GOVERNMENT ARTS COLLEGE (AUTONOMOUS)

KUMBAKONAM 612 002

Re - accredited With 'A' Grade by NAAC & Affiliated to Bharathidasan University

DEPARTMENT OF STATISTICS

(Effective for those admitted from 2020-2021 onwards)

SYLLABI

B.Sc., STATISTICS

GOVERNMENT ARTS COLLEGE (AUTONOMOUS),KUMBAKONAM								
Re-Accredited (II Cycle) with 'A' Grade by NAAC & Affiliated to Bharathidasan university								
2020 -2021 BATCH - CODE & TITLE								
B.Sc.STATISTICS								
S.No	**Part**	**Code**	**Subject**	**credit**	**Inst Hrs/ week**	**Marks**		
						CIA	**E.E**	**Total**
SEMESTER-I								
1	I		LC - Part I Tamil Paper-I	3	6	25	75	100
2	II		ELC -Part II English Paper-I	3	6	25	75	100
3	III		CC-Descriptive Statistics	5	6	25	75	100
4	III		AC-Mathematics – I	4	4	25	75	100
5	IV		VE- Value Education	2	2	25	75	100
			CP-Major Practical		3	-	-	-
			AC-Mathematics I		3	-	-	-
			Total	**17**	**30**			**500**
SEMESTER-II								
6	I		LC-Part I Tamil Paper-II	3	6	25	75	100
7	II		ELC-Part II English Paper-II	3	6	25	75	100
8	III		CC-Probability Theory	5	6	25	75	100
9	III		AC-Mathematics II	4	3	25	75	100
10	III		AC-Mathematics III	4	4	40	60	100
11	III		CP- Statistics Practical-I	3	3	25	75	100
12	IV		ES-Environmental Studies	2	2	25	75	100
			Total	**24**	**30**			**700**
SEMESTER-III								
13	I		LC-Part I Tamil Paper-III	3	6	25	75	100
14	II		ELC-Part Ii English Paper-III	3	6	25	75	100
15	III		CC- Discrete Probability Distributions	5	6	25	75	100
16	III		AC-Programming in 'C'	4	4	25	75	100
17	IV		NE-Indian Polity	2	2	25	75	100
	III		AC-BBA-I		3			
	IV		CP- Major practical-II		3			
			Total	**17**	**30**			**500**
SEMESTER-IV								
18	I		LC-Part I Tamil Paper-IV	3	6	25	75	100
19	II		ELC-Part II English Paper-IV	3	6	25	75	100
20	III		CC- Continuous Probability Distributions	4	4	25	75	100
21	III		AC- Programming in 'C++'	5	4	25	75	100
22	III		AC- Programming in 'C'&'C++'	4	3	25	75	100
23	III		CP- Statistics Practical -II	4	3	40	60	100
24	III		NE-Modern India	2	2	25	75	100
25	IV		SE- Regression Analysis	2	2	25	75	100
			Total	**26**	**30**			**800**
SEMESTER-V								
26	III		CC- Estimation Theory	5	5	25	75	100
27	III		CC- Operations Research	5	5	25	75	100
28	III		CC - Statistical Quality Control	5	5	25	75	100
29	III		CP- Statistics Practical -III	5	4	25	75	100

30	III		EC- Vital Statistics	4	5	25	75	100
31	IV		SE- Time Series And Index Numbers	2	2	25	75	100
32	IV		SE- Optimization Techniques	2	2	25	75	100
33	IV		SD-Soft Skills	2	2	25	75	100
			Total	**30**	**30**			**800**
			SEMESTER-VI					
34	III		CC- Testing Of Hypothesis	6	6	25	75	100
35	III		CC- Design Of Experiments	6	6	25	75	100
36	III		CP- Statistics Practical -IV	5	5	25	75	100
37	III		EC- Sampling Techniques	4	6	25	75	100
38	III		EC- Numerical Methods	4	6	40	60	100
39	V		GS-Gender Studies	1	1	25	75	100
40			EA-Extension Activities	1	0	0	0	0
			Total	**27**	**30**			**600**
			GRAND TOTAL	**140**	**180**			**3900**

UG COURSE STRUCTURE 2020-2021 SUMMARY		
Part	**PAPERS**	
I	LC - Language Course (Tamil)	4
II	ELC - English Language Course	4
III	CC - Core Course	9
	CP - Core Practical	4
	AC - Allied Course	5
	AP - Allied Practical	1
	EC - Elective Course	3
IV	VE - Value Education	1
	ES - Environmental Studies	1
	NE - Non Major Elective Course	2
	SE - Skill Based Elective Course	3
V	SD - Soft Skill Development	1
	GS - Gender Studies	1
	EA - Extension Activities	1
TOTAL PAPERS		**40**

Credits	**: 5**	**Code :**
Hours / Week	**: 6**	
Medium of Instruction	**: English**	

SEMESTER: I

(For students admitted from 2020 onwards)

DESCRIPTIVE STATISTICS

(Major for B.Sc., Degree Course)

Objectives:

To explain how to analyze the given data. At the end of the course a Student should be able to solve simple real-life problems.

Unit -I

Statistics: Definition – Functions and scope of Statistics – Primary data and Secondary data Collections. Classification: Definition and types. Tabulation – Parts of table and Types of tables.

Unit- II

Diagrammatic representations – Bar diagrams and Pie diagram. Graphical representations – Histogram, Frequency curve, frequency polygon and Ogive-(definitions, Simple problems).

Unit- III

Measures of Central Tendencies – Arithmetic Mean, Median, Mode, Geometric mean and Harmonic mean – Definition, merits and demerits. (Simple problems)

Unit -IV

Measures of Dispersion-Range, Quartile deviation, Mean deviation, Standard Deviation, Coefficient of Variation - Definitions, merits and demerits. (Simple problems).

