INTERNAL ASSIGNMENT QUESTIONS
M.Sc. (STATISTICS) FINAL

2023

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 Final has to write and submit **Assignment** for each paper compulsorily. Each assignment carries **20 marks.** The marks awarded to the students will be forwarded to the Examination Branch, OU for inclusion in the marks memo. If the student fail to submit Internal Assignments before the stipulated date, the internal marks will not be added in the final marks memo under any circumstances. The assignments will not be accepted after the stipulated date. **Candidates should submit assignments only in the academic year in which the examination fee is paid for the examination for the first time.**

Candidates are required to submit the Exam fee receipt along with the assignment answers scripts at the concerned counter on or before **20-06-2023** and obtain proper submission receipt.

ASSIGNMENT WITHOUT EXAMINATION FEE PAYMENT RECEIPT (ONLINE) WILL NOT BE ACCEPTED

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

6. Write the above said details clearly on every subject assignments paper, otherwise your paper will not be valued.
7. Tag all the assignments paper wise and submit them in the concerned counter.
8. Submit the assignments on or before **20-06-2023** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

30/06/2023

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Paper – I(Statistical Inference) Faculty of Science

M.Sc (Statistics) CDE Final

Internal Assessment

Roll Number:

Name :

I. Choose the correct answer **Marks:**

10*= 5M

1) Whether a test is one-sided or two-sided depends on [ ]

a) Alternative hypothesis b) composite hypothesis c) null hypothesis d) simple hypothesis

2) A wrong decision about H_0 leads to [ ]

a) One kind of error b) two kinds of error c) three kinds of error d) four kinds of errors

3) Power of test is related to [ ]

a) Type I error b) type II error c) types I and II errors both d) none of the above

4) Level of significance is the probability of [ ]

a) Type I error b) type II error c) not committing error d) any of the above

5) Area of the critical region depends on [ ]

a) Size of type I error b) Size of type II error c) value of the statistic d) number of observations

6) Size of critical region is known as [ ]

a) Power of the test b) Size of type II error c) critical value of the test statistic d) Size of type error

7) Friedman test in two way analysis differ in respect of ..... [ ]

a) The alternative hypothesis b) their test statistics c) approach towards normality d) all the above

8) Kendall's tau and the Spearman's r_s differ in respect of ..... [ ]

a) Their approach towards unity b) numerical values for the same set of data

c) unbiasedness of estimates d) All the above

9) In non- parametric statistics, usually the confidence interval is found out for ..... [ ]

a) Population median b) Population mean c) both a) and b) d) None

10) Formula for coefficient of concordance H with usual notations is ..... [ ]

a) H = b) H= c) H= d) none

II. Fill in the blanks **Marks: 10*= 5M**

1. Most powerful test function for testing null hypothesis .....v/s alternative hypothesis .....
2. The power function is probability of the .....
3. The hypothesis which is under test for possible rejection is called ..... Hypothesis.
4. A hypothesis is an ..... About the parameter of a population.
5. One parameter exponential family form .....
6. The probability of type II error is called .....
7. NP lemma for Non-randomized test function $\emptyset(x)$ = ...
8. The square of the standard normal variant follows to ..... Distribution.
9. Type II error .....
10. In an experiment with 4 treatments and 5 blocks, the sums of the ranks for treatments were 12,15, 6,17. Friedman's F based on the given data is .....
11. When there are three items ranked by two investigators, the only possible values of rank correlation r_s are .....
12. Friedman's test statistics adjusted for ties with usual notations is .....
13. Asymptotic relative efficiency is also known as ..... efficiency.
14. The same ranks assigned to different units are called .....
15. Kruskal- Wallis analysis of data is meant for .....

III . Short Answer

III. Answer the following **Marks : 5*1=5M**

1. Define MP test?
2. Define randomized test function?
3. Explain about Ansari -Bradley test?
4. Write about the Kendall's Tau test?
5. Write about 2 sample dispersions Kruskal - Walli's test?

