

B.Sc. SYLLABUS (SEMESTER WISE) 2020-2021

FIRST YEAR							
Semester I	Paper-I	Descriptive Statistics and Probability	4	3	50	50	100
Semester I	Paper-I	Practical	2	2	50	0	50
Semester II	Paper-II	Probability Distributions and Statistical Methods	4	3	50	50	100
Semester II	Paper-II	Practical	2	2	50	0	50
SECOND YEAR							
Semester III	Paper-III	Statistical Methods	4	3	50	50	100
Semester III	Paper-III	Practical	2	2	50	0	50
Semester IV	Paper-IV	Inferential Statistics	4	3	50	50	100
Semester IV	Paper-IV	Practical	2	2	50	0	50
THIRD YEAR							
Semester V	Paper-V	Sampling Techniques & Design of Experiments	3	3	40	60	100
	Paper-V	Practical	2	2	0	50	50
	Paper-VI	Elective-1: Quality and Reliability	3	3	40	60	100
	Paper-VI	Practical	2	2	0	50	50
Semester VI	Paper-VII	Elective-I Applied Statistics	3	3	40	60	100
		Elective-II Demography & Vital Statistics	3	3	40	60	100
		Elective-III Forecasting Methods	3	3	40	60	100
	Paper-VII	Practical	2	2	0	50	50
Semester VI	Cluster (A)	(A1) Optimization Techniques	3	3	40	60	100
		Practical	2	2	0	50	50
		(A2) Operations Research	3	3	40	60	100
		Practical	2	2	0	50	50
		(A3) Project & Viva Voce	5	5	40	60	100

	Cluster (B)	(B1) Testing of Hypothesis	3	3	40	60	100
		Practical	2	2	0	50	50
		(B2) Actuarial Statistics	3	3	40	60	100
		Practical	2	2	0	50	50
		(B3) Project & Viva Voce	5	5	40	60	100
	Cluster (C)	(C1) Regression Models	3	3	40	60	100
		Practical	2	2	0	50	50
		(C2) Decision Making Analysis	3	3	40	60	100
		Practical	2	2	0	50	50
		(C3) Project & Viva Voce	5	5	40	60	100

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2020-21
I B.Sc. Statistics/Semester-I
(With Mathematics Combination)
Descriptive Statistics and Probability

Total hrs. Required: 60

Total credits: 03

Objective: Descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data. Descriptive statistics are typically distinguished from inferential statistics. With descriptive statistics you are simply describing what is or what the data shows

UNIT-I

Introduction to Statistics: Importance of Statistics. Scope of Statistics in different fields. Concepts of primary and secondary data. Diagrammatic and graphical representation of data: Histogram, frequency polygon, Ogives, Pie. Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean. Median and Mode through graph.

UNIT-II

Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non-Central moments and their interrelationship. Sheppard's correction for moments. Skewness and kurtosis.

UNIT-III

Introduction to Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 and for n events. Boole's inequality and Baye's theorem and its applications in real life problems.

UNIT-IV

Random variable: Definition of random variable, discrete and continuous random variables, functions of random variable. Probability mass function. Probability density function, Distribution function and its properties. Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

UNIT-V

Mathematical expectation : Mathematical expectation of a random variable and its Properties. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Definitions of M.G.F, C.G.F, P.G.F, C.F and their properties. Chebyshev and Cauchy - Schwartz inequalities.

Practicals - Paper – I (Conduct any SIX Practical)

1. Graphical presentation of data (Histogram, frequency polygon, Ogives).
2. Diagrammatic presentation of data (Bar and Pie).
3. Computation of measures of central tendency (Mean, Median and Mode)
4. Computation of measures of dispersion (Q.D, M.D and S.D)
5. Computation of non-central, central moments, β_1 and β_2 for ungrouped data.
6. Computation of Karl Pearson's coefficients of Skewness and Bowley's coefficients of Skewness.
7. Calculation of probabilities
8. Bayes Problems
9. Random Variables Problems
10. Distribution function problems

Text Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan.
2. BA/BSc I year Statistics-descriptive statistics, probability distribution-Telugu Academy-Dr M. Jaganmohan Rao, Dr. N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt. D.Vijayalakshmi.
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.

Reference books:

1. Willam Feller: Introduction to Probability theory and its applications. Volume –I, Wiley
2. Goon AM, Gupta MK, Das Gupta B: Fundamentals of Statistics, Vol-I, the World Press Pvt.Ltd. Kolkata.