Unit-V

Skewness: Definition – Bowley's and Karl Pearson's Coefficient of Skewness (Simple problems). Moments and Kurtosis-Definition and types. (Simple problems)

Course Outcomes:

- Know the uses of Statistics in Society.
- Understand the method of data collection.
- Learn the types of statistical diagrams.
- Applications of pie chart in news papers.

Books for study

Statistics (Theory and practice) -R.S.N. Pillai and V. Bagavathi, Chand& company LTD, New Delhi.

Unit – I Chapter:2(Page No:13-18), Chapter : 4(Page No:31-37), Chapter : 6 (Page No:73-79)

Unit –II Chapter :7 (Page No:84-96) ,Chapter:8 (Page No:101-110)

Unit – III Chapter :9 (Page No :124-186)

Unit – IV Chapter :10 (Page No:229-278)

Unit – V Chapter :11 (Page No:316-351)

Books for Reference

1. S.C.Gupta and V.K.Kapoor – Fundamentals of Mathematical Statistics, Sultan Chand & sons, New Delhi. (11^{th} Edition June 2002. Reprint 2017)

2. S.P.Gupta – Statistical Methods. Sultan Chand&sons, New Delhi. (44^{th} Revised Edition 2014, Reprint 2017)

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)

Section B- 5*5=25 Marks ----- Either (a) or (b)

Section C-3*10=30Marks --- Three out of five questions must be answered

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Credits	**: 5**	**Code :**
Hours / Week	**: 6**	
Medium of Instruction	**: English**	

SEMESTER: II

(For students admitted from 2020 onwards)

PROBABILITY THEORY

(Major for B.Sc., Degree Course)

Objective:

The techniques in Inferential Statistics by and large depend on Probability concepts. Hence the study of Probability theory in this Semester serves as a pre-requisite for all the subsequent Semesters (Major for B.Sc., Degree Course)

Unit-I

Concept of Random experiment – Trial – Sample point – Sample space Event, Mutually Exclusive – Definition of probability, and Axiomatic approach , Theorems on Probability – Addition theorem of probability – Conditional probability – Multiplication theorem – Baye's theorem - (simple problems.)

Unit-II

Concept of Random variables – Discrete and continuous random variables, probability mass function- Probability density function. Distribution function – Properties (simple problems)

Unit-III

Bivariate distribution – Distribution function of bivariate random variable and its properties – joint probability function and joint probability density function - marginal and conditional distributions – Independence of random variable. (simple problems).

Unit-IV

Mathematical expectation – discrete and continuous random variables – Properties – variance – properties – covariance (simple problems).

Unit-V

Moment generating function – properties – cumulants – characteristic functions – properties . Inversion theorem and Chebychev,s inequality theorem. (statement only).

Course Outcomes:

- Conduct random experiments in real life data.
- Understand the Axioms of probability.
- Create the Joint probability density function.
- Obtain the cumulate generating functions and its properties.

Book for study :

N.Subramaniam – Random Processes
Unit –I –Chapter-1(page no :1-29)
S.C.Gupta and V.K.Kapoor, (2004), Fundamentals Mathematical Statistics, Sultan Chand & Sons, New Delhi.
Unit –II-Chapter -5(page no :5.2-5.11)
Unit –III-Chapter -5(page no :5.32-5.49)
Unit –IV-Chapter -6(page no:6.2-6.11)
Unit –V-Chapter -7(page no:7.2 -7.11,7.24)

Reference Books:

1. J.N. Kapur and H.C. Saxena (1999). Mathematical Statistics – S. Chand and Company Ltd., New Delhi.
2.Marek. Fisz, (1961). Probability Theory and Mathematical Statistics, John Wiley and Sons.
3. Hogg. R. V. and Allen T. Craig (1998). Introduction to Mathematical Statistics.

Question Pattern:

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered
Section B- 5*5=25 Marks----- Either (a) or (b)
Section C-3*10=30Marks--- Three out of five questions must be answered

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Credits	**: 3**	**Code :**
Hours / Week	**: 3**	
Medium of Instruction	**: English**	

SEMESTER: II

(For students admitted from 2020 onwards)

STATISTICS PRACTICAL – I

(Based on Semester I& II)

(Major for B.Sc., Degree Course)

Unit- I

Construction of Univariate and Bivariate Frequency Distributions. Diagrammatic representations – Bar and Pie diagrams. Graphical Representations – Histogram, Frequency curve, Frequency Polygon and Ogive curves.

Unit- II

Measures of Central Tendency – Arithmetic Mean, Median, Mode, Geometric mean and Harmonic mean.

Unit- III

Measures of Dispersion – Quartile Deviation, Mean Deviation, Standard deviation and Co-efficient of variation.

Unit- IV

Moments, Measures of Skewness– Bowley's and Karl Pearson's method-Kurtosis.

Unit –V

Probability, Random variables, marginal and conditional distributions and Mathematical expectation ,Moment generating function.

Reference Books:

1. J.N. Kapur and H.C. Saxena (1999). Mathematical Statistics – S. Chand and Company Ltd., New Delhi

2.S.C.Gupta and V.K.Kapoor, (2004), Fundamentals Mathematical Statistics, Sultan Chand & Sons, New Delhi.

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Credits	**: 5**	**Code :**
Hours / Week	**: 6**	
Medium of Instruction	**: English**	

SEMESTER: III

(For students admitted from 2020 onwards)

DISCRETE PROBABILITY DISTRIBUTIONS

(Major for B.Sc., Degree Course)

Objective:

To expose the various important discrete probability models and real life Situations where these distributions provide appropriate models

Unit – I

Binomial distribution – Definition, Concept and Derivation of Moments, Moment Generating Function, Additive property, Characteristic function and Recurrence relation for moments. Fitting of Binomial distribution – Simple problems.

