FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A++" Grade by NAAC (Cycle - IV)

Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT: STATISTICS

NAME OF THE PROGRAMME :B.Sc. STATISTICS

PROGRAMME CODE : USST

ACADEMIC YEAR : 2023 - 2024

VISION OF THE DEPARTMENT

To empower women by developing human capabilities through quality education in the field of Statistics

MISSION OF THE DEPARTMENT

To develop statistical and probabilistic theories and techniques and to propagate statistical knowledge through teaching and outreach programs, in order to serve the needs of the society.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

A graduate of B.Sc. STATISTICS programme after five years will be

PEO 1	Our graduates will be academic, digital and information literates, creative, inquisitive, innovative and desirous for the "more" in all aspects
PEO 2	They will be efficient individual and team performers, exhibiting progress, flexibility, transparency and accountability in their professional work
PEO 3	The graduates will be effective managers of all sorts of real – life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating apt leadership skills
PEO 4	They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

GRADUATE ATTRIBUTES (GA)

Fatima College empowers her women graduates holistically. A Fatimite achieves all-round empowerment by acquiring Social, Professional and Ethical competencies. A graduate would sustain and nurture the following attributes:

I. SOCIAL COMPETENCE	
GA 1	Deep disciplinary expertise with a wide range of academic and digital literacy

GA 2	Hone creativity, passion for innovation and aspire excellence
GA 3	Enthusiasm towards emancipation and empowerment of humanity
GA 4	Potentials of being independent
GA 5	Intellectual competence and inquisitiveness with problem solving abilities befitting the field of research
GA 6	Effectiveness in different forms of communications to be employed in personal and professional environments through varied platforms
GA 7	Communicative competence with civic, professional and cyber dignity and decorum
GA 8	Integrity respecting the diversity and pluralism in societies, cultures and religions
GA 9	All – inclusive skill sets to interpret, analyse and solve social and environmental issues in diverse environments
GA 10	Self awareness that would enable them to recognise their uniqueness through continuous self-assessment in order to face and make changes building on their strengths and improving their weaknesses
GA 11	Finesse to co-operate exhibiting team-spirit while working in groups to achieve goals
GA 12	Dexterity in self-management to control their selves in attaining the kind of life that they dream for
GA 13	Resilience to rise up instantly from their intimidating setbacks
GA 14	Virtuosity to use their personal and intellectual autonomy in being life-long learners
GA 15	Digital learning and research attributes
GA 16	Cyber security competence reflecting compassion, care and concern towards the marginalised

GA 17	Rectitude to use digital technology reflecting civic and social responsibilities in local, national and global scenario
II. PROFESSIONAL COMPETENCE	
GA 18	Optimism, flexibility and diligence that would make them professionally competent
GA 19	Prowess to be successful entrepreuners and become employees of trans-national societies
GA 20	Excellence in Local and Global Job Markets
GA 21	Effectiveness in Time Management
GA 22	Efficiency in taking up Initiatives
GA 23	Eagerness to deliver excellent service
GA 24	Managerial Skills to Identify, Commend and tap Potentials
III. ETHICAL COMPETENCE	
GA 25	Integrity and be disciplined in bringing stability leading a systematic life promoting good human behaviour to build better society
GA 26	Honesty in words and deeds
GA 27	Transparency revealing one's own character as well as self-esteem to lead a genuine and authentic life
GA 28	Social and Environmental Stewardship
GA 29	Readiness to make ethical decisions consistently from the galore of conflicting choices paying heed to their conscience
GA 30	Right life skills at the right moment

PROGRAMME OUTCOMES (PO)

On completion of B.Sc. Statistics programme, the graduates would be able to

PO 1	Evolve as globally competent professionals, researches and entrepreneurs possessing collaborative and leadership skills, for developing innovative solutions in multidisciplinary environment
PO 2	Create, select and apply appropriate techniques, resources and modelling to statistical activities with an understanding of the limitations
PO 3	Involve in lifelong learning to foster the sustainable development in the emerging areas of technology and in the broadest context of statistical change
PO 4	Communicate effectively through soft skills, report writing, documentation and effective presentations
PO 5	Implement ethical principles and responsibilities of a statistician to serve the society

PROGRAMME SPECIFIC OUTCOMES (PSO)

On completion (after three years) of B.Sc. Statistics programme, the graduates would be able to

PSO 1	Apply the knowledge of Statistics, Mathematics and Computer science to become competent professionals at global level
PSO 2	Apply statistical knowledge to analyze and solve complex problems using appropriate statistical methodology and interpret results in a variety of settings
PSO 3	Demonstrate the ability of critical observation, logical, analytical and problem-solving skills
PSO 4	Write code to extract and reformat real data and to utilize statistical programming environments

PSO 5	Effectively present statistical findings to an audience lacking statistical expertise and work collaboratively
PSO 6	Excel as socially committed statistics students having mutual respect, effective communication skills, high ethical values and empathy for the needs of society

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

DEPARTMENT OF STATISTICS

For those who joined in June 2019 onwards

PROGRAMME CODE: USST

PART – I – TAMIL / FRENCH / HINDI– 12 CREDITS

PART – I – TAMIL

Offered by the Research Centre of Tamil

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CRS	CIA Mks	ESE Mks	TOT. Mks
1.								
2.								
3.	III	19TL3C3	Language- Epic Literature பொதுத்தமிழ் - காப்பிய இலக்கியம்	5	3	40	60	100
4.	IV	19TL4C4	Language-Sangam Literature பொதுத்தமிழ் - சங்க இலக்கியம்	5	3	40	60	100
			Total	20	12			

PART – I –FRENCH

Offered by The Department of French

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
..								

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
2.								
3.	III	19RL3C3	PART 1 LANGUAGE FRENCH - LE NIVEAU INTERMEDIAIRE – LA CIVILISATION, LA LITTERATURE ET LA GRAMMAIRE	5	3	40	60	100
4.	IV	19RL4C4	PART 1 LANGUAGE FRENCH - LE NIVEAU DE SUIVRE – LA CIVILISATION, LA LITTERATURE ET LA GRAMMAIRE	5	3	40	60	100
			TOTAL	**20**	**12**			

PART – I –HINDI

Offered by The Department of Hindi

S. NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	III	19DL3C3	PART 1 LANGUAGE HINDI - हिंदी साहित्य का आदिकाल और भक्तिकाल	5	3	40	60	100
2.	IV	19DL4C4	PART 1 LANGUAGE HINDI - हिंदी साहित्य का आधुनिक काल	5	3	40	60	100
			TOTAL	**20**	**12**			

PART – II -ENGLISH – 12 CREDITS

Offered by The Research Centre of English

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	III	19EL3WN	ENGLISH FOR DIGITAL ERA	5	3	40	60	100
2.	IV	19EL4WN	ENGLISH FOR INTEGRATED DEVELOPMENT	5	3	40	60	100
			TOTAL	**20**	**12**			

PART – III -MAJOR, ALLIED & ELECTIVES – 95 CREDITS

CORE COURSES : 64 CREDITS

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CRS	CIA Mks	ESE Mks	TOT. Mks
1.	I	23ST1CC1	DESCRIPTIVE STATISTICS	5	5	40	60	100
2.		23ST1CC2	PROBABILITY THEORY	5	5	40	60	100
3.	II	23ST2CC3	DISTRIBUTION THEORY	5	5	40	60	100
4.		23ST2CC4	MATRIX AND LINEAR ALGEBRA	5	5	40	60	100
5.	III	19ST3CC5	CONTINUOUS PROBABILITY DISTRIBUTIONS	6	4	40	60	100
6.		19ST3CC6	SAMPLING THEORY	6	4	40	60	100
7.	IV	19ST4CC7	ESTIMATION THEORY	6	4	40	60	100
8.		19ST4CC8	APPLIED STATISTICS	6	4	40	60	100
9.	V	19ST5CC9	TESTING OF HYPOTHESES	5	4	40	60	100
10.		19ST5CC10	DESIGN OF EXPERIMENTS	5	4	40	60	100

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CRS	CIA Mks	ESE Mks	TOT. Mks
11.		19ST5CC11	DEMOGRAPHY	5	4	40	60	100
12.		19ST5CC12	REAL ANALYSIS	5	4	40	60	100
13.	VI	19ST6CC13	STATISTICAL QUALITY CONTROL	5	4	40	60	100
14.		19ST6CC14	STOCHASTIC PROCESSES	5	4	40	60	100
15.		19ST6CC15	ACTUARIAL STATISTICS	5	4	40	60	100

ALLIED- 10 CREDITS

S.NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CRS	CIA Mks	ESE Mks	TOT. Mks
1.	III	19G3ACST3	LINEAR PROGRAMMING	5	5	40	60	100
2.	IV	19G4ACST4	LINEAR ALGEBRA	5	5	40	60	100

ELECTIVES

S.No	SEM.	COURSE CODE	COURSE TITLE	HRS	CRS	CIA Mks	ESE Mks	TO Mk
.	I	23G1GEST1	MATHEMATICS FOR STATISTICS	5	3	40	60	10
.	II	23ST2EC2	REAL ANALYSIS	5	3	40	60	10
3.	V	19ST5ME1 & 19ST5ME2/ 22ST5ME3 & 22ST5ME4	COMPUTER PROGRAMMING IN C & C - PRACTICALS/ OBJECT ORIENTED PROGRAMMING WITH C++ & C++ PRACTICALS	3+2	3+2	40+40	60+60	100- 0

S.No	SEM.	COURSE CODE	COURSE TITLE	HRS	CRS	CIA Mks	ESE Mks	TO Mk
4.	VI	19ST6ME5/ 19ST6ME6/ 19ST6ME7	NUMERICAL METHODS/ MULTIVARIATE ANALYSIS/ REGRESSION ANALYSIS	5	5	40	60	10
.	VI	19ST6ME8/19ST6ME9/22ST6ME10	OPERATIONS RESEARCH/ INDUSTRIAL STATISTICS/ ECONOMETRICS	5	5	40	60	10

PART – IV – 20 CREDITS

- **VALUE EDUCATION**
- **ENVIRONMENTAL AWARENESS**
- **SKILL ENCHANCE COURSE**
- **FOUNDATION COURSE**

S.No	SEM.	COURSE CODE	COURSE TITLE	HRS	CRS	CIA Mks	ESE Mks	TOT. Mks
1.	I	23G1VE1	PERSONAL VALUES - VALUE EDUCATION (INCLUDING MEDITATION IN ACTION MOVEMENT)	1	1	40	60	100
2.		23ST1SE1	BASICS OF STATISTICS	2	2	40	60	100
3.		23ST1FC	BRIDGE COURSE IN STATISTICS	2	2	40	60	100
4.	II	23G2VE2	VALUES FOR LIFE	1	1	40	60	100
5.		23ST2SE2	BASICS OF STATISTICS	2	2	40	60	100

6.		23ST2SE3	STATISTICS PRACTICAL-I	2	2	40	60	100
7.	III	19G3EE1	ENVIRONMENTAL EDUCATION	1	1	40	60	100
8.		19ST3SB1	PRACTICAL STATISTICS – I	2	2	40	60	100
9.	IV	19G4EE2	ENVIRONMENTAL EDUCATION	1	1	40	60	100
10.		22ST4SB2	SAMPLING DISTRIBUTION	2	2	40	60	100
11.	V	23ST5SB3	PRACTICAL STATISTICS – II	2	2	40	60	100
12.		19ST5SB4	STATISTICAL SOFTWARE: SPSS	2	2	40	60	100
13.	VI	23ST6SB5	PRACTICAL STATISTICS – III	2	2	40	60	100
14.		19ST6SB6	STATISTICAL SOFTWARE: R	2	2	40	60	100

PART – V – 1 CREDIT

OFF-CLASS PROGRAMMES

SHIFT - II

S.No	SEM	COURSE CODE	COURSE TITLE	HRS	CREDIT	TOT. Mks
1.	I - IV	21S4PED	Physical Education	30/ SEM	1	100
2.		21S4YRC	Youth Red Cross			
3.		21S4NSS	NSS			
4.		21S4RTC	Rotaract			
5.		21S4WEC	Women Empowerment Cell			
6.		21S4ACUF	AICUF			

OFF-CLASS PROGRAMME

ADD-ON COURSES

COURSE CODE	Courses	HRS	CRS	Semester in which the course is offered	CIA Mks	ESEMks	TOT. Mks
19UAD2CA	**COMPUTER APPLICATIONS**	40	2	I&II	40	60	100
19UADFCA	**ONLINE SELF LEARNING COURSE**- Foundation Course for Arts	40	3	I	50	-	50
19UADFCS	**ONLINE SELF LEARNING COURSE-** Foundation Course for Science	40	3	II	50	-	50
21UAD3ES	Professional Ethics	15	1	III	40	60	100
21UAD4ES	Personality Development	15	1	IV	40	60	100
21UAD5ES	Family Life Education	15	1	V	40	60	100
21UAD6ES	Life Skills	15	1	VI	40	60	100
19UAD5HR	Human Rights	15	2	V	40	60	100
	OUTREACH PROGRAMME- Reach Out to Society through Action **ROSA**	100	3	V & VI	-	-	100
	PROJECT	30	4	VI	40	60	100
	READING CULTURE	10/Semester	1	II-VI	-	-	-
	MOOC COURSES(Department Specific Courses/any other courses) * Students can opt other than the listed course from UGC-SWAYAM UGC / CEC	-	Minimum 2 Credits	-	-	-	
	TOTAL		22 +				

EXTRA CREDIT COURSE

Course Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
22ST2SL1	**SELF LEARNING COURSE for ADVANCED LEARNERS (offered for I UG)** Quantitative Aptitude & Data Interpretation		2	II	40	60	100
19UGSLST1	**(offered for III UG)** **Official Statistics**	-	2	V & VI	40	60	100
19UGSLST2	**Biostatistics**						

I B.Sc STATISTICS

SEMESTER –I

For those who joined in 2023 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST1CC1	DESCRIPTIVE STATISTICS	Lecture	5	5

COURSE DESCRIPTION

This course introduces measurement of relationship in terms of quantitative and qualitative data.

COURSE OBJECTIVES

1. It explains the important concepts of statistics and statistical data.
2. It provides to formulate the visualization of frequency distribution.
3. Also they measure the averages, dispersions, lack of symmetry, moments, and relationship among variables.
4. Estimate and predict the unknown and future values.
5. Study of non-linear and consistency of the data.

UNIT-I MEASURES OF CENTRAL TENDENCY (15Hrs)

Introduction-Definitions-Types - Mean-Median-Mode-Geometric mean-Harmonic Mean-Weighted mean - Merits and Demerits-Measures of Dispersion: Introduction – Definition – Types – Range - Quartile deviation - Mean deviation - Standard deviation - Co-efficient of variation – Lorenz curve - Merits and Demerits.

UNIT-III SKEWNESS (15Hrs)

Skewness: Introduction-Definition-Types-Karl Pearson's – Bowley's - Kelly's methods – Their merits and demerits. Kurtosis: Introduction-Definition-Types-Its merits and demerits. Moments: Introduction - Definition-Types - Raw, Central moments and their relations.

