Government College (Autonomous
Rajamundry

NAAC Accredited at 'A+' Grade

DEPARTMENT OF STATISTICS

B.Sc. (III,IV,V,VI,VII &VIII) SEMESTERS

SYLLABUS & MODEL PAPERS

2023-2024

INDEX

Program Specific Outcomes

PROGRAM CODES: B.Sc(M.S.Comp-2209,
B.Sc(M.E.S)-2109,
B.Sc(M.S. Actuarial Science)-2214,
B.Sc(M.S.EM)-2215
B.Sc(M.S.DS)

Sl. No	Program	PSO
1.	M.S.Comp	Understand the nature and scope of the subjects and basic concepts and terminology of three courses of the program
		Analyze, Compare and Contrast the concepts in all three courses and to draw conclusions effective manner.
		Analytical skills, mathematical modeling , data computation using statistical tools and computer programming knowledge is required.
		Applications of mathematics, Statistics, and Computers are necessary to draw conclusions for a given problem .
		To develop Research thinking in Students in solving practical science problems.
2.	M.E.S	Expose the students to various concept in Economics, Mathematics and Statistics and encourage them to uphold scientific integrity and objectivity in professional knowledge.
		Understand and develop excellent mathematical, statistical and problem-solving skills
		Solve and understand the ability to solve economic problems and to estimate future prediction by means of mathematics and statistics models.
		To develop analytical and research skills and to carry out studies regarding economic scenarios.
3.	M.S.As	Understand the basic concepts of Financial Mathematics, Statistical tools and techniques, nature and scope of economics, commerce life insurance policies, actuarial science concept.
		Strong knowledge of statistical methodology and its applications in the fields of economics, economic management, finance, insurance
		Deep knowledge of mathematical models, specifically probability models to apply to finance and actuarial phenomena as well as economic and

		corporate sciences.
		Deep knowledge of quantitative models in the area of risk management.
		Application of mathematical and statistical methods to assess risk in insurance, finance and other industries and professions.
4.	**M.S.Ecom**	**Understand the concepts of mathematics, statistics econometrics**
		Application of statistical methods to economic data in order to give empirical content to economic relationships.
		Know the use of statistical theory and mathematical statistics to evaluate and develop econometric methods.
		Analyze the tools and techniques of mathematics and statistics to economic theory.
5.	**M.S.DS**	**Understand the nature and scope of the subjects and basic concepts and terminology of three courses of the program**
		Analyze, Compare and Contrast the concepts in all three courses and to draw conclusions effective manner.
		Analytical skills, mathematical modeling , data computation using statistical tools and computer programming knowledge is required.
		Applications of mathematics, Statistics, and Data science are necessary to draw conclusions for a given problem .
		To develop Research thinking in Students in solving practical science problems.

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM

DEPARTMENT OF STATISTICS

B.Sc. (M.S.Cs, M.E.S, M.S.AS, M.S.EM, & M.S.DS)

PROGRAM CODE: 2/1/E (M.E.S) & 2/2/E (M.S.Cs), (M.S.AS), (M.S.EM), (M.S.DS)

S.NO	SEMESTER	TITLE OF THE PAPER	COURSE CODE
		II YEAR	
5	III	Statistical Methods	STT403
6	IV	Paper-IV- Statistical Inference	STT404
7	IV	Paper-V- Sampling techniques and Design of Experiments	STT405
		III YEAR	
8	V	A1-Optimization Techniques	STT206
9	V	A2-Operation Research	STT207
10	V	B1-Demography and Vital Statistics	STT208
11	V	B2-Quality & Reliability	STT209
12	V	C1-Regression Analysis	STT210
13	V	C2-Forecasting Methods	STT211
		IV YEAR	
14	VII-A	Operations Research III	
15	VII-A	Multivariate Analysis	
16	VII-A	Sampling Techniques-2	
17	VII-A	Clinical Trials Analysis – 1	
18	VII-A	Data analysis using R	
19	VII-B	Actuarial Statistics - 1	
20	VII-B	Linear Models and Applied Regression Analysis	
21	VII-B	Stochastic Process	
22	VII-B	Business Analytics	
23	VII-B	Modern Statistical Analysis	

24	**VIII-A**	**Operations Research IV**	
25	**VIII-A**	**Design and Analysis of Experiments**	
26	**VIII-A**	**Statistical Inference -2**	
27	**VIII-A**	**Statistical Techniques for Research Methodology**	
28	**VIII-A**	**Econometrics-1**	
29	**VIII-B**	**Actuarial Statistics – 2**	
30	**VIII-B**	**Linear Algebra**	
31	**VIII-B**	**Probability and Distributions-2**	
32	**VIII-B**	**Biostatistics and Survival Analysis**	
33	**VIII-B**	**Data Analysis using SPSS**	

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM

DEPARTMENT OF STATISTICS

STRUCTURE OF B.Sc. STATISTICS

Semester	Paper	Subject	Hrs.	Credits	IA	ES	Total
SECOND YEAR							
Semester-III	Paper-III	Statistical Methods	4	3	50	50	100
	Paper-III	Practical	2	2	50	0	50
Semster-IV	Paper-IV	Statistical Inference	4	3	50	50	100
	Paper-IV	Practical	2	2	50	0	50
	Paper-V	Sampling techniques and Design of Experiments	4	3	50	50	100
	Paper-V	Practical	2	2	50	0	50
THIRD YEAR							
Semester-V (OR) Semester-VI	Paper-VI	A1-Optimization Techniques	4	3	50	50	100
	Paper-VI	Practical	2	2	50	0	50
	Paper-VII	A2-Operation Research	4	3	50	50	100
	Paper-VII	Practical	2	2	50	0	50
	OR						
	Paper-VI	B1-Demography and Vital Statistics	4	3	50	50	100
	Paper-VI	Practical	2	2	50	0	50
	Paper-VII	B2-Quality & Reliability	4	3	50	50	100
	Paper-VII	Practical	2	2	50	0	50
	OR						
	Paper-VI	C1-Regression Analysis	4	3	50	50	100
	Paper-VI	Practical	2	2	50	0	50
	Paper-VII	C2-Forecasting Methods	4	3	50	50	100
	Paper-VII	Practical	2	2	50	0	50
FOURTH YEAR							
	Paper-VIII	Operations Research III	4	3	50	50	100
	Paper-VIII	Practical	2	2	50	0	50
	Paper-IX	Multivariate Analysis	4	3	50	50	100
	Paper-IX	Practical	2	2	50	0	50
	Paper-X	Sampling Techniques-2	4	3	50	50	100
	Paper-X	Practical	2	2	50	0	50
	Paper-XI	Clinical Trials Analysis – 1	4	3	50	50	100