Unit – II

Poisson Distribution – Definition, Concept, Derivation of Moments, Moment Generating Function, Recurrence relation for moments and Poisson Distribution as a limiting case of Binomial Distribution, Fitting of Poisson Distribution – Simple problems.

Unit – III

Negative Binomial Distribution – Definition, Derivation of constants and Poisson Distribution as a limiting case of the Negative Binomial Distribution.

Unit – IV

Geometric Distribution – Definition, Moments, Derivation of Moment Generating Function and Lack of memory property. Power series distribution (Concept only).

Unit – V

Hyper Geometric Distribution – Definition, Derivation of Mean and Variance approximation to Binomial distribution and Recurrence relation. Multinomial Distribution(Concept only).

Course Outcomes:

- Compute the Bernoulli trials. .
- Find the Memory less Property of Geometric distribution.
- Obtain the mean and variance of Hyper geometric distribution.
- Learn the moments of Multinomial distribution.

Book for Study:

Gupta,S.C & Kapoor, V.K (2013), Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
Unit –I-Chapter -8(page no :8.4-8.22)
Unit –II-Chapter -8(page no :8.28-8.47)
Unit –III-Chapter -8(page no :8.48-8.54,8.63)
Unit –IV-Chapter -8(page no:8.54-8.57,8.63)
Unit –V-Chapter -8(page no:8.57 -8.60)

Reference Books

1.V.K. Rohatgi, (1985), An introduction to probability theory and mathematical statistics, Wiley Eastern Ltd., New Delhi
2.Johnson, N.L. and Kotz, S: "Discrete Distributions", John Wiley and sons, 1969.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks----- Either (a) or (b)
Section C-3*10=30Marks--- Three out of five questions must be answered

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Credits	**: 4**	**Code :**
Hours / Week	**: 4**	
Medium of Instruction	**: English**	

SEMESTER: IV

(For students admitted from 2020 onwards)

CONTINUOUS PROBABILITY DISTRIBUTIONS

(Major for B.Sc., Degree Course)

Objective:

To expose the various important continuous probability models and real Life situations where these distributions provide appropriate models

Unit – I

Normal Distribution – Introduction, Limiting form of Binomial Distribution. Characteristics of Normal Distribution, and its curve. Derivation of Mode, Median, Moments and Moment Generating Function .

Unit – II

Derivation of Cumulant Generating Function, Mean Deviation about Mean, and Points of Inflection of Normal curve. Importance of Normal Distribution – Fitting of normal distribution – Simple Problems.

Unit – III

Beta Distribution of First and Second Kind – Derivation of Moments, $\beta 1$, $\beta 2$ and Harmonic Mean. Gamma Distribution – Definition and Derivation of Moment Generating Function, Cumulant Generating function, Moments and Additive property of Gamma Distribution.

Unit – IV

Rectangular Distribution-Introduction and derivation of Moments, Moment Generating Function and Mean Deviation about Mean**.** Exponential Distribution – Definition, Derivation of Moment Generating Function and Lack of Memory property. Concept of Weibul Distribution, Cauchy Distribution .

Unit – V

Sampling Distribution - Concept of 't', 'χ^2' and 'F' Distributions – Derivation of these distributions, Constants and Moment Generating Function – Relationship between 't', '$\chi 2$' and 'F' Distribution.

Course Outcomes:

- Learn the characteristics of Normal distributions.
- Learn the relationship between beta and gamma distribution.
- Know the memory less property of exponential distribution.
- Obtain the difference of two sample tests.
- Understand the relationship between t and F distributions

Book for Study:

Gupta,S.C & Kapoor, V.K (2013), Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
Unit –I-Chapter -9(page no :9.3-9.8)
Unit –II-Chapter -9(page no :9.8-9.23)
Unit –III-Chapter -9(page no :9.38-9.43)
Unit –IV-Chapter -9(page no:9.29,9.30,9.50,9.51,9.55,9.59)
Unit –V-Chapter -15(page no:15.2-15.5),Chapter -16(page no:16.2-16.6,16.29-16.31,16.40,16.41)

Reference Books

Johnson, N.L. and Kotz, S : "Continuous univariate Distributions", Vol.I & Vol.II, John Wiley and Sons, 1970.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks----- Either (a) or (b)
Section C-3*10=30Marks--- Three out of five questions must be answered

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Credits	**: 3**	**Code :**
Hours / Week	**: 3**	
Medium of Instruction	**: English**	

SEMESTER: IV

(For students admitted from 2020onwards)

STATISTICS PRACTICAL - II

(Based on Semester III&IV)

(Major for B.Sc., Degree Course)

Unit- I

Fitting of Binomial and Poisson distributions and testing of its goodness of fit.

Unit -II

Fitting of Normal distribution -Area and Ordinate methods.

Unit -III

Correlation analysis – Karl Pearson's coefficient of Correlation and Spearman's Rank Correlation Coefficient. Regression lines, Partial and Multiple Correlation Coefficients, Multiple Regressions.

Unit- IV

Curve fitting by the method of least squares: Straight line, First order &second order polynomials and logistic curves, Power Curve and Exponential Curve

Unit -V

Association of Attributes–Yule's coefficient of Association and Coefficient of Colligation.

Reference Books

1.Gupta,S.C & Kapoor, V.K (2013), Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi

2. Statistics (Theory and practice) -R.S.N. Pillai and V. Bagavathi, Chand& company LTD, New Delhi

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Credits	**: 2**	**Code :**
Hours / Week	**:2**	
Medium of Instruction	**: English**	

SEMESTER: IV

(For students admitted from 2020 onwards)

Skill Based-REGRESSION ANALYSIS

(Major for B.Sc., Degree Course)

Objectives:

To explain how to analyze the given data. At the end of the course a Student should be able to solve simple real-life problems.

