Pi\ P_i\ e^{ti})^n$ c) $(\Sigma\ P_i\ e^{iti})^n$ d) None ( )

10. If $A \sim W_P(\Sigma, m)$ $B \sim W_P(\Sigma, n)$ $(m, n \geq p)$ are independent then $|A| / |A+B|$ follows

a) Normal b) Wishat c) Wilks Λ d) None ( )

II. Fill in the blanks. Each question carries half Mark.

1. If $\phi_X(t)$, $t \in R^1$ is a characteristic function of a random variable X then the characteristic function of $Z = (X - \mu) / \sigma$ is _____ where μ and σ^2 are the mean and variances of X.

2. The Distribution function of a maximum ordered statistic is _____.

3. If X ~ $\chi^2_{(n1)}$ and Y ~ $\chi^2_{(n2)}$ are independent χ^2 variates then X/Y ~ _____.

4. If the joint probability density function of X and Y is f(x,y); $x \geq 0, y \geq 0$ then the marginal probability density function of X is given by f(x) = _____.

5. If X~ N(μ, σ^2) then Y = e^x is a _____ variate.

6. If the density function is $f(\underline{x})$ = (1/2) exp $\{-\frac{1}{2}\{(x_1-1)^2+(x_2-2)^2\}\}$ then covariance Σ is _____.

7. The coefficients of $(t_1^2/2!)$ and $(t_2^2/2!)$in the CGF of Multinomial are _____.

8. The conditional density of multivariate normal (when p=2) is _____.

9. The correlation between two multivariate normals in p-variate case is _____.

10. The Null distribution of Hotelling T^2 is _____.

III. Write short answers to the following. Each question carries ONE Mark.

1. If X~ N(30, 25) then find P(26 ≤ X ≤ 40):-
2. Obtain Moment generating function of Exponential Distribution.
3. Define Gamma Distribution.
4. Define Hypergeometric Distribution.
5. State the conditions in which (i) Binomial Distribution tends to Poisson distribution and (ii) Binomial Distribution tends to Normal Distribution.
6. State the applications of Wishart distribution.
7. State the applications of Hotelling T^2.
8. If X ~ $N_3([4\ \ 5\ ],\ \Sigma=\begin{bmatrix}12 & 8\\ 8 & 9\end{bmatrix}$ then the density of bi-variate normal.
9. Examine the additive property of Wishart distribution.
10. Define the Generalized variance.

M.Sc. STATISTICS - PREVIOUS
CDE - ASSIGNMENT - 2017
Paper-I : MATHEMATICAL ANALYSIS & LINEAR ALGEBRA

I. Give the correct choice of the Answer like 'a' or 'b' etc. in the brackets provided against the question. Each question carries half Mark.

1. $f(x) = \begin{cases} 1 & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$ has _____ at x = 0.

   a) continuity b) removable discontinuity
   c) irremovable discontinuity d) discontinuity ( )

2. Derivability of a function at a point implies continuity of the function at that point. Its converse is

   a) not true b) true c) cannot be proved
   d) true subject to some conditions ( )

3. A function 'f' is said to be a function of Bounded variation if there exists a positive number M such that $\sum_{k=1}^{n} |\Delta f_k|$ _____ M for all partitions on [a, b], where $\Delta f_k = f(x_k - f_{k-1})$.

   a) < b) > c) $\leq$ d) $\geq$ ( )

4. If f, g, (f+g), (f-g) and f.g are functions of Bounded variation on [a, b], then $V_{fg}(a,b)$ _____ A $V_f(a,b)$ + B $V_g(a,b)$.

   a) > b) $\geq$ c) < d) $\leq$ ( )

5. Which of the following conditions are equivalent to Riemann – Stieltjes

   a) f ε R(α) on [a,b] b) $\underline{I}(f,\alpha) = \bar{I}(f,\alpha)$ c) neither (a) nor (b) d) both (a) and (b) ( )

6. If A^+ is Moore - Penrose inverse of A, it should satisfy _____ conditions.

   a) AA^+ and A^+A should be symmetric b) $AA^+A = A$ and $A^+AA^+ = A^+$
   c) both (a) and (b) d) either (a) or (b) ( )

7. If A is an mxn matrix, its generalized inverse is of order

   a) nxm b) mxn c) mxm d) nxn ( )

