|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester**  **II B.Sc Major**  **(IV Sem)**  **(2023-24)** | | | |
| Course Code | **TITLE OF THE COURSE**  **SAMPLING TECHNIQUES** |
| Teaching | Hours Allocated: 60 (**Theory**) | L | T | P | C |
| Pre-requisites: | **Basic Knowledge in Sampling methods.** | 4 | - | - | 4 |

# Course Objectives:

1. Todealwiththedatabythebasicsampling methods suchasSRS and STARTA’S
2. ToacquainttheStratified sampling applications.
3. TolearnabouttheSystematic samplinganditsapplicationstowardsthereallifeproblems.

4.To familiarwithdealingthedata byN.S.O and C.S.O organizations.

# Course Outcomes:

|  |  |
| --- | --- |
| On Completion of the course, the students will be able to- | |
| **CO1** | **learn about basic concepts of Sampling** |
| **CO2** | **learn about basic concepts of types of sampling** |
| **CO3** | **Know about various measures of stratified sampling** |
| **CO4** | **learn about various measures of systematic sampling** |
| **CO5** | **know about N.S.O and C.S.O organizations.** |

**Course with focus on employability / entrepreneurship / Skill Development modules**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Skill Development |  |  | Employability |  |  | Entrepreneurship |  |

**Unit – 1:**

Briefreviewofparameterandstatistic,samplingdistribution.Principalstepsandprinciplesinasample

survey, sampling and non – sampling errors, advantages of sampling over census, limitations, types of sampling – concept of subjective, probability and mixed sampling.

**Unit– 2:Simple RandomSampling**(withand withoutreplacement)

Notations and terminology, various probabilities of selection. Random numbers tables and its uses. Methods of selecting simple random sample, lottery method, method based on random numbers. Estimatesofpopulationtotal,meanand theirvariances and standard errors, determination of sample size, simple random sampling of attributes.

Unit–3: Stratifiedrandomsampling

Stratifiedrandomsampling,AdvantagesandDisadvantagesofStratifiedRandomsampling,Estimationof population mean, and its variance. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.

Unit–4:Systematic sampling

Systematic sampling definition when N = nk and merits and demerits of systematic sampling - estimate of mean and its variance.Comparison of systematic sampling with Stratified and SRSWOR. Comparison of variance of SRS, StRS and SYS for a linear trend.Concept of Cluster Sampling, Multistage Sampling and Quota Sampling.

Unit -5 : National and International Official Statistical System

National Statistical Organization: Vision and mission. NSSO and CSO roles and responsibilities, important activities, publications etc. National Statistical Commission: Need Constitution ,its role. functions, important ct

# Textbooks:

1. S. C. Gupta & V. K. Kapoor:Fundamentals of MathematicalStatistics, Sultan Chand&Sons, New Delhi.
2. O.P.Gupta:MathematicalStatistics,KedarnathRamnath&Co.
3. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.

# Reference books:

1. S.C. Gupta&V.K. Kapoor:FundamentalsofMathematical Statistics Sultan Chand&Sons,NewDelhi.
2. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.
3. K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.

# WebLinks:

1. <https://conjointly.com/kb/descriptive-statistics/>

2. <https://en.wikipedia.org/wiki/Descriptive_statistics>

3. <https://www.scribbr.com/statistics/descriptive-statistics/>

# CO-PO Mapping:

**(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High} '-':No Correlation)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO4 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO5 |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester**  **II B.Sc Major**  **(IV Sem)**  **(2023-24)** | | | |
| Course Code | **TITLE OF THE COURSE**  **SAMPLING TECHNIQUES** |
| Teaching | Hours Allocated: 30 (**practical**) | L | T | P | C |
| Pre-requisites: | **Basic Knowledge in Sampling methods.** | 4 | - | - | 4 |

* 1. Show the sample mean is unbiased estimator of population mean in SRSWOR and also find variance of sample mean.
  2. Showthesamplemeansquareisunbiasedestimatorof populationmean squarein SRSWOR.
  3. Show the sample mean is unbiased estimator of population mean in SRSWR and also find varianceof sample mean.
  4. Comparemeansandvariancesbetween SRSWRandSRSWOR.
  5. Allocationofsamplesizestovariousstratainproportionalandinoptimumallocationstodrawa Stratified random sample.
  6. Compare precisioninproportional and optimum allocations with SRSWOR and gain in efficiencydue to proportional and optimum allocations.
  7. Systematic sampling with N = nk and Compare the precision of an estimate in systematic samplingwith that of in Stratified andin SRSWOR.

# Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>

2. <https://en.wikipedia.org/wiki/Descriptive_statistics>

3. <https://www.scribbr.com/statistics/descriptive-statistics/>

**SEMESTER-IV: SAMPLING TECHNIQUES(MAJOR)**

**Model blue print for the Question Paper setter**

**Max. Marks: 50 Time: 2 Hrs.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module** | **Short Answer Questions** | **Essay Questions** | **Marks allotted to the Unit/Chapter** |
| **I** | **1** | **1** | **15** |
| **II** | **2** | **1** | **20** |
| **III** | **1** | **2** | **25** |
| **IV** | **2** | **1** | **20** |
| **V** | **1** | **1** | **15** |
| **Total including choice** | **7** | **6** | **95** |

**Pithapur Rajah’s Government College (Autonomous), Kakinada**

**II year B.Sc., Degree Examinations – IV Semester (w.e.f 2023-24)**

**For 2023-24 batch**

**Statistics Course 9: SAMPLING TECHNIQUES(MAJOR01)**

**Model Paper**

**Time: 2 Hrs. Max. Marks: 50**

**Answer any THREE of the following. Choosing at least one from each part. 3x10=30M**

**SECTION - A**

**PART- I**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | Explain principal steps in sample survey. | BT2 | PO2 | CO3 |
| 2 | Show that E(s2)=S2 in SRSWOR. | BT4 | PO5 | CO4 |
| **3** | Show that sample mean is unbiased estimator of population mean in Stratified random sampling. | BT2 | PO3 | CO3 |

**PART- II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | Show that V(opt)<=V(prop)<=V(srswor) | BT3 | PO4 | CO3 |
| 5 | Define Systematic sampling and write it’s advantages and disadvantages. | BT4 | PO5 | CO4 |
| **6** | Explain the roles and responsibilities of N.S.O | BT1 | PO2 | C01 |

**SECTION – B**

**Answer any FOUR of the following: 4x5=20M**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 7. | Define (i)parameter (ii) statistic (iii) Sampling distribution. | BT3 | PO5 | CO2 |
| 8 | Illustrate the types of SRS. | BT2 | PO1 | C04 |
| 9 | Explain about Random number method. | BT2 | PO2 | C04 |
| 10 | Define Proportional and Optimum allocation. | BT3 | PO3 | CO3 |
| 11 | Write about Merits and Demerits of systematic sampling. | BT2 | PO1 | C04 |
| 12 | Define Multistage sampling and Quota sampling. | BT1 | PO3 | CO5 |
| 13 | Describe the vision and mission of N.S.O | BT2 | PO3 | CO3 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester**  **II B.Sc Major2 /Minor(IV Sem)**  **(2023-24)** | | | |
| Course Code | **TITLE OF THE COURSE**  **DESIGN ANDANALYSIS OF EXPERIMENTS** |
| Teaching | Hours Allocated: 60 (**Theory**) | L | T | P | C |
| Pre-requisites: | **Basic Knowledge in Sampling methods.** | 4 | - | - | 4 |

# Course Objectives:

1. TodealwiththedatabythebasicANOVAsuchasOne way and two way applications.
2. ToacquainttheCRD Analysis.
3. TolearnabouttheRBD ,LSDanditsapplicationstowardsthereallifeproblems.

4.To familiarwithdealingthedata by factorial experiments.

# Course Outcomes:

|  |  |
| --- | --- |
| On Completion of the course, the students will be able to- | |
| **CO1** | **learn about basic concepts of Anova** |
| **CO2** | **learn about basic concepts of CRD analysis** |
| **CO3** | **learn about various measures of RBD analysis** |
| **CO4** | **know about various concept of LSD analysis** |
| **CO5** | **know about Concept of factorial experiments** |

**Course with focus on employability / entrepreneurship / Skill Development modules**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Skill Deveopment |  |  | Employability |  |  | Entrepreneurship |  |

**Unit–1:Analysisofvariance (ANOVA)**

Concept, Definitionandassumptions.ANOVA one way classification – mathematical model, analysis –withequalandunequal classification.ANOVA twowayclassification –mathematicalmodel,analysis and problems.

## Unit–2:CompletelyRandomisedDesign (CRD)

Definition, terminology, Principles of design of experiments, CRD – Concept, advantages and disadvantages, applications, Layout, Statistical analysis. Critical Differences when hypothesis is significant.

## Unit–3:RandomisedBlock Design(RBD)

Concept, advantages and disadvantages, applications, Layout, Statistical analysis and Critical Differences.Efficiency of RBD relative to CRD.RBD with one missing value and its analysis, problems.