Semester-VII	Paper-XI	Practical	2	2	50	0	50
	Paper-XII	Data analysis using R	4	3	50	50	100
	Paper-XII	Practical	2	2	50	0	50
	OR						
	Paper-VIII	Actuarial Statistics – 1	4	3	50	50	100
	Paper-VIII	Practical	2	2	50	0	50
	Paper-IX	Linear Models and Applied Regression Analysis	4	3	50	50	100
	Paper-IX	Practical	2	2	50	0	50
	Paper-X	Stochastic Process	4	3	50	50	100
	Paper-X	Practical	2	2	50	0	50
	Paper-XI	Business Analytics	4	3	50	50	100
	Paper-XI	Practical	2	2	50	0	50
	Paper-XII	Modern Statistical Analysis	4	3	50	50	100
	Paper-XII	Practical	2	2	50	0	50
SEMESTER-VIII	Paper-XIII	Operations Research IV	4	3	50	50	100
	Paper-XIII	Practical	2	2	50	0	50
	Paper-XIV	Design and Analysis of Experiments	4	3	50	50	100
	Paper-XIV	Practical	2	2	50	0	50
	Paper-XV	Statistical Inference -2	4	3	50	50	100
	Paper-XV	Practical	2	2	50	0	50
	Paper-XVI	Statistical Techniques forResearch Methodology	4	3	50	50	100
	Paper-XVI	Practical	2	2	50	0	50
	Paper-XVII	Econometrics-1	4	3	50	50	100
	Paper-XVII	Practical	2	2	50	0	50
	OR						
	Paper-XIII	Actuarial Statistics – 2	4	3	50	50	100
	Paper-XIII	Practical	2	2	50	0	50
	Paper-XIV	Linear Algebra	4	3	50	50	100

	Paper-XIV	**Practical**	**2**	**2**	**50**	**0**	**50**
	Paper-XV	**Probability and Distributions-2**	**4**	**3**	**50**	**50**	**100**
	Paper-XV	**Practical**	**2**	**2**	**50**	**0**	**50**
	Paper-XVI	**Biostatistics and Survival Analysis**	**4**	**3**	**50**	**50**	**100**
	Paper-XVI	**Practical**	**2**	**2**	**50**	**0**	**50**
	Paper-XVII	**Data Analysis using SPSS**	**4**	**3**	**50**	**50**	**100**
	Paper-XVII	**Practical**	**2**	**2**	**50**	**0**	**50**

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. (III Sem)			
Course Code STT403	TITLE OF THE COURSE STATISTICAL METHODS				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Sampling concept	0	4	3	3

Objectives:

1. To the course aims at providing an introduction to statistical methods and its application to predictive statistical models.
2. To learn the first part of the course will focus on basic statistics.
3. To learn the Sampling distributions

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about Correlation
CO2	Students would be able to learn about Regression models
CO3	Students would be to learn about Curve Fitting
CO4	Students would be able to learn Attributes
CO5	Students would be to learn Sampling concept

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – I

Correlation: **Definition, Scatter diagram its coefficient and its properties. Scatter diagram, computation of correlation coefficient for ungrouped data. Spearman's rank correlation coefficient, properties of spearman's correlation coefficients and problems.**

Unit-II

Regression: **simple linear regression, properties of regression coefficients. Regression lines, Concept of Correlation ratio, partial and multiple correlation coefficients, correlation verses regression and their problems.**

Unit-III

Curve fitting: Method of least square-Fitting of linear, quadratic, Exponential and power curves and their problems.

Unit-IV

Attributes: Introduction, Nature, and consistency and mention its conditions. Independence and association of attributes, co-efficient of association and Colligation, coefficient of contingency and their problems

Unit-V

Exact Sampling distributions: Concept of Population, Parameter, random sample, statistic, sampling distribution, standard error, Statement and Properties of X^2, t, F distributions and their interrelationships.

Textbooks:

1. **B.A/B.Sc II Year statistics-statistical methods and inference-Telugu Academy by A.Mohanrao, N.SrinivasaRao, Dr.R.Sudhakara Reddy,Dr.T.C. Ravichandrakumar**
2. **K.V.S.Sarma Statistics Made simple: Do it yourself on PC, PHI.**
3. **B.A/B.Sc Statistics Descriptive Statistics and Probability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.**
4.

Reference books:

1. **V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi**
2. **Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt.Ltd, Kolkata.**
3. **Hoel P.G: Introduction to matehematical statistics, Asia Publishing house.**

WebLinks:

1. **https://conjointly.com/kb/descriptive-statistics/**
2. **https://en.wikipedia.org/wiki/Descriptive_statistics**
3. **https://www.scribbr.com/statistics/descriptive-statistics/**
4. **https://byjus.com/maths/probability-and-statistics/**

CO-PO Mapping:

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

	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	2	2	2	3	2	2	2	2
CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	2	1	2	3	2	1	2	2	2	2	1	2	1
CO4	3	2	3	2	2	2	3	2	2	2	2	2	2
CO5	1	2	1	1	1	2	1	1	1	1	1	1	2

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. (III Sem)			
Course Code STT403	TITLE OF THE COURSE STATISTICAL METHODS				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Sampling concept	0	2	3	2

Objectives:

Practical's Semester (IV)
Conduct any 6 (MS-Excel is compulsory)

1. **Fitting of straight line**
2. **Fitting of exponential curves**
3. **Fitting of power curve**
4. **Computation of correlation coefficient & Fitting of regression lines**
5. **Rank correlation coefficient**
6. **Computation of Contingency coefficients.**
7. **M.S-Excel methods any for the serial Numbers 1, 2, 4, 5.**

Reference books:

1. **V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi**
2. **Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt.Ltd, Kolkata.**
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Virtual Lab Links:

1. **https://conjointly.com/kb/descriptive-statistics/**
2. **https://en.wikipedia.org/wiki/Descriptive_statistics**

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CBCS SYLLABUS (Semester Wise) 2023-24

II B.Sc Statistics/Semester-III

Paper-III-STATISTICAL METHODS

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs **Max Marks: 50**

SECTION-A

Answer any FIVE questions. All questions carry equal marks. 5 x 4 =20M

1. **What is Correlation and it types?**
2. **Explain Regression?**
3. **Explain Regression coefficients?**
4. **Explain about Scatter Diagram?**
5. **Explain types of association in Attributes?**
6. **Explain differences between Correlation and Associations?**
7. **Apply Straight line for the given data**

X	**1**	**2**	**3**	**4**	**5**
Y	**5**	**7**	**9**	**10**	**11**

8. **What are Population, Sample ,Parameter and Statistic ?**

SECTION-B

Answer any THREE questions. All questions carry equal marks. 3 x 10 = 30M

9. **Define Rank correlation and derive its equation with its Properties?**

(OR)

10. **Explain Partial and Multiple Correlation Coefficients?**

11. **What are Regression lines? Explain Regression lines on X on Y**

(OR)

12. **Fit Second Degree Equation for the given data**

X	**10**	**15**	**20**	**25**	**30**	**35**	**40**
Y	**11**	**13**	**16**	**20**	**27**	**34**	**41**

13. **What is consistency of data? Explain conditions for consistency of data?**

(OR)

14. **Explain Chi-square, t and F- distributions with its properties**

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. (IV Sem)			
Course Code STT404	TITLE OF THE COURSE Inferential Statistics				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Sampling concept	0	4	3	3

Objectives:

1. To The course aims at providing an introduction to statistical inference and its application to predictive statistical models.
2. The first part of the course will focus on basic probability.
3. Subsequently, the course will deal with the theory of statistical inference (point estimation, interval estimation, hypothesis testing.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about estimation concept
CO2	Students would be able to learn about Hypothesis and its procedure
CO3	Students would be to learn large sample tests and small sample tests
CO4	Students would be able to learn about Non parametric tests
CO5	Students would be to learn computation part

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – I

Theory of Estimation: Estimation of a parameter, criteria of a good estimator-Unbiasedness, consistency, efficiency and sufficiency. Statement of Neyman's factorization theorem. Methods of Estimation

Additional Inputs:Cramer Rao Inequality

Unit-II

Concepts of Statistical hypothesis: Null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. One and two tailed tests. Neyman-Pearson's fundamental lemma. Examples in case of Binomial, Poisson, Exponential and Normal distributions.

Unit – III

Large sample tests: Large sample tests for single mean, two means, single proportion, two proportions, Standard deviation of single and double samples and Fisher's Z transformation.

Unit – IV

Small sample tests: Tests of significance based on $\chi 2$, t and F. $\chi 2$-test for goodness of fit and test for independence of attributes. t-test for single, double and paired tests, Variance Ratio Test (F-test)

Unit – V Non-parametric tests: Advantages and disadvantages, Two sample run test, Two sample Median test and Two sample sign test.

Textbooks:

1. **B.A/B.Sc II Year statistics-statistical methods and inference-Telugu Academy by A.Mohanrao, N.SrinivasaRao, Dr.R.Sudhakara Reddy,Dr.T.C. Ravichandrakumar**
2. **K.V.S.Sarma Statistics Made simple: Do it yourself on PC, PHI.**
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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	1	2	2	1	2	2	3	2	3	2	2	2	2
CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO4	2	2	3	2	2	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. (IV Sem)			
Course Code STT404	TITLE OF THE COURSE Inferential Statistics				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Sampling concept	0	2	3	2

Objectives:

1. To The course aims at providing an introduction to statistical inference and its application to predictive statistical models.
2. The first part of the course will focus on basic probability.
3. Subsequently, the course will deal with the theory of statistical inference (point estimation, interval estimation, hypothesis testing.

Practical's Semester (IV)
Conduct any 6 (MS-Excel is compulsory)

1. Large sample tests for mean(s)
2. Large sample tests for proportion(s)
3. Large sample test for standard deviation(s)
4. Large sample tests for Fisher's Z-transformation
5. Small sample tests for Paired t-test
6. Chi-Square test for independence of attributes.
7. Non-Parametric tests-run test
8. Non-parametric tests-median test.
9. Non-Parametric tests-sign tests.
10. MS-Excel methods for the above serial numbers 1, 2, 3, 4(any one of above).

Reference books:

4. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi
5. Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt.Ltd, Kolkata.
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CBCS SYLLABUS (Semester Wise) 2023-24

II B.Sc Statistics/Semester-IV

Paper-IV-Inferential Statistics

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs **Max Marks: 50**

SECTION-A

Answer any FIVE questions. All questions carry equal marks. 5 x 4 =20M

1. **What is MLE and write its properties**
2. **Explain Confidence Intervals.**
3. **Explain Null hypothesis and Alternative hypothesis.**
4. **Define one tailed and two tailed tests.**
5. **Explain Testing procedure of Hypothesis?**
6. **Explain paired t- test.**
7. **Explain about sign test for one sample ?**
8. **What is Non Parametric Test? Write the assumptions of non parametric tests?**

SECTION-B

Answer any THREE questions. All questions carry equal marks. 3 x 10 = 30M

9. **Explain the criteria of a good estimator.**

(OR)

10. **State and prove Neyman-Pearson's Lemma.**
11. **Explain the test procedure for**
    (i) Testing of Mean and (ii) Equality of two means

(OR)

12. **Fit a binomial distribution for the following data test goodness of fit**

X	0	1	2	3	4	5	6
f	5	18	28	12	7	6	4

13. **What are the differences between parametric tests non-parametric tests?**

(OR)

14. **Explain Median Test?**

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. (IVSem) Paper-V			
Course Code STT405	TITLE OF THE COURSE Sampling Techniques & Design of Experiments				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in methods and Statistical inference	0	4	3	3

Objectives:

1. The aim of this paper is to introduce you to the statistical aspects associated with the design and analysis of sample surveys, and to develop your understanding of the principles and methods used to design survey sampling schemes.
2. Basic theory underpinning survey inference will be introduced, focusing on methodology for survey-based estimation for population totals and related quantities for some standard sample designs

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about the sampling methods
CO2	Students would be able to learn about types of sampling
CO3	Students would be able to learn about simple random sampling
CO4	Students would be able to learn about Anova and Designs
CO5	Students would be able to learn about CRD,RBD,LSD

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – I

Sampling theory:

Concepts of population, sample, sampling unit, parameter, statistic, sampling errors, sampling distribution, sample frame and standard error. Principal steps in a sample survey- need for sampling, census versus sample surveys, sampling and non- sampling errors, Types of sampling- Subjective, probability and mixed sampling methods

Unit-II

Simple random Sampling:

Methods of drawing random samples with and without replacement. Estimation of population mean, total, variances and the estimates in SRSWR and SRSWOR Advantages and Disadvantages of simple random sampling.

Unit-III

Stratified random Sampling:

Proportional and optimum allocation of sample sizes in stratification. Variances in these methods. Systematic sampling: Systematic sampling when N = nk. Comparison of their relative efficiencies. Advantages and Disadvantages of above methods of sampling.

Unit-IV

Analysis of Variance:

One way with equal and unequal classifications and two way classifications.

Unit-V

Design of experiments:

Principles of experimentation in designs, Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) including one missing observation, Comparison of the efficiencies of above designs.

Additional Inputs:2^2,2^3,3^2 Designs

Textbooks:

1. **B.A/B.Sc III Year Paper-III Statistics- Applied Statistics- Telugu Academy by Prof. K. Srinivasa Rao, Dr. D. Giri, Dr. A. Anand, and Dr. V. Papaiah Sastry.**
2. **K.V.S. Sarma: Statistics made simple: do it yourself on PC. PHI**
3. **B.A/B.Sc Statistics Applied Statistics, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.**

Reference books:

1. **V.K.Kapoor and S.C.Gupta: Fundamentals of Applied Statistics. Sultan Chand**
2. **Parimal Mukhopadhyay: Applied Statistics. New Central Book agency.**
3. **S.P.Gupta: Statistical Methods. Sultan Chand and Sons.**

WebLinks:

https://conjointly.com/kb/descriptive-statistics/

https://en.wikipedia.org/wiki/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	2	2	1	2	2	2	3	2	3	2	1	2	2
CO2	2	1	2	2	2	2	2	3	3	2	2	2	2
CO3	3	3	2	3	3	3	2	2	2	3	2	2	1
CO4	2	3	2	2	2	2	1	2	1	2	2	1	2
CO5	2	2	2	2	2	2	2	2	2	1	2	1	2

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc.(IV Sem) Paper-V			
Course Code STT405	TITLE OF THE COURSE Sampling Techniques & Design of Experiments				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in methods and Statistical inference	0	4	3	3

Objectives:

1. The aim of this paper is to introduce you to the statistical aspects associated with the design and analysis of sample surveys, and to develop your understanding of the principles and methods used to design survey sampling schemes.
2. Basic theory underpinning survey inference will be introduced, focusing on methodology for survey-based estimation for population totals and related quantities for some standard sample designs

Practical's Semester-V(Paper-V)
Conduct any 6 (MS-Excel is compulsory)

1. **Estimation of Population Mean, Variance by SRSWOR.**
2. **Estimation of Population Mean, Variance by SRSWR.**
3. **Comparison of Proportional, Optimum allocations with Stratified Random sampling**
4. **Systematic Sampling.**
5. **ANOVA-CRD**
6. **ANOVA-RBD with one missing observation.**
7. **ANOVA-LSD with one missing observation.**
8. **MS-Excel Practical's.**

Reference books:

1. **V.K.Kapoor and S.C.Gupta: Fundamentals of Applied Statistics. Sultan Chand**
2. **Parimal Mukhopadhyay: Applied Statistics. New Central Book agency.**
3. **S.P.Gupta: Statistical Methods. Sultan Chand and Sons.**

Virtual Lab Links:

1.https://digitalelearnings.com/sampling-and-types-of-sampling.
2. https://youtu.be/k3lUo0XYG3E

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
II B.Sc. Statistics (Semester-IV) 2023-24
(With Mathematics Combination)
Paper-V- Sampling Techniques & Design of Experiments
MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs. **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1 **Distinguish between census survey and sample surveys.**

2 **Explain Differences between SRSWR and SRSWOR.**

3 **Explain Systematic Sampling.**

4 **What are different types of sampling**

5 **Explain types of allocation in stratified sampling.**

6 **Systematic Sampling VS Stratified Sampling**

7 **Explain the purpose of ANOVA.**

8 **Explain CRD**

SECTION-B

Answer any THREE questions. **3 x 10 = 30 M**

9 **What are principal steps in a sample survey.**

(OR)

10 **Derive the variance of the sample mean in SRSWOR**

11 **If the population consists of linear trend, then prove that**
$V(Y_{st}) \leq V(Y_{sys}) \leq V(Y_n)_R$

(OR)

12 **How do you allocate samples in Stratified Sampling?**

13 **Discuss about basic principles of experimentation**

(OR)

14 **Explain LSD and merits, demerits of LSD**

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT206	TITLE OF THE COURSE OPTIMIZATION TECHNIQUES				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

1. After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about basics of Operation research
CO2	Students would be able to know concepts of optimization techniques
CO3	Students would be able to know about Transportation problems
CO4	Students must be able to know about different types of assignment problems
CO5	Students would able to learn Sequencing methods.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I

Operations Research: **Introduction to O.R. Origin and development of OR, Nature and features of O.R, Meaning, Definition of O.R, Scope of O.R, Phases of O.R, Advantages and Disadvantages of O.R,Convex sets and their properties.**

Linear Programming Problems : **Definitions of LPP, Components, basic assumptions, Formulation of LPP, Solutions of LPP by Graphical method, Some exceptional cases in graphical method, Alternative Optima, Unbounded solution and Infeasible solution**

Unit-II

Linear Programming Problem-:General LPP, Objective function, Constraints, Non-negative restrictions, Solutions of LPP, Basic definitions, Fundamental

theorem of LPP, the computational procedure of Simplex algorithm and problems. Artificial Variable Technique-The Big-M Method or Method of Penalties, Two Phase Simplex method

Unit –III

Transportation Problem: Definition of transportation problem, TPP as a special case of LPP, General Mathematical Transportation of LPP , Transportation table ,feasible solutions by North-West corner , Matrix minimum and VAM methods and problems. test for optimum ,closed loop in transportation table and its properties optimal solution though the MODI (U- V) method and stepping stone method for balanced and unbalanced

Unit- IV

Assignment problem: Formulation and description of Assignment problem and its Variations. Unbalanced assignment problem, traveling salesman problem, Hungarian method for optimal solution.