Unit I

Correlation – Definition and Types of Correlation - Properties, Methods – Scatter diagram, Karl Pearson's coefficient of Correlation and Spearman's Rank Correlation Coefficient. (Simple problems only)

Unit II

Regression lines and Regression coefficients- Properties. - (Simple problems only)

Unit III

Multiple Correlation Coefficients, Multiple Regression variables. (simple problems only)

Unit IV

Curve fitting by the method of least squares: Straight line, second order polynomials, logistic curves,Power Curve and Exponential Curves.(simple problems only)

Unit V

Association of Attributes – Class frequencies – Order of frequencies – (2X2) Contingency table – Finding missing frequencies – Yule's coefficient of Association and Coefficient of Colligation.

Course Outcomes:

Student learns to identify the relationship between two variables using scatter plot. Interpret a sample correlation

Books for study :

1. Statistics (Theory and practice) -R.S.N. Pillai and V. Bagavathi, Chand& company LTD, New Delhi.

Unit – I - Chapter 12(Page No 362-392)

Unit –II -Chapter 13 (Page No 430-448)

Unit – III -Chapter 11(Page No 338-371)

2. Statistical Methods – S.P.Gupta, Sultan Chand & Sons, New Delhi

Unit –IV- Chapter 9 (Page No1140-1147)

Unit –V -Chapter 12 (Page No 496-533)

Question Pattern:

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)

Section B- 5*5=25 Marks----- Either (a) or (b)

Section C-3*10=30Marks--- Three out of five questions must be answered

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Credits	**: 5**	**Code :**
Hours / Week	**: 5**	
Medium of Instruction	**: English**	

SEMESTER: V

(For students admitted from 2020 onwards)

ESTIMATION THEORY

(Major for B.Sc., Degree Course)

Objective:

To enable the students to clearly understand the concepts of Statistical Estimation. This subject deals with various statistical estimation methodsof parameters and its applications in solving real life problems.

Unit – I

Introduction to estimation theory – definition of parameter space, estimate and estimator. Characteristics of estimator – unbiasedness – definition and simple problems. Consistency – definition, problem based on Normal and Poisson distribution. Invariance property of consistency, sufficient condition for consistency.

Unit – II

Efficient estimators – definition of efficiency, most efficient estimator, minimum variance unbiased estimator. (simple problems).

Unit – III

Sufficiency – definition, Rao Blackwell theorem, Crammer-Rao inequality, statement of Neymann factorization theorem, (simple problems).

Unit – IV

Methods of estimation: Method of Maximum likelihood estimation – definition of likelihood function and M.L.E., properties of M.L.E(simple problems). Statement of Crammer Rao theorem and Hazoor Bazar's theorem.

Unit – V

Methods of minimum variance, Methods of moments and Methods of least squares(simple problems).Interval estimation – definition of confidence limits, confidence co-efficient, confidence interval and Confidence intervals for large samples (simple problems).

Course Outcomes:

- Learn the properties of good estimator.
- Know the importance of maximum likely hood estimator.
- Understand the types of estimation.
- Know the role of Confidence interval in interval estimation. .
- Obtain the importance of Cramer Rao rule.

Book for Study:

Gupta,S.C & Kapoor, V.K (2013), Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
Unit –I-Chapter -17(page no :17.2-17.7)
Unit –II-Chapter -17(page no :17.8-17.14)
Unit –III-Chapter -17(page no :17.14-17.23)
Unit –IV-Chapter -17(page no: 17.30-17.40)
Unit –V-Chapter -17.(page no: 17.43-17.46,17.46-17.52)

Book for Reference:

1. Rohatgi.V.L, "An introduction to probability theory and Mathematical Statistics", Wiley Eastern limited
2. Radhakrishna Rao C., "Linear Statistical Inference and its Applications", Wiley Eastern limited.
3. Lehmann.E.L, Testing of Statistical Hypothesis, John Wiley.
4. Gibbons.J.D, Non – Parametric Statistical Inference, Duxbury.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks -----Either (a) or (b)
Section C-3*10=30Marks ---Three out of five questions must be answered.

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Credits	**: 5**	**Code :**
Hours / Week	**: 5**	
Medium of Instruction	**: English**	

SEMESTER: V

(For students admitted from 2020 onwards)

STATISTICAL QUALITY CONTROL

(Major for B.Sc., Degree Course)

Objective:

To impart the basic knowledge of statistical quality control. At the end of the Course, the student should be able to select the suitable statistical quality control.

Unit – I

Introduction to SQC – Chance and Assignable Causes of Variation – Benefits of SQC – Process and Product Control – Tools for SQC- Control chart for Variables – X-Bar and R- Chart .

Unit – II

Control Chart for Attributes – Control Chart for Fraction Defective (p-Chart)- Control Chart for Number of Defectives (d-chart, for fixed and variable sample size) – Control Chart for Number of Defects per unit (c-Chart) – Natural Tolerance Limit and Specification Limits.

Unit –III

Acceptance sampling by Attributes – Acceptance Quality Level (A.Q.L) – Lot Tolerance Proportion or Percent Defective (LTPD) – Process Average Fraction Defective (p) – Consumer's Risk(β) – Producer's Risk(α) – Rectifying Inspection Plan – Average Outgoing Quality Level (AOQL)- Simple Problem.

Unit – IV

Operating Characteristic Curve (OC-curve) – Average Sample Number (ASN) – Average Amount of Total Inspection (ATI) – Single Sampling Plan – Determination of 'n' and 'c', AOQL, OC-curve – Double Sampling Plan – ASN and ATI of Double Sampling Plan – Single sampling Vs Double Sampling plan. Simple Problem .