## Unit– 4:Latin SquareDesign

Concept, advantages and disadvantages, applications, Layout, Statistical analysis and Critical Differences.Efficiency of LSD over RBD and CRD.Estimation of one missing value in LSD and its analysis, problems.

## Unit–5:Factorialexperiments

Main effects and interaction effects of 22 and 23 factorial experiments and their Statisticalanalysis. Yates procedure to find factorial effect totals.

# Textbooks:

1. S. C. Gupta & V. K. Kapoor:Fundamentals of MathematicalStatistics, Sultan Chand&Sons, New Delhi.
2. O.P.Gupta:MathematicalStatistics,KedarnathRamnath&Co.
3. K.Rohatgi &EhsanesSaleh:AnIntroductiontoProbabilityandStatistics,JohnWiley&Sons.

# Reference books:

1. S.C. Gupta&V.K. Kapoor:FundamentalsofMathematicalStatistics,Sultan Chand& Sons,NewDelhi.
2. O.P.Gupta: MathematicalStatistics,KedarnathRamnath&Co.
3. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.
4. K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.

# WebLinks:

1. <https://conjointly.com/kb/descriptive-statistics/>

2. <https://en.wikipedia.org/wiki/Descriptive_statistics>

3. <https://www.scribbr.com/statistics/descriptive-statistics/>

# CO-PO Mapping:

**(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High} '-':No Correlation)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO4 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO5 |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester**  **II B.Sc Major**  **(IV Sem)**  **(2023-24)** | | | |
| Course Code | **TITLE OF THE COURSE**  **DESIGN ANDANALYSIS OF EXPERIMENTS** |
| Teaching | Hours Allocated: 30 (**practical**) | L | T | P | C |
| Pre-requisites: | **Basic Knowledge in Sampling methods.** | 4 | - | - | 4 |

* 1. ANOVA-one-wayclassificationwithequalnumberofobservations.
  2. ANOVA-one-wayclassificationwithunequalnumberofobservations.
  3. ANOVATwo-wayclassification.
  4. AnalysisofCRDand criticaldifferences.
  5. AnalysisofRBDandcriticaldifferences.RelativeefficiencyofCRDwithRBD.
  6. EstimationofsinglemissingobservationinRBDanditsanalysis.
  7. AnalysisofLSDandefficiencyofLSDoverCRD andRBD.
  8. Estimationofsinglemissingobservationin LSDanditsanalysis.
  9. Analysisof22 withRBDlayout.
  10. Analysisof23withRBDlayout.

# Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>

2. <https://en.wikipedia.org/wiki/Descriptive_statistics>

3. <https://www.scribbr.com/statistics/descriptive-statistics/>

**SEMESTER-IV: DESIGN ANDANALYSIS OF EXPERIMENTS (MAJOR 02/ MINOR)**

**Model blue print for the Question Paper setter**

**Max. Marks: 50 Time: 2 Hrs.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module** | **Short Answer Questions** | **Essay Questions** | **Marks allotted to the Unit/Chapter** |
| **I** | **1** | **1** | **15** |
| **II** | **2** | **1** | **20** |
| **III** | **1** | **2** | **25** |
| **IV** | **2** | **1** | **20** |
| **V** | **1** | **1** | **15** |
| **Total including choice** | **7** | **6** | **95** |

**Statistics Course 10:**

**Pithapur Rajah’s Government College (Autonomous), Kakinada**

**II year B.Sc., Degree Examinations – IV Semester (w.e.f 2023-24)**

**For 2023-24 batch**

**Statistics Course X: DESIGN ANDANALYSIS OF EXPERIMENTS(MAJOR2/Minor)**

**Model Paper**

**Time: 2 Hrs. Max. Marks: 50**

**Answer any THREE of the following. Choosing at least one from each part. 3x10=30M**

**SECTION - A**

**PART- I**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | Explain about ANOVA one-way classification. | BT1 | PO2 | C01 |
| 2 | Explain principles of design of experiments. | BT2 | P02 | C02 |
| **3** | Describe about relative efficiency of RDB over CRD. | BT3 | PO4 | CO3 |

**PART- II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | Explain about missing plot technique in RBD. | BT2 | PO2 | CO3 |
| 5 | Describe about relative efficiency of LSD over RBD. | BT3 | PO4 | CO3 |
| **6** | Explain 2-square factorial experiments with their statistical analysis. | BT1 | PO2 | CO3 |