8. A vector 'X' is said to be orthogonal to onother vector 'Ý' if the inner product of X and Y is

   a) positive b) negative c) zero d) All the above three( )

9. If $V_n(F)$ is a vector space and the set $S = \{X_1, X_2, \ldots\ldots, X_n\}$ is a finite set of vectors in $V_n(F)$, then the set S is called a basis of subspace if

a) S is linearly independent b) S spans $V_n(F)$
c) both (a) and (b) d) neither (a) nor (b) ( )

10. A system of linear equations AX = b is said to be consistent iff

a) $AA^+ b = b$ b) $AA\ b = b$ c) neither (a) nor (b) d) either (a) or (b) ( )

II. Fill in the blanks. Each question carries half Mark.

11. A function 'f' is said to tend to a limit 'Ç' as 'x' tends to 'h' if the left limit and right limit exist and are _____.

12. If F : [a, b] ε ℜ is a function and $a = x_o < x_1 < x_2 < \ldots\ldots\ldots\ldots < x_n = b$, then the set of points P $= \{ x_o, x_1, x_2, \ldots\ldots, x_n\}$ is called_____.

13. If a function 'f'is monotonic on [a, b] then 'f' is a function of _____.

14. If $V_f(a,b) = \text{Sup}\{\Sigma P,\ P\ \varepsilon\ \mathcal{P}[a,b]\}$ is known as _____ of the function 'f' on [a,b].

15. The function 'f' is said to satisfy _____ condition with respect to α, if for every $\in > 0$ there exists a partition $P_\in$ such that for every finer partition $P \supset P_\in$, we have $0 \leq U(P, f, \alpha) - L(P, f, \alpha) < \in$.

16. Every Moore - Penrose inverse is also _____ inverse. But, the converse need not be true.

17. Rank of Moore - Penrose inverse of a matrix A is _____ the rank of matrix A.

18. If A is an mxn matrix, A or A^c is called its generalized inverse if _____.

19. The number of linearly independent vectors in any basis of a sub-space 'S' is known as _____ of the sub-space.

20. A system of linear equations AX= b is said to be consistent iff _____ where B is the augmented matrix.

III. Write short answers to the following. Each question carries ONE Mark.

21. Define removable discontinuity.
22. State Second Mean Value theorem.
23. State the properties of trace of a matrix.
24. State the properties of generalized inverse.
25. Define length of a vector of 'n' elements.
26. Define inner product of two vectors X and Y of order nx1.
27. Define homogeneous and Non-Homogeneous system of equations.
28. State the properties of trace of a matrix.
29. State the properties of generalized inverse.
30. Define Algebraic and Geometric multiplicity of characteristic root.

M.Sc. STATISTICS - PREVIOUS
CDE - ASSIGNMENT - 2017
PAPER- II : PROBABILITY THEORY

I. Give the correct choice of the Answer like 'a' or 'b' etc. in the brackets provided against the question. Each question carries half Mark.

1. If the cumulative distribution function of a random variable X is F(x) = 0 if x < k and F(x) = 1; if $x \geq k$. Then F(x) is called _____ distribution.

   a) Uniform b) Bernoulli c) Degenerate d) Discrete Uniform ( )

2. If A and B are two independent events such that $P(A^c) = 0.7$, $P(B^c) = x$ and $P(A \cup B) = 0.8$ then x =

   a) 0.1 b) 2/7 c) 5/7 d) 1/3 ( )

3. An experiment is said to be a random experiment if

   a) All possible outcomes are known in advance b) Exact outcome is known in advance
   c) Exact outcome is not known in advance d) Both (a) and (c) ( )

4. If the occurrence of one event prevents the occurrence of all other events then such an event is known as _____event.

   a) Mutually exclusive b) Independent c) Equally likely d) Favorable ( )

5. If A and B $\in \xi$ and A $\subseteq$ B then P(A) _____ P(B)

   a) > b) < c) ≥ d) ≤ ( )

6. If A and B are two independent events then_____

   a) A and B^c are also independent b) A^c and B are also independent
   c) $A^c$and B^c are also independent d) All the above ( )