Unit –V

Sequential Sampling – Sequential Probability Ratio Test (SPRT) – ASN Functionn.OC Function.

Course Outcomes:

- Understand the concepts of quality control, chance and assignable causes of variation, control charts for variables and attributes, producer's and consumer's risk - Acceptance sampling plans.
- Understand the setting of mean chart limits, range chart limits using mean and range charts.

Book for Study:

Gupta,S.C. & Kapoor,V.K (2014), Fundamentals of Applied Statistics, 4th Edition, Sultan Chand & Sons, New Delhi.
Unit –I-Chapter -1(Page no 1.2-1.22)
Unit –II-Chapter -1(Page no :1.30-1.45)
Unit –III-Chapter -1(Page no :1.45-1.50)
Unit –IV-Chapter -1(Page no: 1.50-1.60)
Unit –V-Chapter -1(Page no:1.60-1.69)

Book for Reference:

Mahajan, M., Statistical Quality Control, Dhanpat Rai & Co.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks----- Either (a) or (b)
Section C-3*10=30Marks--- Three out of five questions must be answered

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Credits	**: 5**	**Code :**
Hours / Week	**: 5**	
Medium of Instruction	**: English**	

SEMESTER: V

(For students admitted from 2020 onwards)

Major Based Elective - VITAL STATISTICS

(Major for B.Sc., Degree Course)

Objective

To enable the students to have an idea about Vital Statistics andDemography

Unit I

Definition of vital statistics and demography – uses of vital statistics, Methods of collecting Vital Statistics.

Unit II

Measurement of Mortality – Specific death rate – Standardized death rate – Infant Mortality- Concepts and simple problems.

Unit III

Mortality Table or Life table - Stationary and Stable population – Central Mortality Rate, Force of Mortality.

Unit IV

Life Table – Assumptions, Descriptions, Construction and Uses of Life Table. -Simple Problem.

Unit V:

Measurement of Fertility – CBR (crude birth rate) – SFR (specific fertility rate) - ASFR (age specific fertility rate) – GFR (general fertility rate) – TFR (total fertility rate)- Simple Problem.

Course Outcomes:

- Learn the accumulate value and present value.
- Obtain the redemption of loans.
- Role of probability distributions general insurance.
- Understand the Force of mortality.
- Know the importance of mortality tables.

Book for Study:

Gupta,S.C. & Kapoor,V.K (2014), Fundamentals of Applied Statistics, 4th Edition, Sultan Chand & Sons, New Delhi.

Unit –I-Chapter -9 (Page no 9.2-9.4)
Unit –II-Chapter -9 (Page no 9.6-9.15)
Unit –III-Chapter -9 (Page no 9.15-9.27)
Unit –IV-Chapter -9 (Page no 9.28-9.37)
Unit –V-Chapter -9 (Page no 9.44-9.48)

Book for Reference:

1.Hansraj, Fundamentals of Demography, Surjeet Publications, New Delhi.
2.Peter R Cox, Demography, Fifth edition, Vikas Publishing House, New Delhi.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks ----- Either (a) or (b)
Section C-3*10=30Marks --- Three out of five questions must be answered

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Credits	**: 2**	**Code :**
Hours / Week	**: 2**	
Medium of Instruction	**: English**	

SEMESTER: V

(For students admitted from 2020 onwards)

Skill Based Elective-TIME SERIES AND INDEX NUMBERS

(Major for B.Sc., Degree Course)

Objective

To provide fundamental ideas about application of statistical concepts in the real world.Statistics finds innumerable applications in almost all walks of life.

Unit- I

Time series –Concept and Sources of time series data – Components of time series – Additive and Multiplicative models – Resolving the components of time series.

Unit- II

Trend –Methods of measuring trend – Semi average method – Method of moving average –Method of least squares.(simple problems)

Unit –III

Index Numbers – Definition – uses - Problems in the construction –Different types of Index Numbers – Simple and Weighted Index Numbers – Laspeyre's Index Numbers – Paaschey's Index Numbers – Fisher's Index Numbers –Marshall - Edgeworth Index Numbers.(simple problems).

Unit –IV

Index Numbers – Time reversal test – Factor Reversal Test –Circular Test – Chain base Index Number – Conversion of FBI into CBI and Vice versa - Wholesale price Index Numbers (Concept only)**.**

Unit –V

Cost of living Index Numbers – Methods of construction – Aggregate method -Family budget method – Uses of cost of living Index Numbers- Splicing and Deflating – Base shifting (Concepts only).

Course Outcomes:

- Learn the economic statistics.
- Compute the different index numbers.
- Learn the uses of Laspeyre's and Passche's and Fisher's index numbers in real life problems.
- Learn the importance of good index number.

Book for Study:

Gupta,S.C. & Kapoor,V.K (2014), Fundamentals of Applied Statistics, 4th Edition, Sultan Chand & Sons, New Delhi.
Unit –I-Chapter -2(Page no 2.2-2.7)
Unit –II-Chapter -2(Page no 2.7-32)
Unit –III-Chapter -3(Page no 3.2-3.31)
Unit –IV-Chapter -3(Page no 9.28-9.33)
Unit –V-Chapter -3(Page no3.29-3.47)

Book for Reference:

1. A.M. Goon M.K. Gupta and B. Dass Gupta (1994), Fundamentals of Statistics V-II, The worlds press Ltd., Calcutta.
2. Croxton: Applied General Statistics.
3. S.C.Gupta, V.K.Kapoor, (2007): Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks ----- Either (a) or (b)
Section C-3*10=30Marks --- Three out of five questions must be answered

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Credits : 6 **Code :**

Hours / Week 6

Medium of Instruction : English

SEMESTER: V

(For students admitted from 2020 onwards)

OPERATIONS RESEARCH

(Major for B.Sc., Degree Course)

Objective

To import basic knowledge of various optimization techniques. Resources are scarce in many situations. Any decision making process may have to take into account, a set of constraints. The optimization in Such a situation is of vital importance.