FACULTY OF SCIENCE
M.Sc. STATISTICS II year PGRRCDE
INTERNAL ASSESMENT
Paper-II: LINEAR MODELS & DESIGN OF EXPERIMENTS

Name of the Student_____ **Roll No:**_____

Note: Write answers in sequential order as per question paper only.

SECTION-A (10x ½ =5 Marks)

1. The number of MOLS that can be constructed from a Latin square of order 4 is
   a) 2 b) 3 c) 5 d) 6 [ ]
2. For a resolvable BIBD with parameters v, b, r, k, λ
   a) $b \geq v+r$ b) $b \leq v+r$ c) $b \geq v+r-1$ d) $b \leq v+r-1$ [ ]
3. The number of replicates in a simple Lattice design is
   a) 4 b) 3 c) 2 d) 1 [ ]
4. In the usual notation, for a PBIBD(2), $n_1\lambda_1+n_2\lambda_2$ is equal to
   a) r(v-1) b) r(k-1) c) b(v-1) d) b(k-1) [ ]
5. A PBIBD(2) is said to be simple if
   a) $\lambda_1 \neq 0$ b) $\lambda_2 \neq 0$ c) $\lambda_1 \neq 0, \lambda_2 \neq 0$ d) $\lambda_1 \neq 0, \lambda_2 = 0$ [ ]
6. The determinant of the incidence matrix of a symmetric BIBD is
   a) $\pm r(r-\lambda)^v$ b) $\pm r(r-\lambda)^{v/2}$ c) $\pm r(r-\lambda)^{v-1/2}$ d) $\pm r(r-\lambda)^{v+1/2}$ [ ]
7. In a BIBD, the intra-block estimator of the i^{th} treatment effect is given by
   a) $\frac{k}{\lambda v} Q_i$ b) $\frac{r}{\lambda b} Q_i$ c) $\frac{k\lambda}{v} Q_i$ d) $\frac{r\lambda}{b} Q_i$ [ ]
8. The following design

   A B C
   C D E
   B E F
   A B D
   A E F

   is a
   a) BIBD b) Youden Square Design c) Simple Lattice design d) PBIBD(2) [ ]

9. If ε is the residual and X is the regressor in a linear regression model, then Cov (X, ε) =
   a) >0 b) <0 c) $=0$ d) $\neq 0$ [ ]
10. For Estimability of a linear parametric function $\lambda'\beta$, the necessary and sufficient condition is
    a) $t'y = \lambda'$ b) $t'x = \lambda'$ c) $t'y = \beta$ d) $t'x = \beta$ [ ]

SECTION-B (10x ½ =5 Marks) Fill in the blanks.

11. In a BIBD, the inter block estimator of the i^{th} treatment effect $\tilde{\alpha}_i$ = _____.
12. In the usual notation, for a PBIBD(2), parametric relations are ___
13. For a BIBD, if N denotes the incidence matrix, determinant of NN' = _____
14. For a BIBD with parameters v, b, r, k, λ condition for affine resolvable is _____

15. The linear model for PBIBD(m) is given by _____.
16. In a PBIBD(2), the intra block estimator of i^{th} treatment effect $\hat{\alpha}_i$ = _____
17. Youden square designs can be generated from _____ incomplete block design.
18. According to Gauss-Markov theorem, in the Ordinary Least square estimate $\lambda' b^0$ of a linear parametric function $\lambda'\beta$, minimizing the error function $(Y-X\beta)'(Y-X\beta)$, b^0 is the _____.
19. In the model $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots\ldots + \beta_k X_k + \varepsilon$, if some β_j s are random samples from some distributions and the remaining are fixed effects, the the model is called _____ model.
20. The design

A	B	C
B	C	D
C	D	A
D	A	B

is a _____ design.