7. Match the following inequalities

   a) Chebychev's inequality i) $E(XY)^2 \leq E(X)^2 E(Y)^2$
   b) Markov's inequality ii) $\varphi(E(X)) \leq E(\varphi(X))$
   c) Jensen's inequality iii) $P[|X| \geq \varepsilon] \leq E(X^p)/\varepsilon^p$
   d) Schwartz inequality iv) $P[|X| \geq \varepsilon] \leq E(X^2)/\varepsilon^2$

   a) a-iii, b-iv, c-ii, d-i b) a-iv, b-iii, c-ii, d-I
   c) a-iv, b-iii, c-i, d-ii d) a-iii, b-iv, c-i, d-ii ( )

8. Match the following inequalities

a) Holder's inequality	i) $E(\|X+Y\|^p)^{1/p} \le (E\|X\|^p)^{1/p} (E\|Y\|^p)^{1/p}$
b) Lianpunov's inequality	ii) $E(\|XY\|) \le (E\|X\|^p)^{1/p} (E\|Y\|^q)^{1/q}$, $p>1$
c) Triangular inequality	iii) $E(\|X\|^r)^{1/r} \le (E\|X\|^p)^{1/p}$, $r > p > 0$
d) Minkowski's inequality	iv) $E(\|X+Y\|^2)^{1/2} \le (E\|X\|^2)^{1/2} + (E\|Y\|^2)^{1/2}$

a) a-iii, b-iv, c-ii, d-i b) a-iv, b-iii, c-ii, d-I
c) a-iv, b-iii, c-i, d-ii d) a-iii, b-iv, c-i, d-ii ( )

9. Match the following Characteristic functions

a) Binomial	i) $p(1-qe^{it})^{-1}$
b) Geometric	ii) $(q + p\, e^{it})^n$
c) Cauchy	iii) $\exp(-\|t\|)$
d) Laplace	iv) $(1+t^2)^{-1}$

a) a-i, b-ii, c-iii, d-iv b) a-ii, b-i, c-iv, d-iii
c) a-i, b-ii, c-iv, d-iii d) a-ii, b-i, c-iii, d-iv ( )

10. If X follows U(0,12) then $P[|X-6|>4] \le$ ____

a) 0.75 b) 0.3334 c) 0.25 d) None of these ( )

II. Fill in the blanks. Each question carries half Mark.

1. If the number of items produced during a week is a random variable with mean 200. The probability for weeks production will be at least 250 is _____
2. The joint p.d.f. of (X,Y) is given by $f(x, y) = 2 \quad 0 < y < x$ then the $f(y / X=x)$ is _____
3. For any characteristic function $\phi_x(t)$, the real part of $(1-\phi_x(t)) \ge$ _____
4. Borels SLLN is defined for _____ random variables.
5. The WLLN's defined for Bernoulli random variables is known as _____
6. Demoivre's Laplace CLT is defined for _____ random variables.
7. _____SLLN's is a particular case of Kolmogorov's SLLN's.
8. Bochner's stated that, the necessary and sufficient condition for $\phi_x(t)$ to be characteristic function is _____.
9. The variance of X~U(5,9) is _____
10. If f(x) is a convex function and E(X) is finite then $f[E(X)] \le E[f(X)]$ this is known as _____ inequality.

III. Write short answers to the following. Each question carries ONE Mark.

1. Give the Kolmogorov's definition to the probability.
2. State Inversion theorem of characteristic function.
3. State the Uniqueness and inversion theorems for characteristic function.
4. State Holder's inequality.
5. Define Weak and Strong Law of Large numbers.
6. Define convergence in Probability and Convergence in Quadratic mean.
7. Show that convergence in probability implies convergence in law.
8. State the Levy continuity theorem and give its application.
9. State Liapunov Central Limit Theorem.
10. State Lindberg Feller Central Limit Theorem.

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Paper-IV : SAMPLING THEORY & THEORY OF ESTIMATION

I. Give the correct choice of the Answer like 'a' or 'b' etc. in the brackets provided against the question. Each question carries half Mark.

