INTERNAL ASSIGNMENT QUESTIONS
M.Sc (STATISTICS) FINAL

2021

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

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Hyderabad – 7 Telangana State

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

Dear Students,

Every student of M.Sc Mathematics 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. 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 <u>hand written Assignments</u> 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.

<u>FORMAT</u>

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 **<u>8th November, 2021</u>** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

Prof. G.B. Reddy
DIRECTOR

M.Sc. STATISTICS - FINAL YEAR (CDE) - ASSIGNMENT - 2021

PAPER-I : STATISTICAL INFERENCE

Date: **Max. Marks: 20**

Name of the Candidate: _____ Roll No. _____

Note: 1. Answer Section-A & Section-B on the Question paper by taking print of these pages.

2. Answer the questions in Section C in the order that specified in Q.P. on white papers.

SECTION – A Multiple choice (10x 1/2 = 5marks)

1. In a test procedure Accepting H_0 when it is actually false is called ( )

(a) Type I error (b) Type II error (c) Level of significance (d) None

2. The ratio of the likelihood functions under H_0 and under the entire parametric space is called ( )

(a) Probability ratio (b) Sequential ratio (c) Likelihood ratio (d) None

3. Equality of several normal population means is tested by ( )

(a) Bartlett's test (b) F test (c) t test (d) Z test

4. If T_1 and T_2 are two consistent estimators of a certain parameter θ , then T_1 is more efficient than T_2 for all sample sizes. ( )

(a) $V(T_1)>V(T_2)$ (b) $V(T_1)<V(T_2)$ (c) $V(T_1)=V(T_2)$ (d) None

5. If the Likelihood Ratio is λ, the variable $-2\log\lambda$ is approximately distributed as ( )

(a) χ^2 (b) t (c)F (d) None

6. The Non parametric test in which not only the signs but also the ranks of the observations are considered is

(a) Sign test (b) Wilcoxon signed rank test (c) Wilcoxon Mann Whitney – U test (d) None ( )

7. In Wilcoxon signed rank test $T^+ + T^- =$ ( )

(a) The sample size n (b) n (n+1) (c) n(n-1) (d) n(n+1)/2

8. In SPRT $B \leq$ ( )

(a) $\beta/(1-\alpha)$ (b) $\beta/(1+\alpha)$ (c) $(1-\beta)/\alpha$ (d) $(1+\beta)/\alpha$

9. The Kolmogorov Smirnov statistic D_n is

a) Min (D_n^+, D_n^-) b) not related to D_n^+, and D_n^-) c) Max(D_n^+, D_n^-) d) None ( )

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

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

SECTION-B (Fill in the Blanks) (10 x 1/2 = 5)

1. Homogeneity of several population variances can be tested by_____test.
2. Spearman rank correlation is a non-parametric test that is used to measure the degree of association between two variables is given by_____
3. SPRT terminates with probability_____.
4. A non parametric test sometimes called a_____ test does not assume anything about the underlying distribution.
5. Pearson Lemma provides the _____ of simple hypothesis against a simple alternative hypothesis.
6. The most commonly used nonparametric tests for the k-independent sample situation is _____.
7. Quantitative analysts aim to represent a given reality in terms of a_____ value.
8. The _____ is used to determine if there is a significant relationship between two nominal (categorical) variables.
9. A best confidence Interval will have its width _____
10. To test for the randomness of given sample we apply_____

SECTION-C (10 x 1 = 10 marks)

1. State Neyman-Pearson Lemma.
2. Define Maximum likelihood Estimation.
3. Define Point Estimator?
4. Define LR test.
5. State Unbiased Estimator?
6. Write differences between Parametric and Non Parametric tests.
7. Define OC and ASN Function.
8. Define Run.
9. Define Sign test.
10. Define Wilcoxon Mann Whitney U- Statistic.

FACULTY OF SCIENCE
M.Sc. STATISTICS FINAL YEAR (CDE) ASSESSMENT
Paper- II: Linear Models and Design of Experiments

Date: **Max. Marks : 20**

Name of Candidate:_____ Roll No: _____

Note: 1. Answer Section-A & Section-B on the Question paper by taking print of these pages.
2. Answer the questions in Section C in the order that specified in Q.P. on white papers.