Unit-V

Sequencing problem: Optimal Sequencing of N jobs on two and three machines without passing

Textbooks:

1). Operations Research by Kanthi Swaroop k.GUPTA AND ManMohan –Sultan Chand

2).Operation Research- S.D Sharma

Reference books:

1). Operation Research – Taha

Web Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ

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	2	2	2	1	2	1	3	1	3	2	1	2	2
CO2	2	1	3	2	1	2	2	2	1	3	2	2	2
CO3	3	2	3	3	3	1	2	3	2	3	2	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	2	2	1	3	2	2	2	3	2	1	2	2	2

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT206	TITLE OF THE COURSE OPTIMIZATION TECHNIQUES				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn operation research in various disciplines and also learn the opportunities of statistician in different fields.

Practical's Semester-IV

Conduct any 6 (MS-Excel is compulsory)

Practicals-Semester-VI

1. **Solving LPP by Graphical method**
2. **Soving the TP by NWCR, Matrix Minimum and VAM methods**
3. **Game theory-obtaining saddle point and pure, mixed strategies**
4. **Finding solution for Hungarian Method**
5. **Optimal solution for Assignment problem**
6. **Solving sequencing problem for jobs on two machines.**

Reference books:

1) Operations Research by Kanthi Swaroop k.GUPTA AND ManMohan Sultan Chand

2)Operation Research- S.D Sharma

Virtual Lab Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ
3. https://youtu.be/8DaOIjuF4BY

Government College [A] Rajamhendravaram

CBCS SYLLABUS (Semester Wise) 2023-24

III B.Sc Statistics/Semester-V

OPTIMIZATION TECHNIQUES ((Cluster-1, Paper-1) Paper –VI-A1

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs **MaxMarks: 50**

SECTION-A

Answer any FIVE questions. All questions carry equal marks. 5 x 4=20M

1. **Write advantages and disadvantages of O.R**
2. **Explain the slack and surplus Variables**
3. **Explain General LPP**
4. **Explain Concept of Two –Phase Method**
5. **Explain assignment problem as a special case of TP.**
6. **Explain unbalanced assignment problem?**
7. **Explain Hungarian method of Assignment problem?**
8. **How do you obtain a sequence?**

SECTION-B

Answer Any THREE questions. All questions carry equal marks. 3 x 10= 30M

9. **Describe the Nature and Scope of O.R**

(OR)

10. **Solve the Following LPP by using Graphical Method**

Maximize $Z=45X_1+80X_2$

Subject to const: $5X_1+20X_2 \leq 400$ $10X_1+15X_2 \leq 450$ $X_1, X_2 \geq 0$

11. **Use simplex Method to solve the following LPP**

Maximize $Z=X_1-X_2+3X_3$

Subject to const: $X_1+X_2+X_3 \leq 10$ $2X_1-X_3 \leq 2$ $2X_1-2X_2+3X_3 \leq 0$, $X_1, X_2, X_3 \geq 0$

(OR)

12. **Solve the following Transportation Problem by using VAM.**

	D_1	D_2	D_3	Supply
O_1	50	30	220	1
O_2	90	45	170	3
O_3	400	200	50	5
Demand	5	2	2	9

13. **Give an algorithm for n job-2 machines problem.**

(OR)

14. Solve the following Assignment Problem

	D_1	D_2	D_3	D_4
O_1	10	25	15	20
O_2	15	30	5	15
O_3	35	20	12	24
O_4	17	25	24	20

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) Paper-VII			
Course Code STT207	TITLE OF THE COURSE OPERATION RESEARCH				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about game theory and its problems
CO2	Students would be able to know concepts of Inventories
CO3	Students would be able to know about Networking
CO4	Students must be able to know about different networking models
CO5	Students would able to learn queuing models

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I
Game and strategies:
Introduction, Two person zero sum game, Saddle point, Dominance property, 2xn,mx2 games- Graphical method.

Unit-II
Inventory control:
Definition of inventory, Types of inventories, Cost of inventories, Factors effecting inventory control, Concept of EOQ, Deterministic inventory models.

Unit-III

Net work scheduling-I:
PERT, CPM , Logical sequencing ,Rules for net work construction, Critical path analysis ,Floats and slack times.

Unit-IV
Net work scheduling-II:
Probability considerations in PERT, Distinction between PERT and CPM, applications of network techniques, Limitations and difficulties in using Network, Project Cost, time Cost optimization algorithm and problems based on it

Unit-V
Queuing theory:
Introduction, Queuing system and its elements, characteristics of queuing system. Classification of queuing models and types of queuing systems.

Practicals-Semester-VI

1. **Solving game theory**
2. **Game theory-2**
3. **Game theory-obtaining saddle point**
4. **Finding solution for Inventory control**
5. **Optimal solution for Net work scheduling**
6. **Solving Net work scheduling**

Textbooks:

1. **Kanti Swaroop, P.K.Gupta and Man Mohan: Operations Research. Sultan Chand.**
2. **Taha: Operations Research: An Introduction: Mac Millan.**

Reference books:

3) Operation Research – Taha

Web Links:

1. **https://youtu.be/k3lUo0XYG3E**
2. **https://youtu.be/qSUjVDbKLWQ**

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
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CO2	2	1	3	2	1	2	2	3	1	3	2	2	2
CO3	1	2	2	3	3	1	2	1	2	3	2	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	2	2	1	3	2	2	2	1	2	1	2	2	2

	Government College (Autonomous) Rajahmundry	Program & Semester IIIB.Sc. (V Sem) Paper-VI			
Course Code STT207	TITLE OF THE COURSE OPERATION RESEARCH				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn operation research in various disciplines and also learn the opportunities of statistician in different fields.