Unit I

Origin and development of OR- Definition,scope of OR ,Phases in OR, model in OR ,classification of models

Unit II

Linear Programming Problem(LPP) – General Form, Standard form and Canonical form, Basic Solution, Basic Feasible solution, Optimum solution. Linear Programming Problem: Introduction- Mathematical Formulation of LPP-Graphical Solution methods.

Unit III

Simple Method: Formation of LPP and its Solution by Simplex Method, Big-M Method and Two-Phase Simplex Method

Unit IV

Transportation Problem – Meaning, Balanced and Unbalanced Transportation Problem. Initial Basic Feasible Solution – North-West Corner Rule, Least Cost Method and Vogel's Approximation Method

Unit – V

Assignment Problem – Meaning, Balanced and Unbalanced Assignment Problem – Hungarian method to solve an Assignment Problem. Maximization case in Assignment Problem

Course Outcomes:

- Know the different types of Operations Research models.
- Obtain the role of Linear Programming Problem in real life problem.
- Show the uses of travelling sales man problem in marketing industry.
- Know the role of Transportation problems in Transport company.

Book for Study:

S. Kalavathy-Operations Research 2nd edition

Unit –I- Chapter -1(Page no 1-5)
Unit –II- Chapter -2,3(Page no 7-26)
Unit –III- Chapter -4(Page no 35-36)
Unit –IV-Chapter -8(Page no 125-136)
Unit –V- Chapter -9(Page no 165-183)

Book for Reference

1. Philips, D.T., Ravindran, A and Solberg, J.J.: "Operations Research Principle and 2.Practice", 2007.
2. Taha, H.A., "Operations Research – An Introduction", PHI, 2014.
3. Kanti Swarup, P.K. Gupta & Man Mohan: Operations research – Sultan Chand & Sons.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks -----Either (a) or (b)
Section C-3*10=30Marks ---Three out of five questions must be answered

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Credits	**: 4**	**Code :**
Hours / Week	**: 4**	
Medium of Instruction	**: English**	

SEMESTER: V

(For students admitted from 2020 onwards)

STATISTICS PRACTICAL - III

(Based on Semester V)

(Major for B.Sc., Degree Course)

Unit –I

Characteristics of estimator, Method of Maximum likelihood Estimation, minimum variance.

Unit- II

Interval estimation –Confidence intervals for large samples .

Unit- III

Construction of $\bar{X}$,R, P, c and np charts, OC curves for single sampling plan.

Unit – IV

Graphical Solution methods,Simplex Method: Formation of LPP and its Solution by Simplex Method, Big-M Method and Two-Phase Simplex Method

Unit – V

Transportation Problem –. Initial Basic Feasible Solution – North-West Corner Rule, Least Cost Method and Vogel's Approximation Method. Assignment Problem –Hungarian method to solve an Assignment Problem. Maximization case in Assignment Problem. Networkproblem.

Book for Reference:

1.Gupta,S.C & Kapoor, V.K (2013), Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi

2.S.C. Gupta and V.K. Kapoor (2013), Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.

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Credits	**: 2**	**Code :**
Hours / Week	**: 2**	
Medium of Instruction	**: English**	

SEMESTER: V

(For students admitted from 2020 onwards)

Skill BasedElective-OPTIMIZATION TECHNIQUES

Objectives

To import basic knowledge of various optimization techniques.
Resources are scarce in many situations. Any decision making process May have to take into account, a set of constraints. The optimization in Such a situation is of vital importance.

Unit I

Duality in linear programming: Concept of duality – Fundamental Properties of Duality, Dual Problem when Primal Problem is in the Standard Form – Dual Problem When Primal Problem is in the Mixed Form.

Unit II

Inventory control: techniques of inventory control with selective control, ABC analysis, economic lot size problem, and the fundamental problem of EOQ, Problem of EOQ with shortage and without shortages. Multi-item Deterministic Problem.

Unit III

Theory of Games-Game theory Optimal solution of Two-person Zero-sum Games-Mixed strategies-Graphical solutions of (2x n) and (n x 2) Games Solution of m x n games by LPP.

Unit-IV:

Queuing Theory - Basic elements of the queuing model. Role of the Poisson and Exponential distribution: Arrival process-Departure processes - Detailed study of (M/M/1) / (“/FIFO) models.

Unit V

Introduction to Network – Concepts of activity, node, network, critical path, different floats, Critical path method – Calculation of earliest time and latest time - PERT Calculations.

Course Outcomes:

- Understand the role of Game theory in LPP.
- Know the determination critical path.
- Compute the deterministic inventory models.
- Know the practical problems using sequencing problem.
- Obtain the role of sequencing problems in Software Company.

Book for Study:

S. Kalavathy-Operations Research 2nd edition
Unit –I- Chapter -11(Page no 231-243)
Unit –II Chapter -14(Page no 327-332)
Unit –III- Chapter -17(Page no 441-452)
Unit –IV-Chapter -16(Page no 411-414)
Unit –V- Chapter -13(Page no 273-288)

Book for Reference

1. Philips, D.T., Ravindran, A and Solberg, J.J.: "Operations Research Principle
2. Practice", 2007. 2. Taha, H.A., "Operations Research – An Introduction", PHI, 2014.
3. Kanti Swarup, P.K. Gupta & Man Mohan: Operations research – Sultan Chand & Sons.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks ----- Either (a) or (b)
Section C-3*10=30Marks --- Three out of five questions must be answered

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Credits	**: 6**	**Code :**
Hours / Week	**: 6**	
Medium of Instruction	**: English**	

SEMESTER: VI

(For students admitted from 2020 onwards)

TESTING OF HYPOTHESIS

(Major for B.Sc., Degree Course)

Objective:

To enable the students to frame suitable hypothesis for testing and drawing right inference to solve many social, economic and biological real life problems.