UNIT-III CORRELATION ANALYSIS (15Hrs)

Correlation analysis: Introduction - Definition - Types – Ungrouped and Grouped data – Probable error – properties - Rank correlation – Partial and Multiple correlations

UNIT-IV REGRESSION ANALYSIS (15Hrs)

1Regression analysis: Introduction - Definition – Regression Equations -Multiple regression - Principle of least squares for first degree, Second degree Exponential and Power curves.

UNIT-V THEORY OF ATTRIBUTES (15HRS)

Theory of Attributes: Introduction – Definition-Classes and Class frequencies-Consistency of data-Independence of attributes-Association of attributes-Yule's coefficient and -Coefficient of Colligation.

TEXT BOOK:

1. Gupta, S.P. (2017): Statistical Methods, Sultan Chand & Sons Pvt Ltd, New Delhi, 35th Revised Edition.
2. Gupta S.C and Kapoor, V.K. (2002). Fundamentals of Mathematical Statistics, Sultan Chand & Sons Pvt. Ltd., New Delhi

REFERENCE BOOK:

1. Goon A.M. Gupta. A.K. and Das Gupta, B (1987). Fundamental of Statistics, vol.2 World Press Pvt. Ltd., Kolkatta

2. G.U.Yule and M.G. Kendall (1956). An introduction to the theory of Statistics, Charles Griffin.

3. M.R. Spiegel (1961). Theory and problems of Statistics, Schaum's outline series.

4. Anderson, T.W. and Sclove SL. (1978). An introduction to statistical analysis of data, Houghton Miffin&co.

5. Pillai, R.S., and Bagavathi (2003): Statistics, S. Chand and Company Ltd., New Delhi.

e-books, tutorials on MOOC/SWAYAM courses on the subject

https://en.wikipedia.org/wiki/Statistics
https://en.wikipedia.org/wiki/Descriptive_statistics
https://socialresearchmethods.net/kb/statdesc.php
http://onlinestatbook.com/2/introduction/descriptive.html

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-1 MEASURES OF CENTRAL TENDENCY				
1.1	Introduction-Definitions	2	Chalk & Talk	Black Board
1.2	Types - Mean-Median-Mode-	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.3	Geometric Mean-Harmonic Mean-Weighted mean - Merits and Demerits	3	Chalk & Talk	Black Board
1.4	Measures of Dispersion: Introduction – Definition	2	Chalk & Talk	Black Board
1.5	Types – Range - Quartile deviation	2	Chalk & Talk	Black Board
1.6	Mean deviation - Standard deviation	2	Chalk & Talk	Black Board
1.7	Co-efficient of variation – Lorenz curve - Merits and Demerits.	2	Chalk & Talk	Black Board
UNIT-2 SKEWNESS				
2.1	Introduction-Definition-Types	2	Chalk & Talk	Black Board
2.2	Karl Pearson's – Bowley's- Kelly's methods – Their merits and demerits	3	Chalk & Talk	Black Board
2.3	Kurtosis: Introduction-Definition-Types-Its merits and demerits.	5	Chalk & Talk	Black Board
2.4	Moments: Introduction - Definition-Types - Raw, Central moments and their relations.	5	Chalk & Talk	Black Board
UNIT-3 CORRELATION ANALYSIS				
3.1	Introduction - Definition - Types	4	Chalk & Talk	Black Board
3.2	Ungrouped and Grouped data	4	Chalk & Talk	Black Board
3.3	Probable error – properties	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.4	Rank correlation – Partial and Multiple correlations	4	Chalk & Talk	Black Board
UNIT-4 REGRESSION ANALYSIS				
4.1	Introduction - Definition	3	Chalk & Talk	Black Board
4.2	Regression Equations -	3	Chalk & Talk	Black Board
4.3	Multiple regressions	3	Chalk & Talk	Black Board
4.4	Principle of least squares for first degree, Second degree,	3	Chalk & Talk	Black Board
4.5	Exponential and Power curves	3	Chalk & Talk	Black Board
UNIT-5 THEORY OF ATTRIBUTES				
5.1	Introduction – Definition-Classes and Class frequencies	4	Lecture	PPT & White board
5.2	Consistency of data-Independence of attributes	4	Lecture	PPT & White board
5.3	Association of attributes	3	Chalk & Talk	Black Board
5.4	Yule's coefficient and Coefficient of Colligation	4	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %

K3	**3**	**3**	**-**	**-**	**5**	**11**	-	**11**	27.5 %
K4	**3**	**3**	**-**	**5**	**-**	**11**	-	**11**	27.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

	SCHOLASTIC				**NON – SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

EVALUATION PATTERN

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

C1 - Test (CIA 1) - 10 Mks

C2 - Test (CIA 2) - 10 Mks

C3 - Assignment - 5 Mks

C4 - Open Book Test/PPT - 5 Mks

C5 - Quiz - 5 Mks

C6 - Attendance - 5 Mks

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Explain and evaluates various measure of central tendency	K3	PSO1& PSO2
CO 2	Evaluates and interprets the nature of skewness and kurtosis	K1 & K2	PSO2 & PSO3
CO 3	Compute and interpret the spearman correlation coefficient	K1 & K3	PSO6
CO 4	Recognize regression analysis applications for purpose of description and prediction	K3	PSO4
CO 5	Explain the methods of association of attributes	K3 & K4	PSO5

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	3	1	3	2
CO2	2	2	3	1	3	1
CO3	3	3	3	2	2	2
CO4	3	3	3	1	2	2
CO5	3	3	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	3	1	1
CO2	2	2	1	2
CO3	2	2	3	2

CO4	3	3	2	2
CO5	3	3	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

Forwarded By

Dr. V. Vanitha

I B.Sc STATISTICS

SEMESTER –I

For those who joined in 2023 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST1CC2	Probability Theory	Lecture	5	5

COURSE DESCRIPTION

This course introduces the concepts of functions and its properties, theorems related to random variables.

COURSE OBJECTIVES

To enable the students understand the concepts of random variable and distribution functions, expectation, conditional expectation and variance, generating functions, law of large numbers.

UNIT-I THEORY OF PROBABILITY (15 HRS.)

Introduction-Basic terminology- Definition - Axiomatic approach – Types of Events - Conditional Probability - Addition and Multiplication theorems of Probability for 'two' and 'n' events (Statement and Proof) - Boole's inequality (Statement and Proof)- Bayes' theorem of Probability (Statement and Proof with numerical illustration -very simple problems)

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UNIT-II RANDOM VARIABLES AND DISTRIBUTION FUNCTIONS (15 HRS.)

Introduction - Discrete random variable: Probability mass function- Discrete distribution function, Properties. Continuous random variable : Probability density function and properties, measures of central tendency, dispersion, Skewness and kurtosis for continuous Probability distribution.

UNIT-III Two dimensional random variables - Joint probability mass function- Marginal probability function, Conditional probability function. Two dimensional distribution functions- Marginal distribution functions - Joint density function-Marginal density function - Conditional distribution function - Conditional probability density function. Transformation of One - Dimensional and Two Dimensional random variable (concept only).

UNIT-IV MATHEMATICAL EXPECTATIONS (15 HRS.)

Introduction- Expected value of a random variable (Discrete and Continuous)-Expected value of function of a random variable - Properties of Expectation-Properties of variance- Covariance. Inequalities involving expectation: Cauchy Schwartz and Markov inequalities.

UNIT-V GENERATING FUNCTIONS (15 HRS.)

M.G.F-Properties-Uniqueness theorem - C.G.F-Properties- P.G.F-Properties. Characteristic Function: Properties–Inversion theorems (Statement only)- Uniqueness theorem (Statement only). Chebychev's Inequality (Statement and Proof). Law of Large Numbers (L.L.N): Convergence in probability - Properties: Weak L.L.N - properties-Bernoulli's L.L.N (Statement and Proof) - Khinchin's theorems (Statement only).

TEXT:

S.C.Gupta and V.K.Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, Revised edition (2015).

REFERENCES:

1. Arumugam and Thangapandi Isaac, *Statistics*, New Gamma publishing house (2012).
2. Rohatgi, V.K. (1984): An introduction to probability theory and mathematical statistics.
3. Hogg. R.V. and Craig. A.T. (1978) : Introduction to Mathematical Statistics, McGraw Hill Publishing Co. Inc. New York.
4. Mood A.M. Graybill, F.A. and Bose. D.C. (1974): Introduction to the theory of Statistics, McGraw Hill Publishing Co. Inc. New York.
5. Sanjay Arora and Bansilal (1989): New Mathematical Statistics, Satyaprakashan, New Delhi

e-books, tutorials on MOOC/SWAYAM courses on the subject

www.khanacademy.org/math/statistics-probability/random-variables-stats-library
https://ocw.mit.edu/courses/mathematics/18-440-probability-and-random-variables-spring-2014/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-I THEORY OF PROBABILITY				
1.1	Basic Terminology	4	Lecture	PPT & White board
1.2	Mathematical Probability	4	Chalk & Talk	Black Board
1.3	Mathematical Tools	4	Discussion	Black Board
1.4	Axiomatic Approach to Probability.	3	Chalk & Talk	Black Board
UNIT-II RANDOM VARIABLES AND DISTRIBUTION FUNCTIONS				
2.1	Extended Axiom of Addition and Multiplication	5	Discussion	Black Board
2.2	Boole's inequality	3	Chalk & Talk	Black Board
2.3	conditional probability	4	Chalk & Talk	Black Board
2.4	Bayes Theorem.	3	Chalk & Talk	Black Board
UNIT -III RANDOM VARIABLES AND DISTRIBUTION FUNCTIONS				
3.1	Distribution Function	4	Chalk & Talk	Black Board
3.2	Discrete Random Variable	3	Chalk & Talk	Black Board
3.3	Continuous Random Variable	3	Chalk & Talk	Black Board
3.4	Two Dimensional Random Variables	5	Chalk & Talk	Black Board
UNIT-IV MATHEMATICAL EXPECTATIONS				
4.1	Expected Value of Function of a Random Variable	3	Chalk & Talk	Black Board
4.2	Properties of Expectation	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.3	Properties of Variance	2	Chalk & Talk	Black Board
4.4	Covariance and Correlation	2	Chalk & Talk	Black Board
4.5	Moments of Bivariate Probability Distributions	2	Chalk & Talk	Black Board
4.6	Conditional Expectation	2	Chalk & Talk	Black Board
4.7	Conditional Variance	2	Chalk & Talk	Black Board
UNIT -V GENERATING FUNCTIONS				
5.1	Moment Generating Function	3	Chalk & Talk	Black Board
5.2	Characteristics Function	3	Chalk & Talk	Black Board
5.3	Inversion Theorem	2	Chalk & Talk	Black Board
5.4	Necessary and Sufficient Condition for Independence of Random Variables in Terms of Characteristics Functions	3	Chalk & Talk	Black Board
5.5	Chebychve's Inequality	2	Chalk & Talk	Black Board
5.8	Convergence in Probability	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

EVALUATION PATTERN

C1 - Test (CIA 1) - 10 Mks

C2 - Test (CIA 2) - 10 Mks

C3 - Assignment - 5 Mks

C4 - Open Book Test/PPT - 5 Mks

C5 - Quiz - 5 Mks

C6 - Attendance - 5 Mks

The levels of CIA Assessment based on Revised Bloom's Taxonomy are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED

CO 1	Identify from a probability scenario events that are simple, complementary, mutually exclusive, and independent.	K3	PSO1& PSO2
CO 2	Recognize multiplication rule for two independent events, the addition rule for union of two events, and the complement rule.	K1 & K2	PSO2 & PSO3
CO 3	Describe the main properties of probability distribution and random variables.	K1 & K3	PSO6
CO 4	Construct discrete and continuous random variables	K3	PSO4
CO 5	Apply general properties of the expectation and variance operators	K3 & K4	PSO5

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**2**	**2**	**2**	**3**	**2**	**1**
CO2	**3**	**2**	**2**	**2**	**1**	**1**
CO3	**2**	**2**	**2**	**2**	**3**	**2**
CO4	**2**	**2**	**2**	**3**	**2**	**2**
CO5	**2**	**2**	**3**	**2**	**2**	**2**

Mapping of C0s with POs

CO/PSO	PO 1	PO 2	PO 3	PO 4
CO 1	2	1	3	1
CO 2	2	3	2	1
CO 3	3	1	2	2

CO 4	3	1	2	2
CO 5	2	3	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

Forwarded By

Dr. V. VANITHA

I B.Sc STATISTICS

SEMESTER –I

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST1SE1/ 23ST2SE2	Basics Of Statistics	Lecture	2	2

COURSE DESCRIPTION

This course is designed to make the students learn the basics of statistics.

COURSE OBJECTIVES

To enable the students, understand the origin and the need of statistics and the statistical data.

UNIT–I INTRODUCTION (6 HRS)

Origin, meaning and functions of statistics – general uses - relation with other disciplines-limitations and misuses of statistics.

UNIT–II COLLECTION AND SCRUTINY OF DATA (6HRS)

Methods of collection: Complete enumeration – sample survey, Primary data - methods of collection - secondary data sources

UNIT–III MEASURESOFCENTRALTENDENCY(6HRS)

Arithmetic mean - weighted mean – median - mode

UNIT–IVMEASURESOFDISPERSION (6HRS)

Measures of Dispersion: Introduction – Definition – Types – Range - Quartile deviation - Mean deviation - Standard deviation.

UNIT–V SKEWNESS (6HRS)

Introduction-Definition-Types-Karl Pearson's – Bowley's - Kelly's methods – Their merits and demerits.

TEXT BOOK:

1. S.P.Gupta, Statistical Methods, Sultan Chand & Sons, Revised edition (2014).

REFERENCES:

1.S.C.GuptaandV.K.Kapoor,FundamentalsofMathematicalStatistics-SultanChand&Sons,Revisededition(2002).