**SECTION – B**

**Answer any FOUR of the following: 4x5=20M**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 7. | Write about assumptions of ANOVA. | BT3 | PO3 | CO3 |
| 8 | Define completely randomized design (CRD) | BT3 | PO3 | C01 |
| 9 | Explain about fixed effect & random effect model. | BT2 | PO3 | CO3 |
| 10 | Describe about applications for RBD. | BT3 | PO5 | CO2 |
| 11 | Write about advantages and disadvantages of LSD. | BT2 | PO2 | CO3 |
| 12 | Describe about applications for LSD. | BT2 | PO3 | CO3 |
| 13 | Describe Yates procedure to find factorial effect totals. | BT1 | PO2 | CO3 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester**  **II B.Sc Major**  **(IV Sem)**  **(2023-24)** | | | |
| Course Code | **TITLE OF THE COURSE**  **NUMERICAL ANALYSIS** |
| Teaching | Hours Allocated: 60 (**Theory**) | L | T | P | C |
| Pre-requisites: | **Basic Knowledge in Numerical analysis.** | 4 | - | - | 4 |

# Course Objectives:

This course will cover the classical fundamental topics in numerical methods such as, approximation, numerical integration, numerical linear algebra, solution of nonlinear algebraic systems and solution of ordinary differential equations.

# Course Outcomes:

|  |  |
| --- | --- |
| On Completion of the course, the students will be able to- | |
| **CO1** | Understand various finite difference concepts and interpolation methods. |
| **CO2** | Work out numerical differentiation and integration whenever and wherever routine methods are not applicable. |
| **CO3** | Find numerical solutions of ordinary differential equations by using various numerical methods. |
| **CO4** | Analyze and evaluate the accuracy of numerical methods. |

**Course with focus on employability / entrepreneurship / Skill Development modules**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Skill Deveopment |  |  | Employability |  |  | Entrepreneurship |  |

## Unit 1

Definitions of Forward difference operator (∆), Backward difference operator, Shift or Extension (displacement) operator (E), Central Differences operator(µ), Differentiation operator(D), Mean value operator Symbolic relations between operators, properties of difference and shift operators, fundamental theorem on finite differences and simple problems.

## Unit 2

**Interpolation with equal intervals:** Concept of interpolation and extrapolation, assumptions and uses of interpolation, difference tables, methods of interpolation with equal intervals - Newton’s formula for forward and backward interpolation, Central differences, Gauss forward and backward, Sterling, Bessel’s and Laplace - Everett’s Formulae.

## Unit 3

**Interpolation with unequal intervals:** Divided differences and their properties. Methods ofinterpolation with unequal intervals – Newton’s Divided difference formula and Lagrange’s formula. Inverse interpolation - Lagrange’s formula.

## Unit 4

**Numerical Differentiation:** Introduction to Numerical differentiation. Determination of First andSecondorder derivatives for the given data using Newton’s forward and backward, Gauss forward and backward, Sterling, Bessel’s and Newton’s Divided difference formula.

## Unit 5

**Numerical Integration:** Introduction to numerical integration, General Quadrature formula for equidistant ordinates, Trapezoidal rule, Simpson’s 1/3rd, Simpson’s 3/8th rule and Weddle’s rule.

# Textbooks:

1. S. C. Gupta & V. K. Kapoor:Fundamentals of MathematicalStatistics, Sultan Chand&Sons, New Delhi.
2. O.P.Gupta:MathematicalStatistics,KedarnathRamnath&Co.
3. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.
4. K.Rohatgi &EhsanesSaleh:AnIntroductiontoProbabilityandStatistics,JohnWiley&Sons.

# Reference books:

1. S.C. Gupta&V.K. Kapoor:FundamentalsofMathematical Statistics, Sultan Chand& Sons,NewDelhi.
2. O.P.Gupta: MathematicalStatistics,KedarnathRamnath&Co.
3. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.
4. K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.

# WebLinks:

1. <https://conjointly.com/kb/descriptive-statistics/>

2. <https://en.wikipedia.org/wiki/Descriptive_statistics>

3. <https://www.scribbr.com/statistics/descriptive-statistics/>

# CO-PO Mapping:

**(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High} '-':No Correlation)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO4 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO5 |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester**  **II B.Sc Major**  **(IV Sem)**  **(2023-24)** | | | |
| Course Code | **TITLE OF THE COURSE**  **NUMERICAL ANALYSIS** |
| Teaching | Hours Allocated: 30 (**Practical**) | L | T | P | C |
| Pre-requisites: | **Basic Knowledge in Numerical analysis.** | 4 | - | - | 4 |