SECTION-A (Multiple Choice : 10 x ½ = 5 Marks)

1. In the linear model $Y = X\beta + \varepsilon$ with $E(\varepsilon) = 0$ and $D(\varepsilon) = \sigma^2 I$, normal equations for estimating the parameter vector β is given by
a) $XY = (X'X)\hat{\beta}$ b) $X'Y=(X'X)\hat{\beta}$ c) $X'Y=(X'X)^{-1}\hat{\beta}$ d) $X'Y= (X'X)^{-1}\hat{\beta}$ ( )

2. In a multiple regression model with two independent variables each with n observations, error d.f are
a) n b) n-1 c) n-2 d) n-3 ( )

3. In the analysis of multiple regression model, regression sum of squares is given by
a) $\hat{\beta}\ X'Y$ b) $\hat{\beta}\ ' X'Y$ c) $\hat{\beta} XY$ d) $\hat{\beta}\ ' XY$ ( )

4. In the linear model $Y = X\beta + \varepsilon$ with $E(\varepsilon) = 0$ and $D(\varepsilon) = \sigma^2 I$,variance covariance matrix of $\hat{\beta}$ is
a) $(X'X)\sigma^2$ b) $(XX')\sigma^2$ c) $(X'X)^{-1}\sigma^2$ d) $(XX')^{-1}\sigma^2$ ( )

5. For a simple linear regressions model if lack of fit test is insignificant, then an estimate of error variance σ^2 is given by the mean sum of squares due to
a) pure error b) Lack of fit c) residual d) regression ( )

6. In a 2^3 factorial design the effect AB is same as
a) BA b) A c) B d) ABC ( )

7. Sum of the coefficients of contrast of an effect is
a) one b) zero c) two d) None of the above ( )

8. In 2^4 factorial design with two replicates, the degrees of freedom for total sum of squares is
a) 31 b) 15 c) 7 d) 5 ( )

9. If $\beta = 0$ in one way ANCOVA model with single factor, then analysis reduces to

a) ANOVA two way classification b ANCOVA two way classification

c) ANOVA one way classification d) None of the above ( )

10. In 2^5 factorial design the no. of factors are
a) four b) five
c) two d) three ( )

Section-B 10 x 1/2 = 5M)
Fill in the blanks. Each question carries half Mark.

11. A linear function of the response vector Y is said to be a linear zero function , if E(C′Y)=_____.
12. An estimate of error variance σ^2 obtained using repeated observations on the response is called _____.
13. According to Gauss Markoff theorm, unbiased estimate of error variance σ^2 is _____ .
14. Linear zero functions are some times referred to as_____
15. If the _____ mean square is significantly greater than the prior estimate of error variance σ^2 ,then lack of fit of the regression model is considered
16. The Fisher's Least Significant difference between two treatment means =_____.
17. The two-way classification with ANCOVA model is _____.
18. The number of treatment combinations in 2^4 design, are _____.
19. The sum of squares of an effect in 2^3 factorial design is _____.
20. The d.f for error sum of squares in 2^3 factorial design with two replicates is _____.

Section-C (10 x 1= 10M)
Write short answers to the following. Each question carries one Mark.

21. Define linear parametric function and linear zero function, state the relation between two functions.
22. Define the terms lack of fit and pure error.
23. State Gauss Markoff theorem
24. What are multiple comparison tests ?
25. Give the layout of 3^2 factorial design with single replicate.
26. Explain the Split-Plot Design .
27. Define BIBD & PBIBD
28. Explain the Lattice Design
29 Explain the Youden square design
30. Explain the Concept of Fractional factorial designs

FACULTY OF SCIENCE
M.SC. II YEAR CDE ASSIGNMENT : OCTOBER 2021
SUBJECT: STATISTICS
PAPER- III: OPERATIONS RESEARCH

Date: **Max. Marks: 20**

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

Note: Answer all questions.

Note: 1. Answer Section-A & Section-B on the Question paper by taking print of these pages.
2. Answer the questions in Section C in the order that specified in Q.P. on white papers.

(a) 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. In an Assignment problem, if the number of rows are less than the number of columns then we need to add
(a) dummy row **(b)** dummy column **(c)** dummy row and a dummy column **(d)** constant ( )

2. Lpp with four variables can be solved by _____ method. ( )
(a) Graphical **(b)** Simplex **(c)** Big - M **(d)** Both b and c

3. The number of allocated cells in a Transportation problem should be ( )
(a) m+n **(b)** m+n+1 **(c)** m-n **(d)** m+n-1

4. Goal programming problem deals with ( )
(a) Single goal **(b)** Multi goals **(c)** Priority goals **(d)** All the above

5. If the constraint is $x_1+6x_2 \geq 10$ then we need to add _____ variable. ( )
(a) Slack **(b)** Surplus **(c)** Artificial **(d)** Both b and c

6. In two phase method the cost of artificial variable is taken as ( )
(a) 1 **(b)** -1 **(c)** –M **(d)** Cannot be said

7. In Critical Path Method we can obtain a path which has ( )
(a) Minimum Distance **(b)** Maximum Distance **(c)** Constant Distance **(d)** cannot be said

8. In Assignment problem, to obtain the optimal solution, draw lines through _____ rows and_____ columns.
(a) Marked, Marked **(b)** Unmarked, Marked **(c)** Unmarked, Marked **(d)** Unmarked, Unmarked ( )