Practical's Semester-IV

Conduct any 6 (MS-Excel is compulsory)

Practicals-Semester-VI

1. **Solving LPP by Graphical method**
2. **Soving the TP by NWCR, Matrix Minimum and VAM methods**
3. **Game theory-obtaining saddle point and pure, mixed strategies**
4. **Finding solution for Hungarian Method**
5. **Optimal solution for Assignment problem**
6. **Solving sequencing problem for jobs on two machines.**

Reference books:

1) Operations Research by Kanthi Swaroop k.GUPTA AND ManMohan –Sultan Chand

2)Operation Research- S.D Sharma

Virtual Lab Links:

1. **https://youtu.be/k3lUo0XYG3E**
2. **https://youtu.be/qSUjVDbKLWQ**
3. **https://youtu.be/8DaOIjuF4BY**

Government College [A] Rajamhendravaram

CBCS SYLLABUS (Semester Wise) 2023-24

III B.Sc Statistics/Semester-V

(With Mathematics Combination)

OPERATION RESEARCH Paper –VII-A2

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs **Max Marks: 50**

SECTION-A

Answer Any FIVE questions. All questions carry equal marks. 5x 4= 20M

1. **Explain pure and mixed strategies.**
2. **Explain different types of inventories.**
3. **Explain the determination of EOQ with one price break.**
4. **Write about game theory.**
5. **Write basic steps in PERT technique**
6. **Write rules for drawing net work diagram.**
7. **Explain Errors in networking**
8. **Write short note on queuing theory.**

SECTION-B

Answer any THREE questions. All questions carry equal marks. 3x10=30

9. **Apply graphical method to solve graphically**

	B1	B2	B3	B4
A1	4	-2	3	-1
A2	-1	2	0	1
A3	-2	1	-2	0

(OR)

10. **a) Explain the cost associate with inventories**
    b) Explain probabilistic inventory models without setup cost

11. **Apply Critical Path Method for the following data**

Activity	1-2	1-3	1-4	3-4	3-5	5-7	5-6
Normal time	4	7	6	5	7	6	5

(OR)

12. **Explain the differences between CPM and PERT**

13 . **Explain classification of Queuing System**

(OR)

14. **Explain Poisson queuing system.**

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT208	TITLE OF THE COURSE DEMOGRAPHY & VITAL STATISTICS				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about basics of Demography
CO2	Students would be able to know concepts of Population theories
CO3	Students would be able to know about measures of Mortality
CO4	Students must be able to know about different types of fertility
CO5	Students would able to learn Migration methods

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I

Population Theories: Introduction to Population Studies and Theories related Demography and Vital statistics and Sources of Vital Statistics.

Unit-II Measurement of Mortality:**Crude Death Rate (CDR), Specific death rate (SDR), Infant mortality, Rate(IMR) and Standardised death rates .Under five death rates and their importance. Stationary and Stable population,**

Central Mortality Rates and Force of Mortality, Life (Mortality) tables, Assumption, Description, Construction of life tables and use of life tables.

Unit –III

Measurement of Fertility: Abridged life tables: Concept and construction of abridged life tables by Reed-Merrell method, Greville's method and King's method, Measurement of Fertility, Crude Birth Rate (CBR), General Fertility Rate (GFR), Specific Fertility Rate(SFR) and Total Fertility Rate(TFR)

Unit-IV

Reproduction Rates: Measurement of population growth, crude rate of natural increase, Pearl's Vital index, Gross reproductive rate(GRR) and Net reproductive rate(NRR).

Unit-V

Migration and Urbanization

Migration definition, causes and Concepts and numerous types of Migration. Concepts, definitions of urban, trends and patterns of urbanization in India.

Textbooks:

1. **Mukhopadhyaya. P (1999) Applied Statistics, Books and Allied(P) Ltd**
2. **Goon, A.M, Gupta M.K and Dasgupta, B.(2008) : Fundamentals of Statistics, Vol11, 9th edition, World Press**

Reference books:

3) Demography – Pathak

Web Links:

1. **https://youtu.be/k3lUo0XYG3E**
2. **https://youtu.be/qSUjVDbKLWQ**

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	2	2	2	1	2	1	3	2	3	2	1	2	2
CO2	2	1	3	2	1	2	2	3	1	3	2	2	2
CO3	1	2	2	3	3	1	2	1	2	3	2	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	2	2	1	3	2	2	2	1	2	1	2	2	2

	Government College (Autonomous) Rajahmundry	Program & Semester IIIB.Sc. (V Sem) Paper-VI			
Course Code STT208	TITLE OF THE COURSE DEMOGRAPHY & VITAL STATISTICS				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn Demography in various disciplines and also learn the opportunities of statistician in different fields.

Practicals-Semester-VI

1. **Mortality rates**
2. **Age adjustment methods**
3. **Fertility rates**
4. **Migration rates**
5. **Life table**
6. **Reprodcution rates**

Reference books:

1. **Mukhopadhyaya. P (1999) Applied Statistics, Books and Allied(P) Ltd**
2. **Goon, A.M, Gupta M.K and Dasgupta, B.(2008) : Fundamentals of Statistics, Vol11, 9th edition, World Press**

Virtual Lab Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ
3. https://youtu.be/8DaOIjuF4BY

Government College [A] Rajamhendravaram

CBCS SYLLABUS (Semester Wise) 2023-24

III B.Sc Statistics/Semester-V

DEMOGRAPHY & VITAL STATISTICS-VI-B1

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs **Max Marks: 50**

SECTION-A

Answer Any FIVE questions. All questions carry equal marks. 5x 4 = 20M

1. **What are the errors that occur in the census and registration data**
2. **Explain about population composition**
3. **Distinguish between Stationary and Stable population**
4. **Mention the uses of life tables**
5. **Explain abridged life tables**
6. **Explain Crude rate of natural increase**
7. **What are the uses of vital statistics**
8. **What are the assumptions of life table**

SECTION-B

Answer Any THREE questions. All questions carry equal marks. 3x 10= 30M

9. Derive the Chandra Sekharan-Deming Formula

(OR)

10.Explain the Various Mortality Rates

11.Explain the Uses of Myer and UN indices

(OR)

12.Explain about the measurement of population growth

13.Explain types of migration

(OR)

14.Explain types of Urbanization

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) Paper-VII			
Course Code STT209	TITLE OF THE COURSE QUALITY & RELIABILITY				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the statistical quality part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about basics of SQC
CO2	Students would be able to know concepts of Variable charts
CO3	Students would be able to know about Attribute charts
CO4	Students must be able to know about Sampling plans
CO5	Students would able to learn about reliability

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development			Employability			Entrepreneurship	

Syllabus:

Unit-I

SQC: Importance of SQC in industry. Statistical basis of Stewart control charts, uses of control charts, Interpretation of control charts, control limits, Natural tolerance limits and specification limits.