2. Arumugam and Thangapandi Isaac, Statistics,New Gamma publishing house, (2006)

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	Origin, meaning and functions of statistics –--	2	Chalk & Talk	Black Board
1.2	general uses	1	Chalk & Talk	Black Board
1.3	relation with other disciplines	1	Chalk & Talk	Black Board
1.4	limitations and misuses of statistics	2	Chalk & Talk	Black Board
UNIT -2 COLLECTION AND SCRUTINY OF DATA				
2.1	Methods of collection: Complete enumeration	2	Chalk & Talk	Black Board
2.2	sample survey,Primary data	2	Chalk & Talk	Black Board
2.3	Methods of collection - secondary data sources	2	Chalk & Talk	Black Board
UNIT -3 MEASURESOFCENTRALTENDENCY				
3.1	Arithmetic	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.2	weighted mean	1	Chalk & Talk	Black Board
3.3	mean -– median - mode	3	Chalk & Talk	Black Board
UNIT -4 MEASURES OF DISPERSION				
4.1	Measures of Dispersion: Introduction – Definition –-	2	Chalk & Talk	Black Board
4.2	Types – Range - Quartile deviation	2	Discussion	Black Board
4,3	Mean deviation - Standard deviation.	2	Chalk & Talk	Black Board
UNIT -5 SKEWNESS				
5.1	Introduction-Definition-Types	1	Chalk & Talk	Black Board
5.2	Karl Pearson's	2	Chalk & Talk	Black Board
5.3	Bowley's - Kelly's methods	2	Chalk & Talk	Black Board
5.4	Their merits and demerits.	1	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

UG CIA Components

				Nos
C1	-	Test (CIA 1)	-	10 Mks
C2	-	Test (CIA 2)	-	10 Mks
C3	-	Assignment	-	5 Mks
C4	-	Open Book Test/PPT	-	5 Mks
C5	-	Quiz	-	5 Mks
C6	-	Attendance	-	5 Mks

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED

CO 1	Summarize the origin of statistics and its relation with other disciplines	K2 & K4	PSO1& PSO2
CO 2	Explain the collection and scrutiny of Data	K3	PSO5
CO 3	Explain and evaluate various measure of central tendency	K3	PSO1& PSO2
CO 4	Examine the various measures of dispersion	K1, K2&K3	PSO3
CO 5	Evaluate skewness	K2 & K4	PSO2 &PSO3

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	2	3	2	2	2
CO3	2	2	3	2	2	2
CO4	3	2	2	3	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	2
CO2	2	3	1	2
CO3	3	2	2	2
CO4	2	3	2	2
CO5	3	2	2	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

Forwarded By

Dr. V.Vanitha

I B.Sc STATISTICS

SEMESTER –I

For those who joined in 2023onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST1FC	Bridge Course in Statistics	Lecture	2	2

COURSE DESCRIPTION

This course is designed to make the students learn the basic concepts of statistics

COURSE OBJECTIVES

To enable the students to analyse the given data and make them solve simple real-life problems related to descriptive measures in statistics.

UNIT-I STATISTICS **[6 HRS]**

Introduction - Definition – Functions - Applications - Limitations

UNIT-II ORGANIZING A STATISTICAL SURVEY **[6 HRS]**

Planning the survey - Executing the survey

UNIT-III COLLECTION OF DATA **[6 HRS]**

Primary and secondary data - Methods of collecting primary data - Sources of secondary data

UNIT-IV SAMPLING **[6 HRS]**

Census and Sample methods. Classification-Types - Formation of frequency distribution-Tabulation - parts of a Table - Types.

UNIT-V DIAGRAMMATIC REPRESENTATION **[6 HRS]**

Types- Graphical representation - Graphs of frequency distributions. Merits and Limitations of diagrams and graphs.

TEXT BOOK:

1. Gupta, S.P. (2017): Statistical Methods, Sultan Chand & Sons Pvt Ltd, New Delhi, 35th Revised Edition.

2. Gupta S.C and Kapoor, V.K. (2002). Fundamentals of Mathematical Statistics, Sultan Chand & Sons Pvt. Ltd., New Delhi

REFERENCE BOOK:

1. Goon A.M. Gupta. A.K. and Das Gupta, B (1987). Fundamental of Statistics, vol.2 World Press Pvt. Ltd., Kolkatta

2. G.U.Yule and M.G. Kendall (1956). An introduction to the theory of Statistics, Charles Griffin.

3. M.R. Spiegel (1961). Theory and problems of Statistics, Schaum's outline series.

4. Anderson, T.W. and Sclove SL. (1978). An introduction to statistical analysis of data, Houghton Miffin&co.

5. Pillai, R.S., and Bagavathi (2003): Statistics, S. Chand and Company Ltd., New Delhi

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1STATISTICS				
1.1	Introduction - Definition	1	Chalk & Talk	Black Board
1.2	Functions	2	Chalk & Talk	Black Board
1.3	Applications	2	Chalk & Talk	Black Board
1.4	Limitations	1	Chalk & Talk	Black Board
UNIT 2 ORGANIZING A STATISTICAL SURVEY				
2.1	Planning the survey	3	Chalk & Talk	Black Board
2.2	Executing the survey	3	Chalk & Talk	Black Board
UNIT 3 COLLECTION OF DATA				
3.1	Primary and secondary data	2	Chalk & Talk	Black Board
3.2	Methods of collecting primary data	2	Chalk & Talk	Black Board
3.3	Sources of secondary data	2	Chalk & Talk	Black Board
UNIT 4 SAMPLING				
4.1	Census and Sample methods.	1	Chalk & Talk	Black Board
4.2	Classification-Types	1	Chalk &Talk	Black Board
4.3	Formation of frequency distribution-.	2	Chalk & Talk	Black Board
4.4	Tabulation - parts of a Table, Types	2	Chalk & Talk	Black Board
UNIT -5 DIAGRAMMATIC REPRESENTATION				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.1	Types- Graphical representation.	2	Chalk & Talk	Black Board
5.2	- Graphs of frequency distributions	2	Discussion	Black Board
5.3	Merits and Limitations of diagrams and graphs	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

UG CIA Components

C1	-	Test (CIA 1)	-	10 Mks
C2	-	Test (CIA 2)	-	10 Mks
C3	-	Assignment	-	5 Mks
C4	-	Open Book Test/PPT	-	5 Mks
C5	-	Quiz	-	5 Mks
C6	-	Attendance	-	5 Mks

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Recognizes investigation, investigator, numerator and enumeration	K1	PSO1& PSO2
CO 2	Explain statistical survey	K3	PSO3
CO 3	Identifies the need of Classification and Tabulation in sampling	K1 & K2	PSO3

CO 4	Explain different methods of data collection	K1 & K2	PSO3
CO 5	Construct and analyse graphical display to summarize data	K3& K4	PSO3

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	1	2
CO2	2	2	2	2	1	2
CO3	2	2	3	2	1	1
CO4	3	2	3	3	2	1
CO5	2	2	3	2	2	1

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	2
CO2	2	2	1	1
CO3	2	2	2	1
CO4	2	3	2	2
CO5	2	2	1	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

Forwarded By

Dr. V.Vanitha

I B.Sc STATISTICS

SEMESTER –II

For those who joined in 2023onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST2CC3	Distribution Theory	Lecture	5	5

COURSE DESCRIPTION

This course introduces probability functions for random variables that are defined for different probabilistic situations.

COURSE OBJECTIVE

This course exposes students the various important discrete probability models and real life situations where these distributions provide appropriate models.

UNIT I BINOMIAL & NEGATIVE BINOMIAL DISTRIBUTION (15 Hrs)

Binomial distribution – moments, recurrence relation, mean deviation, mode, moment generating function, characteristic function, cumulants. Fitting of Binomial Distribution. Poisson distribution – moments, mode, recurrence relation, moment generating function, characteristic function, cumulants. Fitting of Poisson distribution. Negative binomial distribution – m.g.f., cumulants. Fitting of Negative binomial distribution

UNIT II GEOMETRIC & HYPERGEOMETRIC DISTRIBUTION (15 HRS)

Geometric distribution – lack of memory, moments, m.g.f.- Hypergeometric distribution – mean, variance, approximation to Binomial, recurrence relation – Multinomial distribution – m.g.f., mean and variance.

UNIT III NORMAL DISTRIBUTION (15 HRS)

Normal Distribution – chief characteristics of the normal distribution and normal probability curve, mean, median, mode, m.g.f. characteristic function, moments, points of inflexion, mean deviation, Area property – Rectangular distribution – moments, m.g.f., characteristic function, mean deviation about mean.

UNIT IV BETA & GAMMA DISTRIBUTION (15 HRS)

Memory less property – Gamma distribution – m.g.f., cumulants and central moments, reproductive property – Beta distribution – First kind and second kind – constants.

UNIT-V t, CHI-SQUARE AND F-DISTRIBUTIONS (15 HRS)

Functions of Normal random variables leading to t, Chi-square and F-distributions (derivations, properties and interrelationships).

TEXT BOOK:

S.C.Gupta and V.K.Kapoor, *Fundamentals of Mathematical statistics*, Sultan Chand & Sons, Revised edition (2014).

REFERENCE BOOKS:

1. Arumugam and Thangapandi Isaac, *Statistics*, New Gamma publishing house, (2012).
2. S.P.Gupta, *Statistical Methods*, Sultan Chand & Sons, Revised edition (2014).
3. Mood, A.D. Graybill, F.A. and Boes, D.C (1974): Introduction to the Theory of Statistics, 3/e, Mc.Graw Hill, New York

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-I BINOMIAL & NEGATIVE BINOMIAL DISTRIBUTION				
1.1	Moments of Bernoulli Distribution	2	Chalk &Talk	BlackBoard
1.2	Moments of Binomial Distribution	2	Chalk &Talk	Black Board
1.3	Relation for the Moments of Binomial Distribution– Factorial Moments of Binomial Distribution	4	Chalk &Talk	Black Board
1.4	Moment Generating Function of Binomial Distribution- Additive Property of Binomial Distribution	4	Chalk &Talk	Black Board
1.5	Recurrence Relation for Cumulants of Binomial Distribution	2	Discussion	Black Board
1.6	Probability Generating Function of Binomial Distribution	1	Chalk &Talk	Black Board
UNIT-2 GEOMETRIC & HYPERGEOMETRIC DISTRIBUTION				
2.1	Moments of Poisson Distribution	2	Chalk &Talk	Black Board

2.2	Mode of Poisson Distribution	2	Chalk &Talk	Black Board
2.3	Characteristic Function of Poisson Distribution	2	Chalk &Talk	Black Board
2.4	Cumulants of Poisson Distribution	2	Discussion	Black Board
2.5	Additive Property of Independent Poisson Variates	2	Chalk &Talk	Black Board
2.6	Moment Generating Function of Poisson Distribution	2	Chalk &Talk	Black Board
2.7	Probability Generating Function of Poisson Distribution	2	Chalk & Talk	Black Board
2.8	Recurrence Relation for the Probabilities of Poisson Distribution.	1	Chalk &Talk	Black Board
UNIT-3 NORMAL DISTRIBUTION				
3.1	Moment Generating Function of Negative Binomial Distribution	3	Chalk &Talk	Black Board
3.2	Cumulants of Negative Binomial Distribution	3	Chalk &Talk	Black Board
3.3	Poisson distribution as a Limiting case of Negative Binomial Distribution	3	Chalk &Talk	Black Board
3.4	Probability Generating Function of Negative Binomial Distribution	3	Chalk &Talk	Black Board
3.5	Deduction of Moments of Negative Binomial Distribution from those of Binomial Distribution	3	Chalk &Talk	Black Board
UNIT-4 BETA & GAMMA DISTRIBUTION				
4.1	Moments of Geometric Distribution	5	Chalk &Talk	Black Board
4.2	Moment Generating Function of Geometric	4	Chalk &Talk	Black Board

	Distribution			
4.3	Factorial Moments of the Hypergeometric Distribution	3	Chalk &Talk	Black Board
4.4	Recurrence Relation for the Hypergeometric Distribution.	3	Chalk &Talk	Black Board
UNIT-5 t, CHI-SQUARE AND F-DISTRIBUTIONS				
5.1	Moments of Multinomial Distribution	5	Chalk &Talk	Black Board
5.2	Moment Generating Function of Power Series Distribution	6	Chalk &Talk	Black Board
5.3	Recurrence Relation for Cumulants of Power Series Distribution.	4	Chalk &Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

C1 - Test (CIA 1) - 10 Mks

C2 - Test (CIA 2) - 10 Mks

C3 - Assignment - 5 Mks

C4 - Open Book Test/PPT - 5 Mks

C5 - Quiz - 5 Mks

C6 - Attendance - 5 Mks

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED

CO1	Recognize cases where the Binomial distribution could be an appropriate model.	K1	PSO2
CO2	Able to apply the Poisson distribution to a variety of problems.	K3	PSO5
CO3	Explore the key properties such as the moment generating function, cumulant of a negative binomial distribution.	K1&K3	PSO3
CO4	Understand and derive the formula for the geometric and hypergeometric probability mass function.	K1,K2&K3	PSO4
CO5	Explain and evaluate multinomial and power series distribution	K2&K4	PSO6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	2	2	2	3	2
CO3	2	2	3	2	2	2
CO4	2	2	3	3	2	2
CO5	2	2	3	2	2	3

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	1
CO2	2	3	1	1
CO3	2	2	2	3
CO4	1	3	2	2

CO5	**1**	**3**	**2**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

Forwarded By

Dr. V.Vanitha

I B.Sc STATISTICS

SEMESTER –II

For those who joined in 2023 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	**23ST2CC4**	**Matrix and Linear Algebra**	**Lecture**	**5**	**5**

COURSE DESCRIPTION

This course will focus on properties of matrix and their applications

COURSE OBJECTIVES

To study the basic operations of transpose and inverse of matrices,To know the structure of orthogonal and unitary matrices and To know and to apply the concepts of vector space and matrix polynomials

UNITI OPERATIONS OF MATRICES [15 HRS]

Matrices-Transpose - Conjugate transpose- Reversal law for the transpose and conjugate transpose. Adjoint of a matrix, Inverse of a matrix, Singular and Non -Singular matrices

UNIT II TRANSACTIONS OF MATRICES [15 HRS]

Reversal law for the inverse of product of two matrices. Commutativity of inverse and transpose of matrix, Commutativity of inverse and conjugate transpose of matrix, Orthogonal and Unitary Matrices, Product of unitary matrices, Partitioning of matrices.

UNIT III RANK OF A MATRIX **[15 HRS]**

Rank of a matrix, Echelon form, Rank of transpose, Elementary transformations, Elementary matrices, Invariance of rank through elementary transformations, Reduction to Normal form, Equivalent matrices.

UNIT IV VECTORSPACE **[15 HRS]**

Vector space – Linear Dependence - Basis of a vector space –Sub-space - Properties of Linearly Independent and Dependent systems, Row and Column spaces, Equality of Row and Column ranks, Rank of Sum and Product of matrices

UNIT-V MATRIX POLYNOMIALS **[15 HRS]**

Matrix polynomials, Characteristic roots and vectors,Relation between characteristic roots and characteristic vectors, Algebraic and Geometric multiplicity, Nature of characteristic roots in case of special matrices, Cayley- Hamilton theorem.