* 1. InterpolationbyusingNewton-Gregoryforwardandbackwarddifferenceformulae.
  2. InterpolationbyusingGaussforwardand backward differenceformulae.
  3. InterpolationbyusingSterlingandBessel’sformulae.
  4. InterpolationbyusingLaplace-Everett’sFormula.
  5. InterpolationbyusingNewton’sdivideddifferenceandLagrange’sformulae.
  6. InverseinterpolationbyusingLagrange’sformula.
  7. DeterminationoffirstandsecondorderderivativesbyusingNewton-Gregoryforwardand backward difference formulae.
  8. DeterminationoffirstandsecondorderderivativesbyusingGaussforwardandbackward difference formulae.
  9. DeterminationoffirstandsecondorderderivativesbyusingNewton’sdivideddifferenceformula.
  10. NumericalIntegrationbyusingTrapezoidalrule,Simpson’s1/3rd,Simpson’s3/8thruleand Weddle’s rule.

# Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>

2. <https://en.wikipedia.org/wiki/Descriptive_statistics>

3. <https://www.scribbr.com/statistics/descriptive-statistics/>

**SEMESTER-IV: NUMERICAL ANALYSIS (MAJOR 03/MINOR)**

**Model blue print for the Question Paper setter**

**Max. Marks: 50 Time: 2 Hrs.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module** | **Short Answer Questions** | **Essay Questions** | **Marks allotted to the Unit/Chapter** |
| **I** | **2** | **1** | **20** |
| **II** | **1** | **2** | **25** |
| **III** | **1** | **1** | **15** |
| **IV** | **2** | **1** | **20** |
| **V** | **1** | **1** | **15** |
| **Total including choice** | **7** | **6** | **95** |

**Pithapur Rajah’s Government College (Autonomous), Kakinada**

**II year B.Sc., Degree Examinations – IV Semester (w.e.f 2023-24)**

**For 2023-24 batch**

**Statistics Course 11: NUMERICAL ANALYSIS (MAJOR 03/MINOR)**

**Model Paper**

**Time: 2 Hrs. Max. Marks: 50**

**Answer any THREE of the following. Choosing at least one from each part. 3x10=30M**

**SECTION - A**

**PART- I**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | From the following table find y value at x = 0.26   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | | y = Tanx | 0.1003 | 0.1511 | 0.2027 | 0.2553 | 0.3093 | | BT1 | PO2 | C01 |
| 2 | State and prove Gauss forward interpolation formula . | BT2 | P02 | C02 |
| **3** | State and prove Stirling’s formula . | BT3 | PO4 | CO3 |

**PART- II**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4 | Using the following table , compute  and  at x = 1.2.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | X | 1.0 | 1.2 | 1.4 | 1.6 | 1.8 | 2.0 | 2.2 | | Y | 2.7183 | 3.3201 | 4.0552 | 4.9530 | 6.0496 | 7.3891 | 9.0250 | | BT2 | PO2 | CO3 |
| 5 | Calculate an approximate value of integral by Trapezoidal rule | BT3 | PO4 | CO3 |
| **6** | Using the Taylor’s series for y(x) , find y(0.1) correct to four decimal places if y(x) satisfies y1 = x – y2 , y0 = 1 where x0 = 0 . | BT1 | PO2 | CO3 |

**SECTION – B**

**Answer any FOUR of the following: 4x5=20M**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 7. | Evaluate , the interval of differencing being unity | BT3 | PO3 | CO3 |
| 8 | Find f(2) if f(-1) = 2 , f(0) = 1 , f(1) = 0 and f(3) = -1 | BT3 | PO3 | C01 |
| 9 | Given that   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 50 | 51 | 52 | 53 | 54 | | Tan x | 1.1918 | 1.2349 | 1.2799 | 1.3270 | 1.3764 |   Using Gauss’s backward formula , find the value of tan 510421 . | BT2 | PO3 | CO3 |
| 10 | Find the first order derivative of √x at x = 15 from the following .   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 15 | 17 | 19 | 21 | 23 | 25 | | f( x) | 3.8773 | 4.123 | 4.359 | 4.583 | 4.796 | 5.000 | | BT3 | PO5 | CO2 |
| 11 | Calculate the approximate value of by using Trapezoidal Rule . | BT2 | PO2 | CO3 |
| 12 | Using Simpson’s 1/3 rule to prove that log 7 is approximately 1.9587 using . | BT2 | PO3 | CO3 |
| 13 | Solve by Picard’s method . | BT1 | PO2 | CO3 |