Unit-II

Variable control chart: Construction of control charts for variables (mean, range and standard deviation) and attribute control charts p , np, and c- charts (with fixed and varying sample sizes). Process capability index. Concept of Six sigma and its importance

Unit-III

Acceptance sampling plans: Producers risk and consumer's risk. Concept of AQL and LTPD.

Unit-IV

Sampling Plans: Single and Double sampling plans, OC and ASN functions. Design of Single and double sampling plans for attributes using Binomial.

Unit-V

Reliability: Introduction failure rates, Hazard function, estimation of reliability, exponential distribution as life model, its memory less property. System reliability - series, parallel and k out of N systems and their reliabilities.

Textbooks:

1. **B.A/B.Sc III year paper-IV Statistics- Applied Statistics- Telugu Academy by Prof K. Srinivasa Rao, Dr. D. Giri, Dr A. Anand, Dr V. Papaiah Sastry.**
2. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
3. **B.A/B.Sc Statistics Quality control & Reliability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.**

Reference books:

4) R.C. Gupta: Statistical Quality Control

Web Links:

1. **https://youtu.be/k3lUo0XYG3E**
2. **https://youtu.be/qSUjVDbKLWQ**

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	2	2	2	1	2	1	3	2	3	2	1	2	2
CO2	2	1	3	2	1	2	2	3	1	3	2	2	2
CO3	1	2	2	3	3	1	2	1	2	3	2	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	2	2	1	3	2	2	2	1	2	1	2	2	2

	Government College (Autonomous) Rajahmundry	Program & Semester IIIB.Sc. (V Sem) Paper-VII			
Course Code STT209	TITLE OF THE COURSE QUALITY & RELIABILITY				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn operation research in various disciplines and also learn the opportunities of statistician in different fields.

Practical's- Semester-V (Paper-VI)

1. **Construction of X, R Charts**
2. **Construction of p chart- fixed sample size**
3. **Construction of np-chart**
4. **Construction of C-chart**
5. **MS-Excel methods for the serial numbers1**
6. **MS-Excel methods for the serial numbers 2 to 4.**

Reference books:

1. **B.A/B.Sc III year paper-IV Statistics- Applied Statistics- Telugu Academy by Prof K. Srinivasa Rao, Dr. D. Giri, Dr A. Anand, Dr V. Papaiah Sastry.**
2. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
3. **B.A/B.Sc Statistics Quality control & Reliability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.**

Virtual Lab Links:

1. **https://youtu.be/k3lUo0XYG3E**
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3. **https://youtu.be/8DaOIjuF4BY**

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM

CBCS SYLLABUS (Semester Wise)2023-24

III B.Sc. Statistics (SemesterV)

(With Mathematics Combination)

Quality & Reliability paper-VI -B2

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2hrs. **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 x 4=20M**

1. **What are 3 sigma limits? Give their importance in S.Q.C**
2. **Discuss about Process control and Product control**
3. **Explain the construction of C chart**
4. **Explain about Acceptance Sampling.**
5. **Explain Producer's Risk and Consumer's Risk.**
6. **Explain Bath Tub Curve**
7. **Explain Hazard function.**
8. **Explain Reliability function**

SECTION-B

Answer THREE questions **3 x 10=30M**

9. Define SQC? Explain its usage in industry.

(OR)

10. Explain the construction of X and R charts.

11. What are SSP and DSP? Write their merits demerits

(OR)

12. Define O.C. and A.S.N functions w.r.to single sampling plan for Attributes.

13. Explain the method of system reliability in series configuration

(OR)

14.Explain System reliability

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT210	TITLE OF THE COURSE REGRESSION ANALYSIS				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

1. After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about Regression analysis
CO2	Students would be able to know concepts of Types of regression
CO3	Students would be able to know about measures of multiple regression
CO4	Students must be able to know about testing of hypothesis
CO5	Students would able to learn Multicollinearity

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT - 1

Simple Regression model: Description of data model Estimation and test of hypotheses Indexof fit Predicted values andstanderderrors Evaluation of fit Analysis ofresiduals

UNIT-2

SimpleRegressionmodel:Effectofoutliersinsimplelinearregression Model adequacy andresidual plots Deletion ofdatapoints Transformation of variables transformation tostabilizevariance Removalofhetroscedasticity Principle of weighted leastsquares

UNIT-3

Multiple regression model: Description of data model Properties of least square estimators Predicted values and standard errors Multiplecorrelation coefficient - Selection of variables Forward selection procedure Backward elimination procedure Stepwise method (algorithmsonly).

UNIT 4

Test of hypothesis on thelinearmodel, Assumption about the explanatory variable Testingasubsetofregressioncoefficientsequaltozero. Testing of equality of regressioncoefficients.

Unit 5

Multicollinearity and its effects on inference and forecasting Detection of multicollinearity Searching of linear functions of regression coefficients Method of overcoming multicolinearity problem, Ridgemethod.