TEXT BOOK:

1. Vasishtha.A.R (1972): Matrices, Krishna prakashan Mandir, Meerut.

REFERENCE BOOK:

1. Shanthinarayan, (2012) : A Text Book of Matrices, S.Chand & Co, New Delhi
2. M.L.Khanna (2009), Matrices, Jai Prakash Nath & Co

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 OPERATIONSOFMATRICES				
1.1	Matrices-Transpose - Conjugate transpose	4	Chalk & Talk	Black Board
1.2	Reversal law for the transpose and conjugate transpose	4	Chalk & Talk	Black Board
1.3	Adjoint of a matrix, Inverse of a matrix	4	Chalk & Talk	Black Board
1.4	Singular and Non -Singular matrices	3	Chalk & Talk	Black Board
UNIT -2 TRANSACTIONS OF MATRICES				
2.1	Reversal law for the inverse of product of two matrices.,	3	Chalk & Talk	Black Board
2.2	Commutativity of inverse and transpose of matrix,	3	Chalk &Talk	Black Board
2.3	Commutativity of inverse and conjugate transpose of matrix	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.4	Orthogonal and Unitary Matrices	3	Chalk & Talk	Black Board
2.5	Product of unitary matrices, Partitioning of matrices.	3	Chalk & Talk	Black Board
UNIT -3 RANK OF A MATRIX				
3.1	Rank of a matrix, Echelon form, Rank of transpose, Elementary transformations,	5	Chalk & Talk	Black Board
3.2	Elementary matrices, Invariance of rank through elementary transformations,	5	Chalk & Talk	Black Board
3.3	Reduction to Normal form, Equivalent matrices	5	Chalk & Talk	Black Board
UNIT -4 VECTOR SPACE				
4.1	Vector space – Linear Dependence	3	Chalk & Talk	Black Board
4.2	Basis of a vector space –Sub-space	3	Discussion	Black Board
4.3	Properties of Linearly Independent and Dependent systems, Row and Column spaces	3	Chalk & Talk	Black Board
4.4	Equality of Row and Column ranks	3	Chalk & Talk	Black Board
4.5	Rank of Sum and Product of matrices	3	Chalk & Talk	Black Board
UNIT -5 MATRIX POLYNOMIALS				
5.1	Matrix polynomials, Characteristic roots and vectors	3	Chalk & Talk	Black Board
5.2	Relation between characteristic roots and characteristic vectors	3	Chalk & Talk	Black Board
5.3	Algebraic and Geometric multiplicity	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.4	Nature of characteristic roots in case of special matrices	3	Chalk & Talk	Black Board
5.5	Cayley- Hamilton theorem	3	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

EVALUATION PATTERN

UG CIA Components

C1	-	Test (CIA 1)	-	10 Mks
C2	-	Test (CIA 2)	-	10 Mks
C3	-	Assignment	-	5 Mks
C4	-	Open Book Test/PPT	-	5 Mks
C5	-	Quiz	-	5 Mks
C6	-	Attendance	-	5 Mks

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Do basic operations of matrices	K2 & K4	PSO1& PSO2
CO 2	Understand various transactions of matrices and its applications	K3	PSO5
CO 3	Able to understand various properties of matrices	K3	PSO1& PSO2
CO 4	Able to understand vector space, eigen vector and its applications	K1, K2&K3	PSO3
CO 5	Able to understand vector and matrix	K2 & K4	PSO2 &PSO3

	applications		

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	2	2
CO2	2	2	2	2	1	1
CO3	1	2	2	2	1	1
CO4	2	2	1	1	2	1
CO5	2	2	1	2	2	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	1	2	1	1
CO2	2	3	1	1
CO3	2	2	2	1
CO4	1	3	2	2
CO5	1	3	1	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

Forwarded By

Dr. V.Vanitha

I B.Sc STATISTICS

SEMESTER –II

For those who joined in 2023 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST2EC2	Real Analysis	Lecture	5	3

COURSE DESCRIPTION

This course introduces the basic concepts in analysis and to enable the students understand fundamental ideas and theorems in analysis

COURSE OBJECTIVES

To enable the students, understand the basic concepts of sequences and series, connectedness and compactness and proof techniques

UNIT I REAL VALUED FUNCTIONS (12 Hrs)

Operations on sets, Functions, Real valued functions, Equivalence, Countability, Real Numbers, Cantor set, Least Upper Bounds, Greatest Lower Bound.

UNIT II SEQUENCE (12 Hrs)

Definition of Sequence, Subsequence, Limit of a sequence, Convergent and Divergent sequences, Oscillating sequence, Bounded and Monotone sequences, Operations on convergent sequences, Limit Infimum, Limit Supremum, Cauchy sequences, Summability of sequences.

UNIT III SERIES OF REAL NUMBERS (12 Hrs)

Definition of Series, Convergent and Divergent series, series with nonnegative terms, alternating series, conditional convergence, absolute convergences and test for absolute convergence

UNIT -IV LIMITS (12 Hrs)

Limit of a function on the real line, Increasing and Decreasing functions, Continuous function, Operations on continuous functions, Composition of continuous functions, Derivatives, Derivative and continuity, Rolle's Theorem, Mean value theorem, Taylor's theorem

UNIT-V RIEMANN INTEGRAL (12 Hrs)

Concept of Riemann Integral, Refinement of partition, Upper and Lower sums, Upper integral and Lower Integral Riemann integrability, Necessary and Sufficient condition for Riemann integrable, Properties of Riemann integrals, Fundamental theorem

TEXT:

Richard R. Goldberg, Methods of Real Analysis**,** Oxford & IBH Publishing co. Pvt. Ltd.

REFERENCES:

1. S. Arumugam and A. Thangapandi Issac, ModernAnalysis
2. Shanthinarayan, (2012): Real Analysis, S.Chand & Co, New Delhi
3. Walter Rudin, Mathematical Analysis, MC-craw hill international, Third edition.

e-books, tutorials on MOOC/SWAYAM courses on the subject

https://tutorial.math.lamar.edu/classes/calci/thelimit.aspx

https://www.mathsisfun.com/calculus/derivatives-introduction.html

https://www.math.ucdavis.edu/~hunter/m125b/ch1.pdf

https://math.hmc.edu/calculus/hmc-mathematics-calculus-online-tutorials/single-variable-calculus/taylors-theorem/

http://www.ms.uky.edu/~droyster/courses/fall06/PDFs/Chapter06.pdf

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 REAL VALUED FUNCTIONS				
1.1	Real valued functions	3	Chalk & Talk	Black Board
1.2	equivalence - countability- real numbers	3	Chalk & Talk	Black Board
1.3	least upper bound- definition of sequence and subsequence	3	Chalk & Talk	Black Board
1.4	limit of a sequence.	3	Chalk & Talk	Black Board
UNIT -2 SEQUENCES				
2.1	Convergent sequences divergent sequences-	3	Chalk & Talk	Black Board
2.2	bounded sequences-monotone sequences-	2	Chalk &Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.3	operations on convergent sequences-	2	Chalk & Talk	Black Board
2.4	operations on divergent sequences-	2	Chalk & Talk	Black Board
2.5	Cauchy sequences	3	Chalk & Talk	Black Board
UNIT -3 SERIES OF REAL NUMBERS				
3.1	Series- convergence and divergence of series	3	Chalk & Talk	Black Board
3.2	series with non-negative terms	3	Chalk & Talk	Black Board
3.3	alternating series	1	Chalk & Talk	Black Board
3.4	conditional convergence and absolute convergence-	3	Chalk & Talk	Black Board
3.5	test for absolute convergence	2	Chalk & Talk	Black Board
UNIT -4 LIMITS				
4.1	Limit of a function on the real line-	6	Chalk & Talk	Black Board
4.2	Increasing and Decreasing functions	6	Discussion	Black Board
UNIT -5 RIEMANN INTEGRAL				
5.1	Concept of Riemann Integral,	2	Chalk & Talk	Black Board
5.2	Refinement of partition, Upper and Lower sums,	3	Chalk & Talk	Black Board
5.3	Upper integral and Lower Integral Riemann integrability,	2	Chalk & Talk	Black Board
5.4	Necessary and Sufficient condition for Riemann integrable,	3	Chalk & Talk	Black Board
5.5	Properties of Riemann integrals, Fundamental theorem	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks	CIA Total	

							C6		% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

EVALUATION PATTERN

CIA	
Scholastic	35
Non Scholastic	5
	40

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

C1	-	Test (CIA 1)	-	10 Mks
C2	-	Test (CIA 2)	-	10 Mks
C3	-	Assignment	-	5 Mks
C4	-	Open Book Test/PPT	-	5 Mks
C5	-	Quiz	-	5 Mks
C6	-	Attendance	-	5 Mks

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Can do basic operations of sets and understand set functions	K2 & K4	PSO1& PSO2

CO 2	Understands sequence and its convergence	K3	PSO5
CO 3	Understands series and its convergence	K3	PSO1& PSO2
CO 4	Identifies real valued functions and its discontinuity	K1, K2&K3	PSO3
CO 5	Understands Necessary and Sufficient condition for Riemann integrable	K2 & K4	PSO2 &PSO3

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	3	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	3	2	2
CO2	2	3	2	2
CO3	2	3	2	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

Forwarded By

Dr. V.Vanitha

I B.Sc STATISTICS

SEMESTER –II

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST2SE3	Statistics Practical I	Lecture	2	2

COURSE DESCRIPTION

The course provides problems related to measure of central tendency, measure of dispersion, and measures of association of attributes.

COURSE OBJECTIVES

To expose the students the analysis of statistical techniques in real life situations.

1. Problems based on measure of central tendency
2. Problems based on measure of dispersion.
3. Problems based on moments, skewness and kurtosis
4. Computation of Karl Pearson correlation co-efficient.
5. Correlation coefficient for a bivariate frequency distribution.
6. Concurrent deviation
7. Rank correlation.
8. Regression Equations.
9. Computation of various measures of associations of attributes.

10. Sampling Theory – Simple Random sampling, Stratified Random Sampling, Systematic Random Sampling

TEXT:

1. S.C.Gupta and V.K.Kapoor, *Fundamentals of Mathematical statistics*, Sultan Chand & Sons, Revised edition (2002).

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

EVALUATION PATTERN

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

UG CIA Components

C1	-	Test (CIA 1)	-	10 Mks
C2	-	Test (CIA 2)	-	10 Mks
C3	-	Assignment	-	5 Mks
C4	-	Open Book Test/PPT	-	5 Mks
C5	-	Quiz	-	5 Mks
C6	-	Attendance	-	5 Mks

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Calculate measures of central tendency	K1	PSO1& PSO2
CO 2	Classify measures of dispersion, skewness and kurtosis	K1, K2	PSO5 & PSO6
CO3	Compute correlation, regression and measures of association of attributes	K3	PSO4 & PSO5
CO4	Recognise and solve problems on binomial, poisson and normal distribution	K3	PSO4&PSO5

CO5	Able to apply geometric and hyper geometric distribution	K1	PSO6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	3	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	3	3	3
CO2	2	3	2	2
CO3	2	3	2	2
CO4	2	3	3	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

Forwarded By

Dr. V.Vanitha

II B.Sc STATISTICS

SEMESTER –III

For those who joined in 2021 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	22ST3CC5	Continuous Probability Distribution	Lecture	6	4

COURSE DESCRIPTION

This course is designed to expose the students various important continuous probability models

COURSE OBJECTIVES

To enable the students understand the continuous probability distribution and real life situations where these distributions provide appropriate models.

UNIT – I NORMAL DISTRIBUTION (18 HRS.)

Normal distribution as a limiting form of binomial distribution-chief characteristics of the normal distribution – mode, median, moment generating function of normal distribution - cumulant generating function of normal distribution – moments of normal distribution –

UNIT – II NORMAL DISTRIBUTION CONT. (18 HRS.)

A linear combination of independent normal variates - points of inflexion of normal curves – mean deviation about mean for normal distribution - area property – error function - importance of normal distributions - fitting of normal distribution

UNIT – III RECTANGULAR DISTRIBUTIONS (18 HRS.)

Moments of rectangular distribution -m.g.f of rectangular distribution – characteristics function of rectangular distribution - mean deviation about mean of rectangular distribution –

UNIT – IV BETA AND GAMMA DISTRIBUTIONS (18 HRS.)

M.g.f of gamma distribution – cumulant generating function of gamma distribution – additive function of gamma distribution - beta distribution of first kind – beta distribution of second kind.

UNIT – V EXPONENTIAL AND CAUCHY DISTRIBUTIONS (18 HRS.)

Moment generating function of exponential distribution - **characteristic function of Cauchy distribution – moments of Cauchy distribution – (**Self Study).

TEXT:

S.C.Gupta and V.K.Kapoor, *Fundamentals of Mathematical Statistics,* Sultan Chand & Sons, Revised edition (2014).

REFERENCES:

1. Arumugam and Thangapandi Isaac, *Statistics*, New Gamma publishing house, (2012).
2. S.P.Gupta, *Statistical Methods*, Sultan Chand & Sons, Revised edition (2014).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 NORMAL DISTRIBUTION				
1.1	Normal distribution as a limiting form of binomial distribution-	3	Chalk & Talk	Black Board
1.2	Chief characteristics of the normal distribution	3	Chalk & Talk	Black Board
1.3	Mode	3	Chalk & Talk	Black Board
1.4	Median	3	Chalk & Talk	Black Board
1.5	moment generating function of normal distribution -	3	Chalk & Talk	Black Board
1.6	cumulant generating function of normal distribution	3	Chalk & Talk	Black Board
UNIT 2 NORMAL DISTRIBUTION CONT.				
2.1	Linear combination of independent normal variates	3	Chalk & Talk	Black Board
2.2	Mean deviation about mean for normal distribution	3	Chalk & Talk	Black Board
2.3	Area property	2	Chalk & Talk	Black Board
2.4	Importance of normal distributions	5	Chalk & Talk	Black Board
2.5	Fitting of normal distribution	5	Chalk & Talk	Black Board
UNIT 3 RECTANGULAR DISTRIBUTIONS				
3.1	Moments of rectangular distribution	6	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.2	m.g.f of rectangular distribution	6	Chalk & Talk	Black Board
3.3	Characteristics function of rectangular distribution	6	Chalk & Talk	Black Board
UNIT 4 BETA AND GAMMA DISTRIBUTIONS				
4.1	m.g.f of gamma distribution – cumulant generating function of gamma distribution	6	Chalk & Talk	Black Board
4.2	beta distribution of first kind	6	Chalk & Talk	Black Board
4.3	Beta distribution of second kind.	6	Chalk & Talk	Black Board
UNIT -5 EXPONENTIAL AND CAUCHY DISTRIBUTIONS				
5.1	Moment generating function of exponential distribution	6	Chalk & Talk	Black Board
5.2	characteristic function of Cauchy distribution	6	Discussion	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

EVALUATION PATTERN

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

EVALUATION PATTERN

CIA	
Scholastic	35
Non Scholastic	5
	40

COURSE OUTCOMES

UG CIA Components

On the successful completion of the course, students will be able to:

C1 - Test (CIA 1) - 10 Mks

C2 - Test (CIA 2) - 10 Mks

C3 - Assignment - 5 Mks

C4 - Open Book Test/PPT - 5 Mks

C5 - Quiz - 5 Mks

C6 - Attendance - 5 Mks

NO.	COURSE OUTCOMES	KNOWLEDGELEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Recognize cases where the normal distribution could be an appropriate.	K1	PSO1& PSO2

CO 2	Understand and derive the moments, moment generating functions, characteristic functions of rectangular, beta and gamma distribution.	K1 & K2	PSO3
CO 3	Explore the key properties such as the moment generating function and cumulants of exponential and Cauchy distribution	K3 & K4	PSO3
CO 4	Derive chi square distributionand apply in real life problem	K1, K2 & K3	PSO5
CO 5	State and apply the definitionsof the t and F distributions	K2 & K3	PSO6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms.D.K.PonOvya**

ForwardedBy

Dr.E.Helena

II B.Sc. STATISTICS

SEMESTER III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST3CC6	Sampling Theory	Lecture	6	4

COURSE DESCRIPTION

This course is introduced to the students to impart the basicknowledge of statistical sampling concepts.

COURSE OBJECTIVES

To enable the students understand the concept of statistical sampling and to make them conduct sample survey independently by selecting the suitable sampling techniques.

UNIT –I SAMPLE SURVEY (18 HRS.)