9. If the primal problem has unbounded solution then the dual problem has _____ solution ( )
(a) Feasible **(b)** Infeasible **(c)** unbounded **(d)** None

10. Dynamic programming problem is a _____ decision system. ( )
(a) Single stage **(b)** Two stage **(c)** Multi stage **(d)** Cannot be said

(b) Fill up the blanks, each question carries ½ marks:

1. Dual of Dual is _____.

2. The net evaluations of the primal slack variables will be the solution to the _____ variables.

3. Assignment problem is defined for _____ of the objective function.

4. At EOQ Ordering cost _____Carrying cost

5. In simplex method Minimum Z = _____.

6. In simplex method, a feasible solution is optimum if Δ_j _____.

7. In job sequencing the total elapsed time is _____.

8. In simplex method, if the entering variable has all the elements ≤ 0 then the problem has_____ solution.

9. In simplex method, if there is a tie in the values of the minimum ratios ɵ then such a problem is known as _____ .

10. For the games of order 2 x n or m x 2 _____ method is used to solve the game.

.

c) Answer the following questions, Each question carries 1 mark

1. **Define Linear Programming Problem.**

2. **Explain why we introduce an artificial variable into the simplex table.**

3. **Explain about unbalanced Assignment Problem.**

4. **Define Primal and Dual problems.**

5. **Explain about the Mathematical form of Transportation problem.**

6. **Explain briefly about various time estimates involved in PERT.**

7. **Define Bellman's Principle of Optimality.**

8. **Define DPP.**

9. **Explain the need for Integer programming problem and give two of its applications.**

10. **Define Carrying cost and set up cost in Inventory.**

FACULTY OF SCIENCE
M.Sc. (Final) (CDE) Internal Assignment
SUBJECT: STATISTICS
PAPER: IV: Time Series Analysis & Statistical Process and Quality Control

Date: **Max. Marks: 20**

Name of the Student_____ Roll No:_____

Note: 1. Answer Section-A & Section-B on the Question paper by taking print of these pages.
2. Answer the questions in Section C in the order that specified in Q.P. on white papers.

SECTION-A (Multiple Choice : 10 x ½ = 5 Marks)

1. The forecasts on the basis of a Time Series are: **[ ]**
   a) Cent percent true b) True to a great extent
   c) Never true d) None of the above

2. Cyclic variations in a Time Series are caused by: **[ ]**
   a) Lockouts in a factory b) War in a Country
   c) Floods in the series d) None of the above

3. Least square estimates of parameters of a trend line: **[ ]**
   a) Have minimum variance b) Are unbiased
   c) Can exactly be obtained d) All the above

4. A Time Series consists of: **[ ]**
   a) Long-term changes b) Short-term variations
   c) irregular variations d) All the above

5. Variation in the Items produced in a factory may be due to: **[ ]**
   a) Chance factors b) Assignable causes
   c) Both a & b d) None of the above

6. Variation due to assignable causes in the product occurs due to: **[ ]**
   a) Faulty process b) Carelessness of operators
   c) Poor quality of raw material d) All the above

7. Control charts consists of: **[ ]**
   a) Three control lines b) Upper and lower control limits
   c) The level of the process d) All the above

8. Main tools of statistical quality control are: **[ ]**
   a) Shewhart charts b) Acceptance sampling plans
   c) Both a & b d) None of the above

9. OC Curve reveals the ability of the sampling plan to distinguish between: **[ ]**
   a) Good and bad lots b) Good and bad sampling plans
   c) Good and bad product d) All the above
1. The Time Series Analysis helps: **[ ]**
   a) To Compare the two or more series b) To know the behavior of business
   c) To make predictions d) All the above

SECTION-B (Fill in the Blanks: 10 x ½ = 5 Marks)

Fill in the blanks:> **(10x1/2=5)**

1. A Time Series is a set of values arranged in_____Order
2. A Time Series consists of at the most _____Components
3. Monthly fluctuations observed in a time series data are termed as _____Variation
4. Moving averages remove _____Variation
5. An auto regressive series is a _____values of a Time Series at time t with values at previous time intervals
6. The variation due to _____factors are tolerable
7. Producer's risk is refer to _____ error
8. Consumers risk is refer to _____ error
9. Number of defects follows _____ distribution
10. Sampling inspection results into _____in the process of inspection than total inspection

Section-C(10x1=10)
Write short answers to the following. Each question carries one Mark.

1. Define Time Series
2. Explain about stationary Time Series
3. What is Auto correlation
4. Define ARIMA
5. Describe about to forecasting
6. Define SPQC
7. Explain about control Charts
8. Define CUSUM Chart
9. Define OC Curve
10. Explain about Six Sigma limits