SECTION- C (5x1= 5 Marks)

21. When Generalized Least squares method is used instead of Ordinary Least squares method ?
22. What is an Over fitted, under fitted and best models
23. Construct a triangular PBIBD with 10 treatments.
24. Give the layout of a simple lattice design with 9 treatments
25. Distinguish between resolvable and affine resolvable BIBD
26. Define Balanced Lattice Design. Give an example for v=5.
27. Construct a BIBD with parameters $v=s^2+s+1=b$, $r=k=s+1$, and $\lambda=1$
28. Explain the concept of 3^2 Factorial experiment with confounding.
29. Explain the resolution III, IV and V designs with suitable examples.
30. Design the two blocks for 2^4 factorial experimental treatments with ABC confounded.

FACULTY OF SCIENCE
M.Sc. (STATISTICS) II- Year PGRRCDE May 2023
INTERNAL ASSESSMENT
PAPER-IV: OPERATIONS RESEARCH
Name of the Candidate: ---------- Roll No. ----------

Section-A (10 x ½ = 5)

1. Dynamic programming problem is a _____ decision system. ( )
   (a) Single stage (b) Two stage (c) Multi stage (d) Cannot be said
2. Knapsack problem is also known as ( )
   (a) Cargo loading problem (b) Fly away kit problem (c) Both (a) and (b) (d) None
3. Goal programming problem deals with ( )
   (a) Single goal (b) Multi goals (c) Priority goals (d)All the above
4. 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)
5. In the inventory problem with variable sample, the distribution function of optimal value of 'Q' , $F(Q^*)$ = ( )
   (a) C_s / C_h+C_s (b) C_h+C_s / C_s (c) C_h / C_h+C_s (d) C_h+C_s / C_h
6. The optimum value of 'Q' , Q^* for perishable items is ( )
   (a) $\frac{C_2(b-a)+C_3a+C_4b}{C_1+C_3+C_4}$ (b) $\frac{C_2(b-a)-C_3a+C_4b}{C_1+C_3-C_4}$
   (c) $\frac{C_2(b-a)-C_3a-C_4b}{C_1+C_3-C_4}$ (d) $\frac{C_2(b-a)+C_3a-C_4b}{C_1+C_3-C_4}$
7. If 'd' is the depreciation value per unit of money during a year and r is the annual interest for unit of money then d= ( )
   a) 1/r (b) 1/ 1+r (c) 1/ 1-r (d) 1/ r-1
8. When the average annual cost for n years becomes equal to the annual running cost then ( )
   (a) Replace the equipment (b) Do not replace the equipment
   (c) Go for servicing (d) None
9. 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
10. Goal programming can be solved by, which of these methods:
    (i) Graphical method , (ii) Simplex method, (iii) Modified simplex method ( )
    (a) (i) and (ii) (b) (ii) and (iii) (c) (i) and (iii) (d) All the above methods

Section-B (10 x ½ = 5)

1. Graphically Dynamic programming problem can be represented using _____.
2. Each sub-problem of a dynamic programming problem is known as a _____.
3. In Kuhn-Tucker conditions of NLPP λ is known as _____.

4. The conditions which are necessary and sufficient to solve an NLPP are given by_____.
5. Wolfe's and Beal's method are used to solve _____programming problem.
6. An NLPP in which the objective function can be expressed as a linear combination of several different univariate functions is called as _____programming problem
7. When there is a considerable uncertainty about future demands then we use _____ inventory models.
8. Perishable products have _____ limit for selling them in the market.
9. In regret criterion we develop a _____ matrix.
10. In Hurwicz criterion, 'α' is known as _____ _____ _____ _____.

Section-C (10 x 1 = 10)

1. Explain the Graphical method
2. Explain the VAM for finding IBFS of TP.
3. Explain the Hungarian algorithm
4. Explain various costs used in inventory management.
5. Explain briefly about Goal Programming Problem.
6. Define Bellman's principle of optimality & write characteristics of Dynamic programming.
7. In an instantaneous demand with setup cost model, if the holding cost is one Rupee, shortage cost is five rupees and the purchase cost is one rupee per unit then find y^*, when the demand ~ exp(1).
8. Define Separable convex programming problem.
9. Explain Branch & Bound method.
10. Explain CPM method for finding the critical path.