Census and Sample surveys - principle steps in sample survey - principles of sample survey - sampling and non-sampling errors - **advantages of sampling over complete census – (**Self Study) - limitations of sampling.

UNIT –II SIMPLE RANDOM SAMPLING (18 HRS.)

Sampling from finite population - **simple random sampling with and without replacement–**

(Self Study) – procedure of selecting a randomsample - unbiased estimate, variance of the estimates –finite population correction - estimation of standard error from a sample.

UNIT –III STRATIFIED RANDOM SAMPLING (18 HRS.)

Stratified random sampling - properties of the estimates - unbiased estimates of the mean and variance of the estimates of the mean-optimum and proportional allocations – relative precision of a stratified sampling and

simple random sampling - estimation of gain in precision in stratified sampling.

UNIT –IV SYSTEMATIC SAMPLING (18 HRS.)

Systematic sampling - estimate of mean and variance of the estimated mean – comparison of simple and stratified with systematic random sampling, systematic sampling with cluster sampling, methods for populations with linear trend.

UNIT –V RATIO ESTIMATOR (18 HRS.)

Ratio estimators: Ratio estimates, variance of the ratio estimates - Bias of the ratio estimates. Regression estimators: Linear regression estimate regression estimates with pre assigned b-regression estimates when b is computed from the sample.

TEXT:

1. S.C.Gupta, and V.K. Kapoor, *Fundamentals of Applied Statistics*,Sultan Chand & Co., 11th edition (2014).
2. William G. Cochran, *Sampling Techniques*, John Wiley Sons (1999).

REFERENCES:

1. Daroga Singh and F.S.Choudary, *Theory and Analysis of SampleSurvey Designs*, New age international publishers (1986).
2. P.V. Sukhatame and B.V.Sukhatame, *Sampling Theory of Surveys with Applications*, ISAS publishers, 3rd Edition (1957).
3. S.Sampath, *Sampling Theory and Methods*, Narosa Publishing House (2001).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids

UNIT- 1 SAMPLE SURVEY				
1.1	Census and Sample surveys	3	Lecture	PPT & White board
1.2	Principle steps in sample survey	4	Lecture	PPT & White board
1.3	Sampling and non-sampling errors	4	Lecture	PPT & White board
1.4	Advantages of sampling over complete census	4	Lecture	PPT & White board
1.5	Limitations of sampling.	3	Lecture	Smart Board
UNIT -2 SIMPLE RANDOM SAMPLING				
2.1	Sampling from finite population	3	Chalk & Talk	Black Board
2.2	Simple random sampling with and without replacement	4	Discussion	Black Board
2.3	Procedure of selecting a random sample	4	Chalk & Talk	Black Board
2.4	Unbiased estimate, variance of the estimates	4	Chalk & Talk	Black Board
2.5	Estimation of standard error from a sample	3	Chalk & Talk	Black Board
UNIT -3 STRATIFIED RANDOM SAMPLING				
3.1	Stratified random sampling	2	Chalk & Talk	Black Board
3.2	Properties of the estimates	3	Chalk & Talk	Black Board
3.3	Unbiased estimates of the mean and variance of the estimates of the mean	3	Chalk & Talk	Black Board
3.4	Optimum and proportional allocations	2	Chalk & Talk	Black Board
3.5	Relative precision of a stratified sampling and simple random sampling	5	Chalk & Talk	Black Board

3.6	Estimation of gain in precision in stratified sampling	3	Chalk & Talk	Black Board
UNIT -4 SYSTEMATIC SAMPLING				
4.1	Estimate of mean and varianceof the estimated mean	6	Chalk & Talk	Black Board
4.2	Comparison of simple and stratified with systematic random sampling, systematic sampling with cluster sampling,	7	Chalk & Talk	Black Board
4.3	Methods for populations with linear trend	5	Chalk & Talk	Black Board
UNIT -5 RATIO ESTIMATOR				
5.1	Ratio estimates	5	Chalk & Talk	Black Board
5.2	variance of the ratio estimates	4	Chalk & Talk	Black Board
5.3	Bias of the ratio estimates	4	Chalk & Talk	Black Board
5.4	Estimate regression estimates with pre assigned b-regression estimates when b is computed from the sample	5	Chalk & Talk	Black Board

Levels	**C1**	**C2**	**C3**	**C4**	**C5**	**Total Scholastic Marks**	**Non Scholastic Marks C6**	**CIA Total**	**% of Assessment**
	T1 **10 Mks.**	**T2** **10 Mks.**	**Quiz** **5 Mks.**	**Assignment** **5 Mks**	**OBT/PPT** **5 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**2**	**2**	**-**	**-**	**-**	**4**	-	**4**	10 %
K2	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
K3	**3**	**3**	**-**	**-**	**5**	**11**	-	**11**	27.5 %
K4	**3**	**3**	**-**	**5**	**-**	**11**	-	**11**	27.5 %

Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

EVALUATION PATTERN

	SCHOLASTIC				**NON – SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

COURSE OUTCOMES	**KNOWLEDGELEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)**	**PSOs ADDRESSED**
Illustrate census and sampling andtheir advantages and disadvantages	K2	PSO1& PSO2
Differentiates the SRSWOR, SRSWR, methods of SRS – lottery method and random number table method	K1 & K2	PSO2

Understand and identify stratified random sampling	K1 & K3	PSO5
Understand and identify systematic sampling.	K4	PSO6
Analyse ratio estimator	K2 & K4	PSO2

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	2	2	3	2
CO4	2	3	2	2	2	2
CO5	2	3	2	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	1	2	3
CO2	3	2	3	1
CO3	1	2	3	2
CO4	3	2	2	3
CO5	1	2	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms.D.K.PonOvya**

ForwardedBy

Dr.E.Helena

II B.Sc. STATISTICS

SEMESTER III

For those who joined in 2019 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	21G3ACST3	Linear Programming	Lecture	5	5

COURSE DESCRIPTION

The course provides appropriate methods for the efficient computationof optimal solutions to problems which are modelled by objective function and linear constraints.

COURSE OBJECTIVES

This course enable the students convert real life problems into a Mathematical problem and to solve them using different techniques likegraphical method, simplex method, Big – M method, Two - phase methodand dual simplex method.

UNIT –I MATHEMATICAL FORMULATION OF LPP (15 HRS.)

Mathematical formulation – classification - graphical solutions of lpp- **simple examples of lpp - slack and surplus variables - standard form of lpp– (**Self Study)**.**

UNIT–II SIMPLEX METHOD (15 HRS.)

Definition of objective function - linear and non-negative constraints - feasible solution - basic feasible solution - optimum basic feasible solution - degenerate solution - evaluation and net evaluation - unbounded solutions and conditions for optimality of a feasible solution in terms of netevaluations (no proof) - pivotal element - computational procedure of the simplex method - tie for entering basis vector and leaving basis vector-solution using artificial variables.

UNIT –III METHOD AND TWO PHASE METHOD (15 HRS.)

Charne‟s method of penalities and two phase simplex method - restricted and unrestricted variables - inverse of a matrix using simplex method

UNIT –IV TRANSPORTATION PROBLEM (15 HRS.)

Mathematical formulation - existence of feasible solution - feasible solution by north west corner rule - matrix minima method - Vogel‟s approximation method -optimal solution to a TP by modified distribution method - degeneracy in TP - unbalanced TP.

UNIT –V ASSIGNMENT PROBLEM (15 HRS.)

Mathematical formulation - assignment algorithm rule for finding optimal assignment - unbalanced AP - travelling salesman problem as anAP.

TEXT:

Kanti Swarup, P.K.Gupta and Man Mohan, *Operation Research*, Sultan Chand and sons, New Delhi - 11th Edition (2003).

REFERENCES:

1. P.K.Gupta and Man Mohan, *Problems in Operation Research*, Sultan Chand and sons, New Delhi, 11th Edition (2007).
2. Prem Kumar Gupta and D.S.Hira, *Operations Research*, S.Chand and Company, Ram Nagar, New Delhi, Edition (2007).

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 MATHEMATICAL FORMULATION OF LPP				
1.1	Mathematical formulation	3	Chalk & Talk	Black Board
1.2	Classification	3	Chalk & Talk	Black Board
1.3	Graphical solutions of lpp	3	Chalk & Talk	Black Board
1.4	Simple examples of lpp	2	Discussion	Black Board
1.5	Slack and surplus variables	2	Discussion	Black Board
1.6	Standard form of lpp	2	Chalk & Talk	Black Board
UNIT -2 SIMPLEX METHOD				
2.1	Linear and non-negative constraints	1	Chalk & Talk	Black Board
2.2	Feasible solution	1	Chalk & Talk	Black Board

2.3	Basic feasible solution, optimumbasic feasible solution	3	Chalk & Talk	Black Board
2.4	Unbounded solutions and conditions for optimality of a feasible solution in terms of net evaluations	3	Chalk & Talk	Black Board
2.5	Computational procedure of thesimple method	4	Chalk & Talk	Black Board
2.6	Solution using artificial variables	3	Chalk & Talk	Black Board
Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -3 BIG – M METHOD AND TWO PHASE METHOD				
3.1	Charne‟s method of penalities and two phase simplex method	6	Chalk & Talk	Black Board
3.2	restricted and unrestrictedvariables	4	Chalk & Talk	Black Board
3.3	inverse of a matrix using simplex method.	5	Chalk & Talk	Black Board
UNIT -4 TRANSPORTATION PROBLEM				
4.1	Mathematical formulation	2	Chalk & Talk	Black Board
4.2	Existence of feasible solution	2	Chalk & Talk	Black Board
4.3	Feasible solution by north westcorner rule	2	Chalk & Talk	Black Board
4.4	Vogel‟s approximation method	4	Chalk & Talk	Black Board
4.5	Optimal solution to a TP by modified distribution method	2	Chalk & Talk	Black Board
4.6	Unbalanced TP	3	Chalk & Talk	Black Board
UNIT-5 ASSIGNMENT PROBLEM				
5.1	Mathematical formulation	2	Chalk & Talk	Black Board
5.2	Assignment algorithm rule forfinding optimal assignment	5	Chalk & Talk	Black Board

5.3	Unbalanced AP	4	Chalk & Talk	Black Board
5.4	Travelling salesman problem asan AP.	4	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

CIA	
Scholastic	35
Non Scholastic	5
	40

UG CIA Components

C1	-	Test (CIA 1)	-	10 Mks
C2	-	Test (CIA 2)	-	10 Mks
C3	-	Assignment	-	5 Mks
C4	-	Open Book Test/PPT	-	5 Mks
C5	-	Quiz	-	5 Mks
C6	-	Attendance	-	5 Mks

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGELEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Formulate linear programming problems and solve by graphical method	K2	PSO1& PSO2
CO 2	Classify simplex method to solve linear programming problems	K1, K2 & K3	PSO3
CO 3	Identify and solve two phase and Big – M method	K2 & K3	PSO3
CO 4	Recognize and formulate transportation and find the optimal solution	K1, K2 & K3	PSO2 & PSO3

CO5	Recognize and formulate assignment problems and find the optimal solution.	K2 & K3	PSO3

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	2	3	2	2	2
CO3	2	2	3	2	2	2
CO4	2	3	3	2	2	2
CO5	2	2	3	2	2	2

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	1
CO2	2	1	1	1
CO3	3	2	1	1
CO4	3	2	2	3
CO5	2	1	3	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.R.Srija**
2. **Ms.K.Mano**

ForwardedBy

Dr.E.Helena

II B.Sc. STATISTICS

SEMESTER III

For those who joined in 2019 onwards

Employability-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST3SB1	Practical StatisticsI	Lecture & Practical	2	2

COURSE DESCRIPTION

The course provides problems related to measure of central tendency,measure of dispersion, and measures of association of attributes.

COURSE OBJECTIVES

To expose the students the analysis of statistical techniques in reallife situations.

1. Problems based on measure of central tendency
2. Problems based on measure of dispersion..
3. Problems based on moments, skewness and kurtosis
4. Computation of Karl Pearson correlation co-efficient.
5. Correlation coefficient for a bivariate frequency distribution.
6. Concurrent deviation
7. Rank correlation.
8. Regression Equations..
9. Computation of various measures of associations of attributes.

TEXT:

S.C.Gupta and V.K.Kapoor, *Fundamentals of Mathematicalstatistics*, Sultan Chand & Sons, Revised edition (2002).

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1	T2	Quiz	Assignment	OBT/PPT				
	10 Mks.	10 Mks.	5 Mks.	5 Mks	5 Mks	35 Mks.	5 Mks.	40Mks.	

K1	**2**	**2**	**-**	**-**	**-**	**4**	-	**4**	10 %
K2	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
K3	**3**	**3**	**-**	**-**	**5**	**11**	-	**11**	27.5 %
K4	**3**	**3**	**-**	**5**	**-**	**11**	-	**11**	27.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

EVALUATION PATTERN

	SCHOLASTIC				**NON – SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	**COURSE OUTCOMES**	**KNOWLEDGELEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)**	**PSOs ADDRESSED**
CO 1	Calculate measure of central tendency.	K1	PSO1& PSO2
CO 2	Classify measures of dispersion, skewness and kurtosis.	K1, K2	PSO5 & PSO6
CO3	Compute correlation, regression and measures of association of attributes.	K3, K4	PSO5 & PSO6

Mapping of COs with PSOs

CO/ PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**

CO1	3	3	2	2	2	2
CO2	2	2	2	2	3	3
CO3	2	2	2	3	3	3

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **D.K.PonOvya**

ForwardedBy

Dr.E.Helena

II B.Sc. STATISTICS

SEMESTER IV

For those who joined in 2019 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST4CC7	Estimation Theory	Lecture	6	4

COURSE DESCRIPTION

This course introduces the concepts of statistical estimation theory.

COURSE OBJECTIVES

To enable the students understand the various statistical estimation methods of parameters and its applications in solving real life problems

UNIT –I POINT ESTIMATION THEORY (18 HRS.)

Parametric estimation: estimator - characteristics of an estimator - consistency and

unbiasedness of an estimator - Cramer-Rao inequality. Efficiency-asymptotic efficiency of an estimator- estimators based on sufficient statistics- Neyman"s factorization theorem (without proof) - Rao- Blackwell theorem

UNIT –II METHODS OF POINT ESTIMATION-I (18 HRS.)

Methods of point estimation - **method of Maximum Likelihood Estimator (MLE) – (**Self Study) - Properties of MLEs (without proof) – Problems based on MLEs.

UNIT–III METHODS OF POINT ESTIMATION-II (18 HRS.)

Method of moments – problems-method of least squares - method of minimum Chi-square-method of minimum variance-Minimum Variance Unbiased Estimation (MVUE)-Problems based on MVUE.

UNIT –IV INTERVAL ESTIMATION-I (18 HRS.)

Concept of interval estimation - interval estimation in case of large samples- confidence interval for proportions, means and variances based on normal distribution.

UNIT –V INTERVAL ESTIMATION-II (18 HRS.)

Interval estimation for small samples – confidence intervals for means,variances, correlation coefficient and regression coefficient based on Chisquare,Student"st,andfdistributions.

TEXT:

S.C. Gupta and V.K.Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi, 11th Edition (2002).