Unit – I

Statistical hypothesis – simple and composite, Null and Alternative hypothesis, Critical region, Level of significance, type of errors and Power of test (simple problems). Steps involved in testing of hypothesis. Neymann Pearson Lemma .

Unit – II

Large sample test – Test for single proportion, difference between proportions, single mean, difference between means and difference between standard deviation.- Simple Problem.

Unit – III

Small sample test – student's 't' test – test for single mean, difference between means, paired 't' test and observed sample correlation co-efficient.- Simple Problem.

Unit –IV

Snedecor's F test – test for equality of two population variance – Testing the significance of an observed multiple correlation co-efficient, observed sample correlation ratio and linearity of regression , Chi-square test (concepts only).- Simple Problem.

Unit – V

Non-parametric test - Independence of attributes and goodness of fit. One sample tests – Sign test(small sample) and Run test for randomness, two sample tests – Sign, median and Mann Whitney U- test – Simple Problems.

Course Outcomes:

- Know about the two types of errors.
- Know the role of Neyman – Pearson Lemma in testing of hypothesis.
- Learn the properties of likelihood ratio test.
- Know the test of significance for small samples..
- Calculate the problems using non parametric tests.

Book for Study:

Gupta,S.C & Kapoor, V.K (2013), Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
Unit –I-Chapter -14(page no 14.6-14.25) Chapter -18(page no 18.8)
Unit –II-Chapter -14(page no 14.25-14.36)
Unit –III-Chapter -16(page no 16.2-16.25)
Unit –IV-Chapter -16(page no 16.29-16.40), Chapter -15(page no 15.2)
Unit –V-Chapter -18(page no18.2-18.47),

Book for Reference:

1. Radhakrishna Rao C., "Linear Statistical Inference and its Applications", Wiley Eastern limited.

2. Lehmann.E.L, Testing of Statistical Hypothesis, John Wiley.

3. Gibbons.J.D , Non – Parametric Statistical Inference, Duxbury.

4. Rohatgi.V.L, "An introduction to probability theory and Mathematical Statistics", Wiley Eastern limited.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks----- Either (a) or (b)
Section C-3*10=30Marks--- Three out of five questions must be answere

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Credits	**: 5**	**Code :**
Hours / Week	**5**	
Medium of Instruction	**: English**	

SEMESTER: V

(For students admitted from 2020 onwards)

DESIGN OF EXPERIMENTS

(Major for B.Sc., Degree Course)

Objective:

To expose the essential ideas about designing and executing and Interpreting statistical field experiments.

Unit - I

Analysis of Variance: Definition and assumptions. Cochran's theorems (statement only) ANOVA - One way and Two way classifications (with one observation per cell).

Unit - II

Design of Experiment: Need, terminology. Experimental design,Randomization, Replication and Local control; Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD) - Estimation of missing values in RBD and LSD (one and two).

Unit - III

Factorial experiment - main effects and interactions; definitions of contrast and orthogonal contrast; Analysis of 2^2 and 2^3 experiments.

Unit - IV

Confounding in factorial design –Total Confounding and Partial confounding in 2^3 experiments.

Unit – V

Analysis of co-variance for a one way layout with one concomitant variable and RBD with one concomitant variable.

Course Outcomes:

- Know the basic principles of experimental design.
- Learn the difference between one way and Two way ANOVA.
- Understand the applications of CRD and LSD.
- Know the factorial experiments.
- Understand the classification of One way and Two way Analysis of variance.

Book for Study:

S.C. Gupta and V.K. Kapoor (2013), Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.

Unit –I-Chapter -5(Page no :5.2-5.41)
Unit –II-Chapter -6(Page no :6.1-6.45)
Unit –III-Chapter -6(Page no :6.9-6.95)
Unit –IV-Chapter -6(Page no: 6.100-6.104)
Unit –V-Chapter -6.(Page no: 6.54-)

Books for Reference:

1. Douglas C.Montgomery (2010), Design and Analysis of experiment, Wiley International Edition, India.
2. Cochran.W.G. & G.M.Cox(1957), Experimental designs, Wiley International edition, India.

Question Pattern:

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks ---- Either (a) or (b)
Section C-3*10=30Marks -- Three out of five questions must be answered

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Credits	**: 5**	**Code :**
Hours / Week	**: 6**	
Medium of Instruction	**: English**	

SEMESTER: VI

(For students admitted from 2020 onwards)

Major Based Elective -SAMPLING TECHNIQUES

(Major for B.Sc., Degree Course)

Objective:

To impart the basic knowledge of statistical sampling concepts. At the end of the Course, the student should be able to select the suitable Sampling techniques. Also, he should be in a position to conduct sample Survey independently.

Unit I

Basic concept of sample survey - Introduction, definitions and preliminaries, fields of application of sampling techniques and limitations, Census and sample surveys, their advantages and disadvantages, principles of sampling theory, principal steps in a sample survey. Probability and non-probability sampling, sampling unit, sampling frame, sampling and non-sampling errors.

Unit II

Sampling from finite population – simple random sampling – unbiased estimate of the mean and variance –Determination of sample size.

Unit III

Stratified Random Sampling–Properties of the Unbiased Estimate of the Mean and Variances–Optimum and Proportional Allocation–Relative Precision of a Stratified Sampling and Simple Random Sampling.