SEMESTER-I: DISCRIPTIVE STATISTICS

Model blue print for the Question Paper setter

Max. marks: 50

Time: 2 ½ Hrs.

Unit / Chapter name	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
Unit-I: Introduction to Statistics	3	2	25
Unit II: Measures of Dispersion	2	2	22
Unit-III: Introduction to Probability	1	2	19
Unit-IV: Random variable	2	1	14
Unit-V: Mathematical Expectation	2	1	14
Total No. of Questions including choice (17)	10	8	17
Total marks allotted to all questions including choice			94

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2020-21
Descriptive Statistics and Probability
MODEL QUESTION PAPER

Time: 2 1/2 hrs.

Max Marks: 50

SECTION-A

Answer any SIX questions.

6X3= 18M

1. Distinguish between Primary and Secondary data.
2. What is Sheppard's correction? What will be the corrections for the first four moments?
3. Write short note on Diagrams and its types?
4. Explain types of classification
5. Explain Conditional Probability
6. In a frequency distribution, the co-efficient of skewness based upon the quartiles is 0.6. If the sum of the upper and lower quartiles is 100 and median is 38, find the value of the upper and lower quartiles.
7. Explain pmf and pdf
8. Explain Booles inequality
9. Explain Kurtosis
10. Explain Standard deviation

SECTION – B

Answer Any FOUR questions.

4 x8=32M

11. What do you understand by collection of data? What are its objectives?
Discuss different methods
12. Describe the different measures of central tendency and discuss their Merits and demerits.
13. Explain the methods of measuring skewness and kurtosis of a frequency Distribution.
14. Define the raw and central moments of a frequency distribution. Derive the Relationship between them.
15. Explain MGF and its properties.
16. A random variable X has the following probability function

X	0	1	2	3	4	5	6	7
P(X)	0	K	2K	2K	3K	K ²	2K ²	7K ² +K

(i) Find K

And (ii) $P(X < 6)$, $P(X \geq 6)$ and $P(0 < X < 5)$.

17. Explain $E(X+Y)=E(X)+E(Y)$
 $E(XY)=E(X)E(Y)$
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GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2020-21
II B.Sc. STATISTICS / Semester-III
(With Mathematics Combination)
Statistical Methods

Total hrs.Required: 60
03

Total credits:

Objective: Statistical Methods is helpful to study the relation between variables and various methods to obtain relation among them and also study the qualitative variables and also learn basic concepts to understand Statistical inference.

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.

Additional input: Method of studying regression

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.

Practical's-Semester-III

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.

Text Books:

1. B.A/B.Sc II Year statistics-statistical methods and inference-Telugu Academy by A.Mohanrao, N.Srinivasa Rao, Dr.R.Sudhakara Reddy, Dr. T.C. Ravichandrakumar
2. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi.
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.

Reference Books:

1. Outlines of statistics, Vol II: Goon Gupta, M.K.Gupta, Das Guptha B.
2. Introduction to Mathematical Statistics: Hoel P.G.

SEMESTER-III: STATISTICAL METHODS

Model blue print for the Question Paper setter

Max. marks: 50

Time: 2 ½ Hrs.

Unit / Chapter name	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
Unit-I: Correlation	3	2	25
Unit II: Regression	2	2	22
Unit-III: Curve fitting	2	2	22
Unit-IV: Attributes	2	1	14
Unit-V: Exact Sampling distributions	1	0	3
Total No. of Questions including choice (17)			17
Total marks allotted to all questions including choice			86

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
II B.Sc. Statistics (Semester-III) 2020-21
(With Mathematics Combination)
Statistical Methods
MODEL QUESTION PAPER (THEORY)

Time: 2 ½ Hrs.

Max Marks: 50

SECTION-A

Answer any SIX questions

6 x 3 = 18M

1. Derive the limits for Karl Pearson's correlation coefficient.
2. Explain the concept of correlation ratio.
3. Explain the method of least squares.
4. Explain the Scatter Diagram.
5. State the properties of X^2 , t and F distributions.
6. Give the properties of spearman's rank correlation coefficient.
7. Explain about regression.
8. Explain about Coefficient colligation.
9. Write short note on attributes.
10. What is Partial Correlation?