REFERENCES:

1. M.Kendall and A.Stuart, *The advanced theory of Statistics*, Vol. II, Charles Griffin, (1961).
2. V.K.Rohatgi, *Statistical Inference*, John Wiley and sons (1984).
3. R.V Hogg, A.T.Craig. and Tannis, *Introduction to Mathematical Statistics*, Prentice Hall, England (1995).

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 POINT ESTIMATION THEORY				

1.1	Parametric estimation: estimator	3	Chalk & Talk	Black Board
1.2	characteristics of an estimator	3	Chalk & Talk	Black Board
1.3	consistency and unbiasednessof an estimator	4	Chalk & Talk	Black Board
1.4	Cramer-Rao inequality	2	Chalk & Talk	Black Board
1.5	asymptotic efficiency of anestimator	2	Chalk & Talk	Black Board
1.6	Neyman‟s factorization theorem	2	Chalk & Talk	Black Board
1.7	Rao-Blackwell theorem.	2	Chalk & Talk	Black Board
UNIT -2 METHODS OF POINT ESTIMATION-I				
2.1	Methods of point estimation- method of Maximum LikelihoodEstimator (MLE)	6	Discussion	Black Board
2.2	Properties of MLEs	4	Chalk & Talk	Black Board
2.3	Problems based on MLEs.	8	Chalk & Talk	Black Board
UNIT -3 METHODS OF POINT ESTIMATION				
3.1	Method of moments	3	Chalk & Talk	Black Board
3.2	Method of least squares	3	Chalk & Talk	Black Board
3.3	Method of minimum Chi-square	3	Chalk & Talk	Black Board
3.4	Method of minimum variance	3	Chalk & Talk	Black Board
3.5	Minimum Variance Unbiased Estimation (MVUE)	2	Chalk & Talk	Black Board
3.6	Problems based on MVUE.	4	Chalk & Talk	Black Board
UNIT -4 INTERVAL ESTIMATION –I				
4.1	Concept of interval estimation	5	Chalk & Talk	Black Board

4.2	interval estimation in case oflarge samples	13	Chalk & Talk	Black Board
UNIT -5 INTERVAL ESTIMATION-II				
5.1	Interval estimation for smallsamples	4	Chalk & Talk	Black Board
5.2	Confidence intervals for means	4	Chalk & Talk	Black Board
5.3	Confidence intervals for variances	4	Chalk & Talk	Black Board
5.4	Confidence intervals for correlation coefficient	4	Chalk & Talk	Black Board
5.5	Regression coefficient based onChi square, Student‟s t, and F distributions.	6	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

EVALUATION PATTERN

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGELEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Explain and compute point estimation	K1	PSO1& PSO2
CO 2	Estimate maximum likelihood estimator	K1, K2,	PSO3
CO 3	Analyse minimum variance unbiased estimator	K1 & K3	PSO5
CO 4	Compute interval estimation in large samples using normal distribution	K3 & K4	PSO5 & PSO6
CO 5	Distinguish Interval estimation in small samples based on F, chi square and t distribution	K3 & K4	PSO5 & PSO6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	2	3	2	2	2
CO3	2	2	2	2	3	2
CO4	2	2	2	2	3	3
CO5	2	2	3	2	3	3

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	3
CO2	2	1	3	1
CO3	1	1	1	3

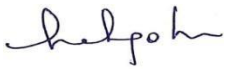
CO4	**1**	**3**	**2**	**2**
CO5	**2**	**1**	**1**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms.D.K.PonOvya**

ForwardedBy



Dr.E.Helena

II B.Sc. STATISTICS
SEMESTER IV

For those who joined in 2019 onwards

Employability-60%

Skill Development-40%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	**22ST4CC8**	**Applied statistics**	**Lecture**	**6**	**4**

COURSE DESCRIPTION

This course provides some of the applications of statistics which includes topics such as time series, index numbers and national income.

COURSE OBJECTIVES

To enable the students understand and appreciate the applications of Statistics

UNIT –I TIME SERIES **(18 HRS.)**

Concepts of Time series-Components of Time series-Uses-Additive and Multiplicative Models-Measurement of Trend-Least Square Method-Fitting of Linear Trend- Method of Moving Averages

UNIT –II ANALYSIS OF TIME SERIES **(18 HRS.)**

Seasonal Variations-Simple Average, Ratio to Moving Average, Ratio to Trend, Link relative Method- Cyclical fluctuations-Residual method only-Random Components-Variate difference Method.

UNIT –III INDEX NUMBERS (18 HRS.)

Classification and methods-Tests of adequacy- Chain index numbers - **consumer price index numbers– (**Self Study).

UNIT –IV INDEX NUMBERS CONT. (18 HRS.)

Laspeyer's , Paasche's, Fisher's Kelly's and Marshall Edgeworth Index numbers- Tests for ideal index numbers. Cost of Living index number-Construction and uses.

UNIT –V NATIONAL INCOME (18 HRS.)

National Income-Estimation methods-Uses of National Income Etimate-Computationa difficulties in India**.**

TEXT:

1. S.C.Gupta and V.K.Kapoor, *Fundamentals of Applied Statistics*, Sultan Chand & Sons, Revised edition (2002).
2. Goon. A.M., Gupta.B & Das Gupta.M.K., *Fundamentals of Statistics*,World Press,1987.
3. Agarwal.B.L., Basic Statistics,Anshan Publisher, I edn 2012.

REFERENCES:

1. Elhance. D,N., *Fundamentals of Statistics*, Kitab Mahal,,2010.
2. Croxton & Frederick ., Applied General Statistics, Prentice Hall of India, 1979.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 TIME SERIES				
1.1	Concepts of Time series	3	Chalk & Talk	Black Board
1.2	Components of Time series-Uses	3	Chalk & Talk	Black Board
1.3	Additive and Multiplicative Models	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.4	Measurement of Trend-Least Square Method	3	Chalk & Talk	Black Board
1.5	Fitting of Linear Trend	3	Chalk & Talk	Black Board
1.6	Method of Moving Averages.	3	Chalk & Talk	Black Board
UNIT -2 ANALYSIS OF TIME SERIES				
2.1	Seasonal Variations-Simple Average method	3	Chalk & Talk	Black Board
2.2	Ratio to Moving Average, Ratio to Trend	3	Chalk & Talk	Black Board
2.3	Link relative Method, Cyclical fluctuations	3	Chalk & Talk	Black Board
2.4	Residual method only	3	Chalk & Talk	Black Board
2.5	Random Components	3	Chalk & Talk	Black Board
2.6	Variate difference Method	3	Chalk & Talk	Black Board
UNIT 3 INDEX NUMBERS				
3.1	Basic Index numbers and their definitions-	5	Chalk & Talk	Black Board
3.2	Constructions of Whole sale Price Index Numbers and uses	3	Chalk & Talk	Black Board
3.3	Fixed and Chain base index numbers	5	Chalk & Talk	Black Board
3.4	Un weighted and Weighted index numbers.	5	Discussion	Black Board
UNIT 4 INDEX NUMBERS CONT.				
4.1	Lespeyer's , Paasche's Index numbers	4	Chalk & Talk	Black Board
4.2	Fisher's Kelly's and Marshall Edgeworth Index numbers	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.3	Tests for ideal index numbers.	4	Chalk & Talk	Black Board
4.4	Cost of Living index number	4	Chalk & Talk	Black Board
4.5	Construction and uses	3	Chalk & Talk	Black Board
UNIT 5 NATIONAL INCOME				
5.1	National Income	5	Lecture	PPT & White board
5.2	Estimation methods	3	Lecture	PPT & White board
5.3	Uses of National Income Estimate	5	Lecture	PPT & White board
5.4	Computational difficulties in India	5	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %

Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

EVALUATION PATTERN

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Fitting of Linear trend and Calculation of Moving Average.	K2	PSO2
CO 2	Understand the calculation of seasonal variations using different methods and able to find cyclic fluctuations	K1 & K2	PSO5
CO 3	Apply the concept of Index numbers uses and its applications.	K3 & K4	PSO3
CO 4	Prepare cost of living index and other index numbers for real life situations	K1, K3 & K4	PSO5 & PSO6
CO 5	To estimate the national income and to analysis its difficulties.	K3 & K4	PSO5 & PSO6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	2	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	3	3
CO5	2	2	2	2	3	3

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	3	2	2
CO2	2	3	2	2
CO3	3	2	2	2
CO4	2	2	3	2
CO5	2	2	2	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

Course Designer:

1. Mrs. K. Bhuvaneswari

2. Ms.K . Mano

Forwarded By

Dr. E. Helena

II B.Sc. STATISTICS

SEMESTER IV

For those who joined in 2019 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19G4ACST4	Linear Algebra	Lecture	5	5

COURSE DESCRIPTION

This course will focus on matrix as linear transformations relative to abasis of a vector space.

COURSE OBJECTIVES

To enable the students to understand matrix and vector space concepts which can be applied in Graph Theory, Linear Programming,Physics and Chemistry etc.,

UNIT –I VECTOR SPACES (15 HRS.)

Definition and Examples – Subspaces – Linear Transformation – Spanof a set

UNIT –II BASIS AND DIMENSION (15 HRS.)

Linear Independence – Basis and Dimension – Rank and Nullity -Matrix of a Linear Transformation

UNIT –III INNER PRODUCT SPACES (15 HRS.)

Definition and Examples – Orthogonality – Orthogonal Complement

UNIT –IV THEORY OF MATRICES (20 HRS.)

Algebra of Matrices – Types of Matrices – The Inverse of a Matrix –Elementary Transformations. Rank of a Matrix **– Simultaneous Linear Equations – Characteristic Equation and Cayley Hamilton Theorem – Eigen Values andEigen Vectors (Self Study).**

UNIT –V BILINEAR FORMS (10 HRS.)

Bilinear forms – Quadratic forms

TEXT:

S. Arumugam and A.Thanga Pandi Isaac *Modern Algebra*, Scitech Publications (India) Private Limited (2003). Chapters 5,6,7,8.

REFERENCES:

1. A.R.Vasishtha, *Modern Algebra,* Krishna Prakashan Media (P) Ltd.,Delhi(2006).
2. N.S.Gopalakrishnan, *University Algebra*, New Age International Limited- IIEdition (2005).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 VECTOR SPACES				
1.1	Definition and Examples of Vector Spaces	6	Chalk & Talk	Black Board
1.2	Subspaces	4	Chalk & Talk	Black Board
1.3	Linear Transformation	3	Lecture	PPT & White board
1.4	Span of a set	2	Chalk & Talk	Black Board
UNIT -2 BASIS AND DIMENSION				
2.1	Linear Independence	3	Chalk & Talk	Black Board
2.2	Basis and Dimension	5	Chalk & Talk	Black Board
2.3	Rank and Nullity	3	Chalk & Talk	Black Board
2.4	Matrix of a Linear Transformation	4	Chalk & Talk	Black Board
UNIT- 3 INNER PRODUCT SPACES				
3.1	Definition and Examples of Inner Product Space	5	Chalk & Talk	Black Board
3.2	Orthogonality	5	Chalk & Talk	Black Board

3.3	Orthogonal Complement	5	Chalk & Talk	Black Board
UNIT- 4 THEORY OF MATRICES				
Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
4.1	Algebra of Matrices	3	Lecture	PPT & White board
4.2	Types of Matrices	3	Lecture	PPT & White board
4.3	The Inverse of a Matrix	3	Chalk & Talk	Black Board
4.4	Elementary Transformations.Rank of a Matrix	3	Chalk & Talk	Black Board
4.5	Characteristic Equation andCayley Hamilton Theorem	3	Discussion	PPT & White board
4.6	Eigen Values and Eigen Vectors.	5	Discussion	Black Board
UNIT- 5 BILINEAR FORMS				
5.1	Bilinear forms	4	Chalk & Talk	Black Board
5.2	Quadratic forms	6	Chalk & Talk	Black Board

Levels	**C1**	**C2**	**C3**	**C4**	**C5**	**Total Scholastic Marks**	**Non Scholastic Marks C6**	**CIA Total**	**% of Assessment**
	T1 **10 Mks.**	**T2** **10 Mks.**	**Quiz** **5 Mks.**	**Assignment** **5 Mks**	**OBT/PPT** **5 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**2**	**2**	**-**	**-**	**-**	**4**	-	**4**	10 %
K2	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
K3	**3**	**3**	**-**	**-**	**5**	**11**	-	**11**	27.5 %

K4	**3**	**3**	**-**	**5**	**-**	**11**	-	**11**	27.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

	SCHOLASTIC				**NON – SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

EVALUATION PATTERN

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGELEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Define Vector Space and explain its various concepts	K1	PSO1
CO 2	Explain basis and dimension	K1, K2,	PSO3
CO 3	Illustrate Inner Product Spaces	K1 & K3	PSO3
CO 4	Define basic concepts of matricesand solve linear equations, Appraise Eigen Value and Eigen Vectors of matrices	K1, K2 & K4	PSO4

CO 5	Describe bilinear forms and quadratic forms	K2 & K4	PSO4

Mapping of COs with PSOs

Mapping of

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	3	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	3	2	2
CO5	2	2	3	3	2	2

COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	2
CO2	2	2	1	3
CO3	3	1	2	1
CO4	1	3	2	1
CO5	1	2	2	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Mrs.R.Rajeswari**
2. **Dr.M.Rajeswari**

ForwardedBy

Dr.E.Helena

II B.Sc STATISTICS

SEMESTER –IV

For those who joined in 2021 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	22ST4SB2	Sampling Distribution	Lecture	2	2

COURSE DESCRIPTION

The course provides an application related to the concepts of sampling distribution for large & small samples.

COURSE OBJECTIVES

To expose the students analyze the statistical techniques in real life situations

UNIT – I CHI-SQUARE DISTRIBUTION (6 HRS.)

Introduction – derivation of the χ^2 distribution – moment generating function of the χ^2 distribution –

UNIT – II CHI-SQUARE DISTRIBUTION CONT.(6 HRS.)

Some theorems on χ^2 distribution – linear transformation – applications of χ^2 distribution.

UNIT – III t - DISTRIBUTION (6 HRS.)

Introduction – student's 't' distribution – applications of 't' distribution – distribution of sample correlation coefficient when population correlation coefficient $\rho = 0$ -

UNIT –IV F - DISTRIBUTION (6 HRS.)

f distribution – applications of f distribution – relation between t and f distributions – relation between f and χ^2 distribution.

UNIT –V F - DISTRIBUTION CONT. (6 HRS.)

Relation between t and f distributions – relation between f and χ^2 distribution.

TEXT:

S.C.Gupta and V.K.Kapoor, *Fundamentals of Mathematical Statistics,* Sultan Chand & Sons, Revised edition (2014).