Unit IV

Systematic sampling – Estimation of mean and variance – Comparison of simple random sampling and Stratified random sampling with systematic sampling

Unit V

Ratio – estimators – Variance of the ratio estimate – comparison of the ratio estimates with the mean per unit – Bias of the ratio estimate – Regression estimators – linear regression estimate – Regression estimators with pre-assigned ratio estimator.

Course Outcomes:

- Learn the role of pilot survey in sampling.
- Understand the concept of sampling and non sampling errors..
- Understand the properties of unbiased estimate of the mean and variance of the estimated mean.
- Comparison of simple random sampling and stratified random sampling.

Book for Study:

1. Gupta,S.C. & Kapoor,V.K (2014), Fundamentals of Applied Statistics, 4th Edition, Sultan Chand & Sons, New Delhi.

Unit –I-Chapter -7(Page no 7.2-7.12)
Unit –II-Chapter -7(Page no 7.12-7.22)
Unit –III-Chapter -7(Page no 7.42-7.54)
Unit –IV-Chapter -7(Page no 7.76-7.86)

2. Cochran W.G. (1984), Sampling Techniques, Wiley Eastern Ltd.
Unit –V-Chapter -6(Page no 157.160)

Books for Reference:

1. Murthy M.N.(1976), Sampling theory and methods- statistical publishing society, Calcutta.
2. Des Raj (1976): Sampling Theory, Tata-Mcgraw Hill.
3. Kapoor V.K. and Gupta S.C. Fundamentals of Applied statistics.
4. Daroga Singh and Choudry F.S(1986), Theory and Analysis of Sample Survey Design, Wiley Eastern Ltd: New Delhi.

Question Pattern:

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks ---- Either (a) or (b)
Section C-3*10=30Marks -- Three out of five questions must be answered.

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Credits	**: 5**	**Code :**
Hours / Week	**: 6**	
Medium of Instruction	**: English**	

SEMESTER: VI

(For students admitted from 2020 onwards)

Major Based Elective-NUMERICAL METHODS

(Major for B.Sc., Degree Course)

Objectives:

To tackle the practical situations demands the use of interpolation and Extrapolation.To solve Mathematical calculus problems, whenever the classical approach fails.To solve mathematical calculus problems through computers.

Unit-I

Finite differences – Forward and Backward difference operators 'E' and 'And' their basic properties – Interpolation with equal intervals – Newton's forward and backward difference formulae – simple problems.

Unit-II

Interpolation with unequal intervals – Divided differences and their properties – Newton's divided difference formula – Lagrange's formula - simple problems

Unit-III

Central difference interpolation formula – Gauss forward and backward differences formulae – Stirring's, Bessel's and Everett's central difference formulae.

Unit-IV

Numerical integration – Trapezoidal rule, Simpson's $1/3^{rd}$ rule, Simpson's $3/8^{th}$ rule (Problems only).

Unit-V

Numerical solution of Ordinary Differential Equation – Taylor series method, Modified Euler's method and Second and Fourth order Runge-Kutta method (Problems only)

Course Outcomes:

- Understand the uses of interpolation in various fields
- . Know the role of Picard's method for successive approximation. .
- Learn the usage of numerical differentiation and integration
- Learn the importance of Lagrange's problem in interpolation..

Book for Study:

1.P.Kandasamy, K. Thilagavathy, and K.Gunavathy (2003), Numerical Method
Unit –I-Chapter -5(Page no 170-198)
Unit –II-Chapter -8(Page no 257-275)
Unit –III-Chapter -7(Page no 231-254)
Unit –IV-Chapter -9(Page no 299-317)
Unit –V-Chapter -9(Page no 348-393)

Books for Refernce:

1. S.S. Sastry (2000), Introduction methods of Numerical Analysis, Prentice-Hall of India Pvt- India III Editions.
2.P.Kandasamy, K. Thilagavathy, and K.Gunavathy (2005), Numerical Methods.
3.E. Balagurusamy (2004), Numerical Methods, Tata McGraw Hill Publishing Company Limited, New Delhi.
4. A.Singaravel, 'Numerical method', Meenakshi publications, Chennai.

Question Pattern

The question paper setter is kindly informed to strictly follow the following question paper pattern

	Unit-I	Unit-II	Unit-III	Unit-IV	Unit-v
Section-A Question no	1&2	3&4	5&6	7&8	9&10
Section-B Question no	11(a&b)	12(a&b)	13(a&b)	14(a&b)	15(a&b)
Section-C Question no	16	17	18	19	20

Section A- 10*2=20 Marks ---all question must be answered)
Section B- 5*5=25 Marks----- Either (a) or (b)
Section C-3*10=30Marks--- Three out of five questions must be answered

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Credits	**: 5**	**Code :**
Hours / Week	**: 5**	
Medium of Instruction	**: English**	

SEMESTER: VI

(For students admitted from 2020 onwards)

STATISTICS PRACTICAL - IV

(Based on Semester VI) (Major for B.Sc., Degree Course)

Unit-I

Large sample test – Test for single proportion, difference between proportions, single mean, difference between means and difference between standard deviation.

Unit – II

Small sample test – student's 't' test – test for single mean, difference between means, paired 't' test .Snedecor's F test – test for equality of two population variance ,Chi-square test.

Unit – III

Non-parametric test - Independence of attributes and goodness of fit. One sample tests – Sign test and Run test for randomness, two sample tests – Sign, median and Mann Whitney U- test – Simple Problems.

Unit –IV

Analysis of CRD, RBD one and two observations per cell and LSD layouts, missing plot techniques in RBD and LSD (one or two missing observations) Latin Square Design.

Unit- V

Analysis of 2^2 and 2^3 factorial design with and without confounding – Analysis of covariance for an RBD with one concomitant variable.

Book for Reference:

1. Gupta, S.C. & Kapoor, V.K.(2013), Fundamental of mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. S.C. Gupta and V.K. Kapoor(2013), Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi

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