1. In stratified random sampling with optimum allocation, n_h is large if stratum variability S_h is

   a) zero b) small c) large d) none of the above ( )

2. In two-stage sampling with equal first stage units, variance of sample mean per second stage units is given by

   a) $\left(\frac{1-f_1}{n}\right)+\left(\frac{1-f_2}{m}\right)$ b) $\frac{S_b^{\,2}}{n}(1\text{-}f_1)+\frac{S_w^{\,2}}{nm}(1\text{-}f_2)$

   c) $\frac{S_b^{\,2}}{n}(1\text{-}f_1)+(1\text{-}f_2)$ d) None of the above ( )

3. In PPSWOR, Horwitz-Thomson estimator of population total 'Y' is defined by

   a) $\sum_{i=1}^{N}\frac{Y_i}{P_i}$ b) $\sum_{i=1}^{n}\frac{y_i}{P_i}$ c) $\sum_{i=1}^{n}\frac{y_i}{\pi_i}$ d) None of the above ( )

4. PPSWOR is _____ efficient than PPSWR.

   a) more b) less c) equally d) None of the above ( )

5. The errors arising at the stages of ascertainment and processing of data are termed as

   a) Sampling errors b) group A errors c) Non-sampling errors d) None ( )

6. If $T_1(x)$ and $T_2(x)$ be two unbiased estimators of θ, $E(T_1^{\,2}(x)) < \infty$ and $E(T_2^{\,2}(x)) < \infty$, then efficiency of $T_1(x)$ relative to $T_2(x)$ is denoted by 'e' and is defined as

   a) $e=\frac{V(T_2(x))}{V(T_1(x))}$ b) $e=\frac{V(T1(x))}{V(T_2(x))}$

   c) $e=V(T_2(x))-V(T_1(x))$ d) $e=V(T_2(x))+V(T_1(x))$ ( )

7. In Cramer – Rao inequality $Var(T(x)) \geq$ …….

   a) $(\psi(\theta))^2 \big/ I_x(\theta)$ b) $(\psi^1(\theta))^2 \big/ I_x(\theta)$ c) $I_x(\theta) \big/ (\psi(\theta))^2$ d) $I_x(\theta) \big/ (\psi^1(\theta))^2$ ( )

8. Let $x_1, x_2, \ldots\ldots, x_n$ be a random sample from $P(\lambda)$ population. Method of moment estimator of λ is

   a) $\frac{\bar{x}}{n}$ b) $n\,\bar{x}$ c) $\bar{x}$ d) $\bar{x}+n$ ( )

9. Confidence interval for chebychev's inequality is given by T(x) ± ……..

a) $E(E(T(x))+\theta)^2$ b) $E(E(T(x))-\theta)^2$ c) $E\sqrt{(E(T(x)+\theta)^2}$ d) $E\sqrt{(E(T(x)-\theta)^2}$ ( )

10. Rosenblatt's naïve estimator, optimum band width h_n is given by

a) $\left(\frac{C_1}{4C_0}\right)^{1/5} n^{-1/5}$ b) $\left(\frac{C_1}{4C_0}\right)^{1/5} n^{+1/5}$ c) $\left(\frac{C_0}{4C_1}\right)^{1/5} n^{-1/5}$ d) $\left(\frac{C_0}{4C_1}\right)^{1/5} n^{+1/5}$ ( )

II. Fill in the blanks. Each question carries half Mark.

11. SRSWOR is the technique of selecting a sample in such a way that each of the ${}^{N}C_{n}$ sample has an equal probability _____ of being selected.
12. The approximate variance of the ratio estimator of population total is given by _____.
13. The linear regression estimate of population total is given by _____.
14. The relationship between S^2, S_b^2 and S_w^2 is given by S^2 = _____ .
15. In PPSWOR, the estimate of Yates and Grundy form of variance of Y_{HT} = _____.
16. Statistic is a function of _____ observations.
17. A sufficient statistics for θ in a U[0, θ] distribution is _____.
18. Jackknife and Bootstrap are known as _____ techniques.
19. MLE's are _____ estimators.
20. $\{f_n(x)\ ;\ n \geq 1\}$ is said to be asymptotically unbiased if, for every x and f(x), $\lim_{n\to\infty} E_F f_n(x)$ _____ $f(x)$.

III. Write short answers to the following. Each question carries ONE Mark.

21. Define ratio estimator in stratified random sampling.
22. Define regression estimator in simple random sampling.
23. Define cluster sampling with an example.
24. Define sub-sampling with an example.
25. Define PPSWOR and PPSWR.
26. Explain Rao-Blackwellization.
27. Explain Bootstrap method.
28. State the properties of ML estimator.
29. Define CAN and BAN estimators.
30. Describe Shortest – length CI estimation method.