Books for Reference:

Johnston J.(1984): EconometricMethods

S.ChatterjeeandB.Price(1977):RegressionAnalysisbyExample,JohnWiley& Sons,NewYork.Chapter1,2,3andrelevantportionsinchapters4,5,6,7,8,9N.R. Draper&H.Smith(1981),AppliedRegressionAnalysis,SecondEdition

Textbooks:

Johnston J.(1984): EconometricMethods

S.ChatterjeeandB.Price(1977):RegressionAnalysisbyExample,JohnWiley& Sons,NewYork.Chapter1,2,3andrelevantportionsinchapters4,5,6,7,8,9N.R. Draper&H.Smith(1981),AppliedRegressionAnalysis,SecondEdition

Reference books:

Web Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ

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	2	2	2	1	2	1	3	2	3	2	1	2	2
CO2	2	1	3	2	1	2	2	3	1	3	2	2	2
CO3	1	2	2	3	3	1	2	1	2	3	2	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	2	2	1	3	2	2	2	1	2	1	2	2	2

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT210	TITLE OF THE COURSE REGRESSION ANALYSIS				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn Regression analysis and also learn the opportunities of statistician in different fields.
Practical's Semester-IV
Conduct any 6 (MS-Excel is compulsory)

Practicals-Semester-VI

1. **Regressions**
2. **Simple Regression**
3. **Multiple Regression**
4. **Hypothesis**
5. Multicollinearity-1
6. Multicollinearity-2

Reference books:

1. Mukhopadhyaya. P (1999) Applied Statistics, Books and Allied(P) Ltd
2. Goon, A.M, Gupta M.K and Dasgupta, B.(2008) : Fundamentals of Statistics, Vol11,

Virtual Lab Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ
3. https://youtu.be/8DaOIjuF4BY

Government College [A] Rajamahendravaram

CBCS SYLLABUS (Semester Wise) 2023-24
III B.Sc. Statistics/Semester-V
(With Mathematics Combination)
REGRESSION ANALYSIS Paper –VI –C1
MODEL QUESTION PAPER THEORY

Time: 2 1/2 hrs. **Max Marks: 50**

SECTION-A

Answer Any FIVE of the following questions. **5 x 4= 20M**

1. **Explain** Regression
2. **Explain** Simple Regression model
3. **Explain** Deletion of data points
4. **Explain** the Transformation of variables
5. **Explain** Least squares method
6. **Give** the assumptions for Regression
7. **Explain** about Multiple regression model
8. **Explain** Auto correlation

SECTION-B

Answer Any THREE following questions **3X10=30M**

9. Explain reasons for introducing error term in the model

(OR)

10. Describe general linear model

11.Define Selection of variables Forward selection procedure Backward Elimination procedure Stepwise method

(OR)

12. Describe Ridge method

13.Explain Multi co-Linearity

(OR)

14.Explain Ridgemethod

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) Paper-VII			
Course Code STT211	TITLE OF THE COURSE Forecasting Methods				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the statistical quality part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about basics of Forecasting
CO2	Students would be able to know concepts of smoothing methods
CO3	Students would be able to know about models of time series data
CO4	Students must be able to know about Box Jenkins models
CO5	Students would able to learn about applications of timeseries

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development			Employability			Entrepreneurship	

Syllabus
Unit-I
Smoothing Methods. Averaging methods, Exponential Smoothing methods, a Comparison of methods, general aspects of smoothing methods

Unit-II

Decomposition methods: Trend fitting, the ratio to moving averages classical decomposition method. Different types of moving averages

Unit-III

Modes for time Series data: Auto-covariance and auto correlation functions, stationary process, white noise process, moving averages (MA) process, Auto Regressive (AR)process, Auto regressive and Moving Average (ARMA)Process, Auto Regressive Integrated and Moving Average (ARIMA) Process

Unit –IV

BOX-Jennings Models: Identification, Estimation and diagnostic checking

For the models, Simulation and Monte Carlo Methods

Unit-V

Application of Time –Series Analysis:

Determining randomness of data, Examining stationary of a time series, removing non- stationary in a time series, recognizing seasonality in a Time series

Textbooks:

1. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
2. **BOX,GEP and Jenkins,G.M(1976),Time series Analysis –Forecasting and Control,Holden-dav,San Franciso**
3. **Forecasting Methods by Makridakis**

Reference books:

1) Montgomery,DC and JohnsionL.A(1977)Forecasting and Time Series Analysis

Web Links:

1. **https://youtu.be/k3lUo0XYG3E**
2. **https://youtu.be/qSUjVDbKLWQ**

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
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CO2	2	1	3	2	1	2	2	3	1	3	2	2	2
CO3	1	2	2	3	3	1	2	1	2	3	2	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	2	2	1	3	2	2	2	1	2	1	2	2	2

	Government College (Autonomous) Rajahmundry	Program & Semester IIIB.Sc. (V Sem) Paper-VII			
Course Code STT211	TITLE OF THE COURSE Forecasting Methods				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn operation research in various disciplines and also learn the opportunities of statistician in different fields.

Conduct any 6

1. **Averaging methods**
2. **Measurement of Exponential Smoothing methods**
3. **Decomposition methods**
4. **Auto Regressive (AR) process.**
5. **Auto Regressive Integrated and Moving Average (ARIMA) Process.**
6. **Auto regressive and Moving Average (ARMA) Process.**
7. **Monte Carlo Methods**

Reference books:

1. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
2. **BOX,GEP and Jenkins,G.M(1976),Time series Analysis –Forecasting and Control,Holden-dav,San Franciso**
3. **Forecasting Methods by Makridakis**

Virtual Lab Links:

1. **https://youtu.be/k3lUo0XYG3E**
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Government College [A] Rajamahendravaram

CBCS SYLLABUS (Semester Wise)-2023-24

III B.Sc. Statistics/Semester-V

(With Mathematics Combination)

Forecasting Methods Paper –VII-C2

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs. **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 x 4= 20**M

1. **Explain Simulation Method**
2. **Explain Time series**
3. **Explain Stationary and non-Stationary methods**
4. **What are the sources of Smoothing methods**
5. **Explain White Noise process**
6. **Explain different types of moving averages method**
7. **Explain Decomposition Method**
8. **Explain AR & ARMA**

SECTION-B

Answer any THREE questions. **3 x 10 = 30M**

9. Explain Exponential Methods

(OR)

10. Explain ARIMA

11. Explain ratio to trend Moving averages method.

(OR)

12. Explain Auto correlation and Auto Covariance process

13. Explain the procedure of Non-stationary in a time series.

(OR)

14. Explain Determining randomness of data