FACULTY OF SCIENCE
M.Sc. (FINAL)
INTERNAL ASSESSMENT
SUBJECT : STATISTICS
Paper-IV: TIME SERIES ANALYSIS

1. Holt-Winter method is applicable when the time series data consists of
   a) trend and cyclical components b) trend and seasonal components
   c) seasonal and cyclical components d) trend, seasonal and cyclical Component
   ( )

2. The Spectral density function g(f) =
   a) $I(f)/\sigma^2_z$ b) E {I(f)}
   c) $P(f)/\sigma^2_z$ d) E {P(f)} ( )

3. The residual analysis will help in evaluating the ARIMA model for
   a) adequacy b) inadequacy
   c) Stationary d) none of the above ( )

4. To get the initial estimates of AR or MA or ARMA processes we use
   a) Least squares method b) Maximum likelihood method
   c) neither a) nor b) d) both a) and b) ( )

5. In an ARIMA(p, d, q) process, order of the polynomial g(B) is
   a) p+d b) p+q
   c) q+d d) p+d+q ( )

6. The equation $T_t = \beta(L_t - L_{t-1}) + (1-\beta)T_{t-1}$ represents trend in
   a) Holt Winter b) Winter
   c) Stationary d) none of the above ( )

7 In the model $Z_t(1-1.8B+1.9B^2) = a_t$ the values of g_1, g_2 are
   a) 1.8, 1.9 b) -1.8,-1.9 c) 1.8,-1.9 d) -1.8,1.9 ( )

8. Functions which are helpful in in identifying the order of stationary time series ARIMA model is
   a) ACF b) PACF
   c) ACF and PACF d) none of the above ( )

9. The model of ARIMA(0, 1, 1) is
   a) $\nabla Z_t = a_t + \theta_1 a_{t-1}$ b) $\nabla Z_t = (1-\theta_1 B)a_t$
   c) $\nabla Z_t = a_t + \varphi_1 a_{t-1}$ d) $\nabla Z_t = (1+\varphi_1 B)a_t$ ( )

10. The model $\tilde{Z}_t = \varphi_2 \tilde{Z}_{t-2} + a_t$ represents
   a) AR(1) b) AR(2)
   c) MA(2) d) MA (1) ( )

II. Fill in the blanks

1. ARIMA(p, d, q) can be expressed in _____ explicit forms.
2. The inverted form of ARIMA (p, d, q) model is _____ .
3. To convert a non-stationary time series to stationary time series _____ operator is used.
4. In ARIMA (0, d, 1) process φ_1 = _____ .
5. Initial estimates of AR(2) process are _____
6. The residuals of AR(1) process are _____
7. The white noise process a_t follows normal distribution with mean _____ and variance _____ .
8. For an ARMA(p, q) process ACF is a mixture of _____ and _____.
9. The correlation coefficient between the t- origin forecasts errors at lead time l and l+j, $\rho(e_t(l), e_t(l+j))$ = _____
10. Auto correlation function of forecasts errors at different time origin with same lead time $\rho(e_t(l), e_{t-j}(l))$ =

III. Answer the following questions:

1. What are the different methods of Forecasting?
2. Write difference equation form of ARIMA?
3. Find ψ weights for an ARIMA (1, 1, 1) model
4. Write the diagnostic checks for the given time series model
5. Write the expression for forecasts in integrated form
6. What is the necessity of smoothing in a time series
7. What is a stochastic time series model
8. What is a periodogram?
9. Write the AR(2) model. Write the conditions for stationarity
10. What is an autocovariance function? Write the expression for AR(p) process?