REFERENCES:

1. Arumugam and Thangapandi Isaac, *Statistics*, New Gamma publishing house, (2012).
2. S.P.Gupta, *Statistical Methods*, Sultan Chand & Sons, Revised edition (2014).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 CHI SQUARE DISTRIBUTION				
1.1	Derivation of the χ^2 distribution	3	Chalk & Talk	Black Board
1.2	Moment generating function of the χ^2 distribution	3	Chalk & Talk	Black Board
UNIT -2CHI SQUARE DISTRIBUTION CONT.				
2.1	Linear transformation	3	Chalk & Talk	Black Board
2.2	Applications of χ^2 distribution.	3	Chalk & Talk	Black Board
UNIT -3 t - DISTRIBUTION				
3.1	student's 't' distribution	3	Chalk & Talk	Black Board
3.2	applications of 't' distribution	3	Chalk & Talk	Black Board
UNIT - 4 F - DISTRIBUTION				
4.1	applications of f distribution	6	Chalk & Talk	Black Board
UNIT - 5 F – DISTRIBUTION CONT.				
5.1	Relation between t and f distributions	3	Chalk & Talk	Black Board
5.2	Relation between f and χ^2 distribution.	3	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5
K3	3	3	-	-	5	11	-	11	27.5
K4	3	3	-	5	-	11	-	11	27.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are :**

  K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Recall the definition of a t statistic in terms of statistics of a sample from a normal distribution	K1, K2 & K3	PSO5
CO 2	State and apply the definitions of the t, F and Chisquare distributions in terms of the standard normal.	K2 & K3	PSO5 & PSO6
CO 3	Able to use the application of t distribution.	K2 & K3	PSO5 & PSO6
CO4	Understand the applications of f distribution	K2 & K3	PSO5 & PSO6
CO5	Explain the relation between t, f and χ^2	K3	PSO5 & PSO6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	2	2	2	2	3	3
CO3	2	2	2	3	3	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr. M.Mano Prabha**
2. **Mrs. K. Bhuvaneswari**

Forwarded By

Dr. E. Helena

III B.Sc. STATISTICS

SEMESTER V

For those who joined in 2019 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSET ITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST5CC9	TESTING OF HYPOTHE SIS	Lecture	5	4

COURSEDESCRIPTION

The course provides the basics of hypothesis testing with emphasis on some commonly encountered hypothesis tests in statistical data analysis.

COURSEOBJECTIVES

To enable the students have a better understanding on testing of hypothesis in statistical data analysis.

UNIT–I TESTINGOFHYPOTHESIS (15HRS.)

Statistical Hypothesis – Simple and composite hypothesis, Null andalternative Hypothesis, Two types of errors, statistical test, size of a test,level of significance, critical region, power of the test- Steps in solving testingof hypothesis problem - Most powerful test (definition) – Neymann-Pearsonlemma – Simple problems based on Binomial, Poisson, Uniform, Normal &exponentialdistributions.

UNIT–II UNIFORMLYMOSTPOWERFULTESTS (15HRS.)

Powerfunctionandpowercurve(definition)– one parameterexponential family, Monotone likelihood Ratio property- Best critical region -Simple problems based on BCR -UMP tests for the parameters of univariateNormalandExponentialdistributions.

UNIT–III LIKELIHOODRATIOTEST(LRT) (15HRS.)

Definition of LRT–Parameter space-Properties of LRT tests(Statements only) – Theorem based on LRT - Test for the mean of normal

population-Testforthevarianceofnormalpopulation-

Testforequalityofmeansof2independentnormalpopulations–

Testforequalityofvariancesof2independentnormalpopulations–(SelfStudy).

UNIT–IV NON-PARAMETRICTESTS (15HRS.)

Signtest,Wilcoxonsignedranktest,Mediantest,Mann-WhitneyUtest,Runstest-testforrandomness.

UNIT–V SEQUENTIALPROBABILITYRATIOTEST(15HRS.)

Sequential Probability Ratio Test – Definition and properties of SPRT(withoutproof),simpleproblembasedonOCandASNforBinomial,Bernoulli,Poisson&Normaldistributions.

TEXT:

1. S.CGuptaandV.K.Kapoor,*FundamentalsofMathematicalStatistics*,Sultan Chand &SonsPvt.Ltd.NewDelhi(2002).
2. S.P.Gupta,*FundamentalsofStatistics*,SultanChand&SonsPvt.Ltd.NewDelhi.

REFERENCES:

1. A.M.Mood,F.A.GraybillandD.C.Boes,*IntroductiontothetheoryofStatistics*,McGrawHill(1974).
2. R.V.HoggandA.T.Craig,*Introductiontomathematicalstatistics*,3rdedition(1972).
3. A.M.Goon,M.K.GuptaandB.DasGupta, *An outline of statisticaltheory*, VolumeI, 6threvised edition World Press ltd,Calcutta(1980)
4. P.G.Hod,*Introductiontomathematicalstatistics*,Asiapublishinghouse(1971).
5. V.K.Rohatgi,*AnintroductiontoprobabilitytheoryandMathematicalStatistics*,WileyEastern(1984).
6. MarekFisz,*ProbabilitytheoryandMathematicalStatistics*,JohnWiley(1961).

COURSECONTENTS&LECTURESCHEDULE:

ModuleNo.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-1TESTINGOFHYPOTHESIS				
1.1	StatisticalHypothesis	2	Lecture	PPT& Whiteboard

1.2	Simpleandcompositehypothesis, Null and alternativeHypothesis	2	Chalk &Talk	BlackBoard
1.3	Twotypesoferrors	2	Lecture	PPT& Whiteboard
1.4	statisticaltest,sizeofatest,levelofsignificance,criticalregion	3	Lecture	PPT& Whiteboard
1.5	Mostpowerfultest	1	Chalk &Talk	BlackBoard
1.6	Neymann-Pearsonlemma	1	Chalk &Talk	BlackBoard
1.7	SimpleproblemsbasedonBinomial, Poisson,Uniform,Normal&exponentialdistributions.	4	Chalk &Talk	BlackBoard
UNIT-2UNIFORMLYMOSTPOWERFULTESTS				
2.1	Powerfunctionandpowercurve	2	Lecture	GreenBoard Charts
2.2	oneparameter exponentialfamily,Monotonelikelihoodratioproperty	4	Chalk &Talk	BlackBoard
2.3	Best critical region	2	Chalk &Talk	BlackBoard
2.4	SimpleproblemsbasedonBCR	3	Chalk &Talk	BlackBoard
2.5	UMPtestsfortheparametersofunivariateNormalandExponentialdistributions.	4	Chalk &Talk	BlackBoard
UNIT3LIKELIHOODRATIOTEST(LRT)				
3.1	DefinitionofLRT	1	Chalk &Talk	BlackBoard
3.2	Parameterspace-PropertiesofLRTtests	2	Chalk &Talk	BlackBoard
3.3	TheorembasedonLRT	1	Chalk &Talk	BlackBoard
3.4	Test forthemean ofnormalpopulation-Testforthevarianceofnormalpopulation	4	Chalk &Talk	BlackBoard

3.5	Testforequalityofmeansof2independentnormalpopulations	4	Discussion	BlackBoard
3.6	Testforequalityofvariancesof2independentnormalpopulations	3	Discussion	BlackBoard
UNIT4NON-PARAMETRICTESTS				
4.1	Signtest,Wilcoxonsignedranktest	5	Chalk &Talk	BlackBoard
4.2	Mediantest,Mann-WhitneyUtest	5	Chalk &Talk	BlackBoard
4.3	Runstest-testforrandomness	5	Chalk &Talk	BlackBoard
UNIT5SEQUENTIALPROBABILITYRATIOTEST				
Module No.	**Topic**	**No.ofLectures**	**TeachingPedagogy**	**TeachingAids**
5.1	SequentialProbabilityRatioTest	5	Chalk &Talk	BlackBoard
5.2	DefinitionandpropertiesofSPRT	5	Chalk &Talk	BlackBoard
5.3	SimpleproblembasedonOCandASNforBinomial,Bernoulli,Poisson &Normal distributions.	5	Chalk &Talk	BlackBoard

	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**2**	**2**	**-**	**-**	**-**	**4**	-	**4**	10%
K2	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5%
K3	**3**	**3**	**-**	**-**	**5**	**11**	-	**11**	27.5%
K4	**3**	**3**	**-**	**5**	**-**	**11**	-	**11**	27.5%
NonScholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5%
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100%**

CIA

Scholastic	**35**
NonScholastic	**5**
	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSEOUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Describe the process of hypothesis testing and given a statement of a research question, construct an appropriate null and alternative hypothesis to use for hypothesis testing.	K1&K3	PSO1&PSO2
CO2	Explain best critical region and carryout UMPtestforthe parameters ofunivariatenormalandexponentialdistribution.	K2	PSO5

CO3	Explain LRT and its properties and test mean and variance of normal population	K3&K4	PSO5 &PSO 6
CO4	Analyse the basic properties of nonparametricstatisticaltechniques Illustrate the significance level as the probability of rejecting a true null hypothesis	K1,K2&K3	PSO5 &PSO 6
CO5	Illustrate Sequential probability ratio test	K2&K4	PSO5 &PSO 6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms.D.K.PonOvyaF**

orwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER V

Forthosewhojoinedin2019onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSETITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST5CC10	Design of Experiment	Lecture	5	4

COURSEDESCRIPTION

This course is introduced to the students to understand the fundamental principles of experimental designs.

COURSEOBJECTIVES

To enable the students understand the fundamentals of experimental designs, analysis tools and techniques, interpretation and applications.

UNIT–I FUNDAMENTALPRINCIPLESOFEXPERIMENTS (15HRS.)

Terminology in Experimental statistics – Principles of experimentaldesign-Replication,RandomizationandLocalControlTechniques

UNIT–II LINEARMODELANDITSCLASSIFICATIONSI (15HRS.)

Completely Randomized Design (CRD) and its analysis-**RandomizedBlock Design (RBD) – (**Self Study)and its analysis - **Latin Square Design(LSD)–(**SelfStudy)anditsanalysis.

UNIT–III ANALYSISOFVARIANCE (15HRS.)

Definition–Assumption–Onewayclassification– Two

wayclassification(oneobservationpercell)-Twowayclassificationwithmobservationpercell

UNIT–IV LINEARMODELANDITSCLASSIFICATIONSII (15HRS.)

Missingplottechnique–Meaning–Analysisofmissingplotdesign(Fisher"sRule)–AnalysisofRBDwithonemissingobservation-Analysisof RBDwithtwomissingobservation-AnalysisofLSDwithonemissingobservation

UNIT–V FACTORIALEXPERIMENTS (15HRS.)

Advantages of factorial experiment – Definition 2^2, $2^3$and 2^nfactorialexperimentsandtheiranalysis–Confounding-PartialandCompleteconfounding in 2^3- Split plot design and its analysis, BlBD- definition andparameters.

TEXT:

1.S.C.GuptaandV.K.Kapoor,*FundamentalsofAppliedStatistics*,SultanChand &Sons(2007).

REFERENCES:

1. D.Montgomery,*DesignofExperiments*,JohnWileyandSon(2009).
2. M.N.DassandN.C.Gin,*DesignandAnalysisofExperiments*,WileyEastern,NewDelhi(1986)
3. Kempthorne,*DesignandAnalysisofExperiments*,JohnWiley.NewYork(1956).

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-1FUNDAMENTALPRINCIPLESOFEXPERIMENTS				
1.1	Terminologyinexperimentalstatistics	3	Lecture	PPT& Whiteboard
1.2	Principlesofexperimentaldesign	6	Chalk &Talk	BlackBoard
1.3	Replication, Randomization andLocalControlTechniques	6	Chalk &Talk	BlackBoard
UNIT-2ANALYSISOFVARIANCE				
2.1	Definition – Assumption – Onewayclassification	3	Chalk &Talk	BlackBoard

2.2	Twowayclassification(oneobservationpercell)	6	Chalk &Talk	BlackBoard
2.3	Twowayclassificationwithmobservationpercell	6	Chalk &Talk	BlackBoard
UNIT-3LINEARMODELANDITSCLASSIFICATIONSI				
3.1	CompletelyRandomizedDesign(CRD)anditsanalysis	5	Chalk &Talk	BlackBoard
3.2	Randomized BlockDesign(RBD)anditsanalysis	5	Discussion	PPT& Whiteboard
3.3	LatinSquareDesign(LSD)anditsanalysis.	5	Discussion	PPT& Whiteboard
UNIT-4LINEARMODELANDITSCLASSIFICATIONSII				
4.1	Missingplottechnique	2	Chalk &Talk	BlackBoard
4.2	Analysisofmissingplotdesign	3	Chalk&	Black
Module No.	Topic	No.of Lectures	TeachingPedagogy	TeachingAids
	(Fisher‟sRule)		Talk	Board
4.3	AnalysisofRBDwithonemissingobservation	4	Chalk &Talk	BlackBoard
4.4	AnalysisofRBDwithtwomissingobservation	3	Chalk &Talk	BlackBoard
4.5	AnalysisofLSDwithonemissingobservation	3	Chalk &Talk	BlackBoard
UNIT-5FACTORIALEXPERIMENTS				
5.1	Advantagesoffactorialexperiment	2	Chalk &Talk	BlackBoard
5.2	Definition 2^2, $2^3$and 2^nfactorialexperiments and their analysis –Confounding	5	Chalk &Talk	BlackBoard
5.3	PartialandCompleteconfoundingin2^3	4	Chalk &Talk	BlackBoard
5.4	Splitplotdesignanditsanalysis,BlBD	4	Chalk &Talk	BlackBoard

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35
NonScholastic	5
	40

EVALUATION PATTERN

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED

CO1	Define and recognize the terminology of experimental design.	K1	PSO1&PSO2
CO2	Apply and interpret the methods of analysis of variance	K2&K3	PSO4
CO3	Analyse CRD, RBD and LSD	K4	PSO3
CO4	Analyse missing plot technique IRBDandLSD	K1,K2&K3	PSO5 &PSO 6
CO5	Design and conduct two level functional factorial designs, split plot design	K1,K2&K3	PSO5 &PSO 6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms.D.K.PonOvya**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER V

Forthosewhojoinedin2019onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST5CC11	Demography	Lecture	5	4

COURSE DESCRIPTION

This course begins by focusing on understanding the core social demographic variables such as fertility, mortality and migration and how these variables influence population growth, composition and structure.

COURSE OBJECTIVES

To enable the students understand how population is examined in relation to its sociological determinants and consequence

UNIT–I DEMOGRAPHY (15HRS.)

Demography: Definition–Sources of Demographic data-Vital Registration–Population Census-Population Register-Demographic Surveys-Population data as an aid to Social, Economic and Health Planning

-Simple Problems

UNIT–II FERTILITYMEASUREMENTS (15HRS.)

Fertility measurements: Rates and Ratios –Fertility – Factors affecting fertility – Fertility Measures - **Crude Birth Rate (CBR), General, Specific and Total Fertility Rates – (**Self Study) – Growth Rates- Gross and Net Reproduction Rates(GRR,NRR)-Simple Problems.

UNIT–III MORTALITYMEARSUREMENTS (15HRS.)

Mortality Measurements: Mortality–Mortality Measures- Crude Death Rate (CDR), Age, Sex and Cause Specific Death Rates – Standardized Death Rate-Infant Mortality Rate—

Simple Problems

UNIT–IVLIFETABLE (15HRS.)

Life Table: Assumptions, Description of various columns of a Life table and their relationships - Construction of a Life table - Uses of a Life table –Simple Problems

UNIT–V MIGRATION (15HRS.)