SECTION-B

Answer Any FOUR questions

4 x 8 = 32M

11. Define Correlation. Explain different types of correlation and its properties
12. Define Rank correlation. Derive the limits for rank correlation coefficient.
13. Derive the equation of regression lines of X on Y and Y on X.
14. Explain the differences between Correlation and Regression.
15. Explain the method of fitting a power curve $y = ab^x$ for a given data.
16. Explain the method of fitting of an exponential curve $y = ae^{bx}$ for a given data.
17. Write the consistency conditions for a given data for (i) single attributes (ii) two Attributes and (iii) three attributes.

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2020-21

III B.SC Statistics / Semester -V
(With Mathematics Combination)

Sampling Techniques & Design of Experiments

Total hrs.required: 50

Total Credits: 03

Objective: 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. 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

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.

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.

Text Books:

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.**

SEMESTER-V: Sampling Techniques & Design of Experiments

Model blue print for the Question Paper setter

Max. marks: 60

Time: 3 Hrs.

Unit / Chapter name	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
Unit-I: Sampling theory	2	2	24
Unit II: Simple Random Sampling	1	2	20
Unit-III: Stratified Random Sampling	3	1	20
Unit-IV: Analysis of Variance	1	1	12
Unit-V: Design of Experiments	1	2	20
Total No. of Questions including choice (18)	8	8	
Total marks allotted to all questions including choice			96

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
III B.Sc. Statistics (Semester-V) 2020-21
(With Mathematics Combination)
Sampling Techniques & Design of Experiments
MODEL QUESTION PAPER (THEORY)

Time: 3 hrs.

Max Marks: 60

SECTION-A

Answer any FIVE questions.

5 x 4 = 20M

- 1 Distinguish between census survey and sample surveys.
- 2 Define SRSWR and SRSWOR.
- 3 Explain Systematic Sampling.
- 4 Explain the purpose of ANOVA.
- 5 Explain about CRD
- 6 What are different types of sampling
- 7 Explain types of allocation in stratified sampling.
- 8 Systematic Sampling VS Stratified Sampling

SECTION-B

Answer any FIVE questions.

5 x 8 = 40 M

- 9 What are principal steps in a sample survey.
- 10 Discuss Sampling and non-sampling errors.
- 11 Derive the variance of the sample mean in SRSWOR.
- 12 What are simple random samples? Explain the methods of selecting simple random samples.
- 13 If the population consists of linear trend, then prove that
$$V(Y_{st}) \leq V(Y_{sys}) \leq V(Y_n)_R$$
- 14 Discuss about basic principles of experimentation
- 15 Explain the analysis of RBD with one missing observation.
- 16 Explain LSD and merits, demerits of LSD

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
III B.Sc Statistics Syllabus 2020-21
(With Mathematics Combination)
Semester-V CBCS
QUALITY & RELIABILITY

Total hrs. Required: 50

Total Credits: 03

Objective: The aim of this paper is to understand the purpose and function of statistical quality control and also learn methods of statistical process control and learn the importance of Reliability in Quality Control.

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.

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

1. Construction of \bar{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 numbers 1
6. MS-Excel methods for the serial numbers 2 to 4.

Text 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.

Reference Books:

1. R.C. Gupta: Statistical Quality Control.

SEMESTER-V: Sampling Techniques & Design of Experiments

Model blue print for the Question Paper setter

Max. marks: 60

Time: 3 Hrs.

Unit / Chapter name	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
Unit-I: SQC	4	2	32
Unit II: Variable control chart	1	2	20
Unit-III: Acceptance sampling plans	1	1	12
Unit-IV: Sampling Plans	1	2	20
Unit-V: Reliability	1	1	12
Total No. of Questions including choice (18)			
	8	8	
Total marks allotted to all questions including choice			96

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2020-21
III B.Sc. Statistics (Semester-V)
(With Mathematics Combination)
Quality & Reliability
MODEL QUESTION PAPER (THEORY)

Time: 3hrs.

Max Marks: 60

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 FIVE questions

5 x 8=40M

- 9. Define SQC? Explain its usage in industry.**
- 10. Explain Six-Sigma and their importance in industry**
- 11. Explain the construction of X and R charts.**
- 12. Explain the construction of p and np charts.**
- 13. Explain the concepts AQL and LTPD**
- 14. What are SSP and DSP? Write their merits demerits**
- 15. Define O.C. and A.S.N functions with respect to single sampling plan for Attributes.**
- 16. Explain the method of system reliability in series configuration.**