Migration:Definition-FactorsaffectingMigration-GrossandNetMigrationRates-Projection:PopulationestimatesandProjection–Arithmetic,GeometricandExponentialGrowthRates-BasicideasofStationaryandStablepopulation-SimpleProblems.

TEXT:

1. A.M.Goon,M.K.Gupta.andDasGupta,*FundamentalsofStatistics* Vol.II,worldpress.

2. S.C.GuptaandV.K.Kapoor,*FundamentalsofAppliedStatistics*,S.Chand&Co,4thoroughlyrevisededition,New Delhi, Reprint2009

REFERENCES:

1. D.E.Mishra,*Anintroductiontothestudyofpopulation*,SouthIndiapublishers,Madras.
2. M.LJhingan,B.K.BhattandJ.N.Desai,*Demography*,VrindaPublicationsPvt.Ltd,Delhi,2nd RevisedEdition(2003).

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-1 DEMOGRAPHY				
1.1	SourcesofDemographicdata	3	Lecture	PPT& Whiteboard
1.2	VitalRegistration	2	Lecture	PPT& Whiteboard

1.3	PopulationCensusandPopulationRegister	3	Lecture	PPT& Whiteboard
1.4	DemographicSurveys	2	Lecture	PPT& Whiteboard
1.5	Population data as an aid toSocial, Economic and HealthPlanning	2	Lecture	PPT& Whiteboard
1.6	SimpleProblems	3	Chalk &Talk	BlackBoard
UNIT-2FERTILITYMEASUREMENTS				
2.1	RatesandRatios–Fertility–Factorsaffectingfertility	4	Chalk &Talk	BlackBoard
2.2	FertilityMeasures-CrudeBirthRate(CBR),General,SpecificandTotalFertilityRates	4	Discussion	PPT& Whiteboard
2.3	GrowthRates	3	Chalk &Talk	BlackBoard
2.4	Gross and Net ReproductionRates(GRR,NRR)-SimpleProblems.	4	Chalk &Talk	BlackBoard
Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
3.1	MortalityMeasures	5	Chalk &Talk	BlackBoard
3.2	Crude Death Rate (CDR), Age,Sex and Cause Specific DeathRates	5	Chalk &Talk	BlackBoard
3.3	StandardizedDeathRate,Infant MortalityRate,SimpleProblems	5	Chalk &Talk	BlackBoard
UNIT-4LIFETABLE				
4.1	LifeTable:Assumptions,DescriptionofvariouscolumnsofaLifetable andtheirrelationships	4	Chalk &Talk	BlackBoard
4.2	ConstructionofaLifetable	4	Chalk &Talk	BlackBoard

4.3	UsesofaLifetable	2	Chalk &Talk	BlackBoard
4.4	SimpleProblems	5	Chalk &Talk	BlackBoard
UNIT-5 MIGRATION				
5.1	FactorsaffectingMigration	3	Chalk &Talk	BlackBoard
5.2	GrossandNetMigrationRates	3	Chalk &Talk	BlackBoard
5.3	PopulationestimatesandProjection	2	Chalk &Talk	BlackBoard
5.4	Arithmetic,GeometricandExponentialGrowthRates	2	Chalk &Talk	BlackBoard
5.5	BasicideasofStationaryandStablepopulation	2	Chalk &Talk	BlackBoard
5.6	SimpleProblems	3	Chalk &Talk	BlackBoard

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% ofAssessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10%
K2	2	2	5	-	-	9	-	9	22.5%
K3	3	3	-	-	5	11	-	11	27.5%
K4	3	3	-	5	-	11	-	11	27.5%
NonScholastic	-	-	-	-	-		5	5	12.5%
Total	10	10	5	5	5	35	5	40	100%

CIA	
Scholastic	35

NonScholastic	**5**
	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATION PATTERN

COURSEOUTCOMES

On the successful completion of the course, students will be able to:

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Explain sources of demographic data.	K1&K2	PSO1&PSO2
CO2	Apply fertility measurements such as CBR,TFR,GRRandNRR	K1,K2&K3	PSO5
CO3	Compute mortality measures CDR,SDR and infant mortality rate	K2&K4	PSO5

CO4	Construct the demographic table	K1,K2&K3	PSO6
CO5	Explain the factors affecting migration and the basic ideas of Stationary and Stable population	K1,K2&K3	PSO6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Mrs.K.Bhuvaneswari**

ForwardedBy

Dr.E.Helena

III B.Sc STATISTICS

SEMESTER –V

For those who joined in 2019 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST5CC12	Real Analysis	Lecture	5	4

COURSE DESCRIPTION

This course introduces the basic concepts in analysis and to enable the students understand fundamental ideas and theorems in analysis.

COURSE OBJECTIVES

To enable the students understand the basic concepts of sequences and series, connectedness and compactness and proof techniques.

UNIT –I REAL VALUED FUNCTIONS AND REAL SEQUENCE (15 HRS.)

Real valuedfunctions **- equivalence - countability- real numbers–** (Self Study)– least upper bound- definition of sequence and subsequence – limit of a sequence.

UNIT –IICONVERGENT AND DIVERGENT SEQUENCES (20 HRS.)

Convergent sequences –divergent sequences-bounded sequences-monotone sequences-operations on convergent sequences- operations on divergent sequences- Cauchy sequences

UNIT –III SERIES OF REAL NUMBERS (20 HRS.)

Series- convergence and divergence of series – series with non-negative terms – alternating series- conditional convergence and absolute convergence- test for absolute convergence

UNIT –IV LIMITS AND METRIC SPACES (10 HRS.)

Limit of a function on the real line- metric spaces- limit in metric spaces

UNIT –V CONTINUOUS FUNCTIONS (10 HRS.)

Functions continuous on a metric space- functions continuous on the real line

TEXT:

Richard R. Goldberg, *Methods of Real Analysis***,** Oxford & IBH Publishing co. Pvt. Ltd.

REFERENCES:

1. S. Arumugam and A. Thangapandi Issac, *Modern Analysis*

2. Copson, *Metric spaces*, Universal book stall, New Delhi (1989).

3. Walter Rudin, *Mathematical Analysis*, MC-craw hill international, Third edition.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 REAL VALUED FUNCTIONS AND REAL SEQUENCES				
1.1	Real valued functions	1	Chalk & Talk	Black Board
1.2	Equivalence	1	Discussion	PPT & White board
1.3	Countability, real numbers	2	Discussion	PPT & White board
1.4	Least upper bound	2	Chalk & Talk	Black Board
1.5	Definition of sequence and subsequence	4	Chalk & Talk	Black Board
1.6	Limit of a sequence.	5	Chalk & Talk	Black Board
UNIT -2 CONVERGENT AND DIVERGENT SEQUENCES				
2.1	Convergent sequences	4	Chalk & Talk	Black Board
2.2	Divergent sequences	4	Chalk & Talk	Black Board
2.3	Bounded sequences-monotone sequences	4	Chalk & Talk	Black Board
2.4	Operations on convergent sequences	3	Chalk & Talk	Black Board
2.5	Operations on divergent sequences	3	Chalk & Talk	Black Board
2.6	Cauchy sequences.	2	Chalk & Talk	Black Board
UNIT -3 SERIES OF REAL NUMBERS				
3.1	Convergence and divergence of series	4	Chalk & Talk	Black Board
3.2	Series with non-negative terms	4	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.3	Alternating series	4	Chalk & Talk	Black Board
3.4	Conditional convergence and absolute convergence	4	Chalk & Talk	Black Board
3.5	Test for absolute convergence	4	Chalk & Talk	Black Board
UNIT -4 LIMITS AND METRIC SPACES				
4.1	Limit if a function on the real line-metric spaces	5	Chalk & Talk	Black Board
4.2	Limit in metric spaces	5	Chalk & Talk	Black Board
UNIT -5 CONTINUOUS FUNCTIONS				
5.1	Functions continuous on a metric space	5	Chalk & Talk	Black Board
5.2	Functions continuous on the real line.	5	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35

Non Scholastic	**5**
	40

- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are :**

  K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Describe fundamental ideas and theorems on sequences.	K1	PSO1& PSO2
CO 2	Distinguish convergent and divergent sequences	K2 & K4	PSO2
CO 3	Distinguish convergent and divergent series	K3 & K4	PSO3
CO 4	Explain the concept of limits and metric space and their roles in the real line	K1, K2 & K3	PSO3
CO 5	Organize theorems in a correct mathematical way	K2 & K4	PSO3

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	3	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	3	2	2
CO2	2	3	2	2
CO3	2	3	2	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Mrs. J. Annaal Mercy**
2. **Dr. K. Mano**

Forwarded By

Dr. E. Helena

III B.Sc. STATISTICS

SEMESTER V

For those who joined in 2019 onwards

Employability-100%

PROGRAMMECODE	COURSECODE	COURSETITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST5ME1	Computer Programming in C	Lecture	3	3

COURSEDESCRIPTION

This course provides skills in designing and writing simple programs in C.

COURSEOBJECTIVES

To enable the students to learn the basic concepts of data input, output, operators, expressions, control statements, arrays, handling of strings and user–defined functions to write C programs,

UNIT–I CFUNDAMENTALS,OPERATORSANDEXPRESSION (9 HRS.)

Character Set – C Tokens – Keywords and Identifiers – Constants –Variables– Datatypes–DeclarationofVariables–AssigningValuestoVariables– DefiningSymbolicConstants–Operators&Expressions:Introduction – **Arithmetic of operators – Relational operators – Logicaloperators–Assignmentoperators– Incrementanddecrementoperators –Conditionaloperator–Bitwiseoperators–Specialoperators–(**SelfStudy) – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Some computational problems – Type conversions in expressions–Operator precedence and associativity – Mathematical functions.

UNIT–II DATAINPUT,OUTPUT&CONTROLSTATEMENTS (9HRS.)

Reading a character–Writing a character–Formatted input – Formatted output-Decision Making and Branching: IF Statement – the IF ELSE statement – Nesting of IF..ELSE statements – The ELSE IF ladder – The switch statement - The ?: Operator – the GOTO statement – Decision Making and Looping: The WHILE statement– the DO statement – the FOR statement–Jumps in loops

UNIT–III ARRAYS **(9HRS.)**

OneDimensionalArray–TwoDimensionalArrays–InitializingTwoDimensionalArrays

UNIT–IV HANDLINGOFSTRINGS **(9HRS.)**

Handling of Character Strings: Declaring and Initializing StringVariables–ReadingStringfromTerminal–WritingStringstoScreen–Arithmetic Operations on Characters – Putting Strings together –Comparison of two Strings–String Handling Functions–Table of Strings

UNIT–V USER–DEFINEDFUNCTIONS **(9HRS.)**

NeedforUser-DefinedFunctions–AMulti-functionProgram–FormofCFunctions–ReturnValuesandtheirTypes– Calling a Function –Category of Functions – No Arguments and No Return Values – Arguments but No Return Values – Arguments with Return Values – Handling of Non-Integer Functions–Nesting of Functions–Recursion–Functions with Arrays-the scope and lifetime of variables in functions.

TEXT:

E.Balagurusamy-ProgramminginANSIC-TataMcGraw-HillPublishingCompanyLtd.– SixthEdition-2014

UNITI&II: Chapters: 2,3,4,5,6

UNITIII :Chapter: 7:Section7.1 –7.6

UNITIV : Chapter8

UNITV :Chapter: 9

REFERENCES:

1. Byron S. Gotfried - Theory and problems of programming with C(SchaumsSeries)Tata–McGrawHillsEdition-1991.

2. Kernighan&Brian.W-TheCprogramminglanguage,Prentice–HallofIndia,PrivateLimited,NewDelhi-1999.

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-1CFUNDAMENTALS,OPERATORSANDEXPRESSION				

1.1	CharacterSet–CTokens–KeywordsandIdentifiers	1	Lecture	PPT& Whiteboard
1.2	Constants–Variables–Datatypes–DeclarationofVariables –AssigningValuestoVariables	1	Chalk &Talk	BlackBoard
1.3	DefiningSymbolicConstants–Operators&Expressions	1	Lecture	PPT& Whiteboard
1.4	Arithmetic ofoperators–Relationaloperators–Logicaloperators–Assignmentoperators	2	Discussion	PPT& Whiteboard
1.5	Incrementanddecrementoperators–Conditionaloperator –Bitwiseoperators–Specialoperators	1	Discussion	PPT& Whiteboard
1.6	Typeconversionsinexpressions	1	Chalk &Talk	BlackBoard
1.7	Operatorprecedenceandassociativity –Mathematicalfunctions.	2	Lecture	PPT& Whiteboard
UNIT-2DATAINPUT,OUTPUT&CONTROLSTATEMENTS				
2.1	Readingacharacter–Writingacharacter–Formattedinput–Formattedoutput-DecisionMakingandBranching	2	Chalk &Talk	BlackBoard
2.2	IFStatement–theIFELSEstatement–NestingofIF..ELSEstatements–TheELSEIFladder	2	Chalk &Talk	BlackBoard
Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
2.3	DecisionMakingandLooping:TheWHILEstatement	3	Chalk &Talk	BlackBoard
2.4	theDOstatement–theFORstatement–Jumpsinloops	2	Chalk &Talk	BlackBoard
UNIT-3ARRAYS				
3.1	OneDimensionalArray	3	Chalk &Talk	BlackBoard

3.2	TwoDimensionalArrays	3	Chalk &Talk	BlackBoard
3.3	InitializingTwoDimensionalArrays	3	Chalk &Talk	BlackBoard
UNIT–4HANDLINGOFSTRINGS				
4.1	Declaring and Initializing StringVariables – Reading String fromTerminal	3	Chalk &Talk	BlackBoard
4.2	WritingStringstoScreen– ArithmeticOperationsonCharacters	2	Chalk &Talk	BlackBoard
4.3	PuttingStringstogether	1	Chalk &Talk	BlackBoard
4.4	Comparison oftwo Strings – StringHandlingFunctions	2	Chalk &Talk	BlackBoard
4.5	TableofStrings	1	Chalk &Talk	BlackBoard
UNIT-5USER–DEFINEDFUNCTIONS				
5.1	AMulti-functionProgram	1	Lecture	PPT& Whiteboard
5.2	FormofCFunctions	1	Lecture	PPT& White
Module No.	Topic	No.of Lectures	TeachingPedagogy	TeachingAids
				board
5.3	ReturnValuesandtheirTypes	2	Chalk &Talk	BlackBoard
5.4	CategoryofFunctions	2	Lecture	PPT& Whiteboard
5.5	HandlingofNon-IntegerFunctions– NestingofFunctions–	2	Chalk &Talk	BlackBoard
5.6	Functions with Arrays-thescopeandlifetimeofvariablesinfunctions.	1	Lecture	PPT& Whiteboard

Levels	C1	C2	C 3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% ofAssessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10%
K2	2	2	5	-	-	9	-	9	22.5%
K3	3	3	-	-	5	11	-	11	27.5%
K4	3	3	-	5	-	11	-	11	27.5%
NonScholastic	-	-	-	-	-		5	5	12.5%
Total	10	10	5	5	5	35	5	40	100%

CIA	
Scholastic	35
NonScholastic	5
	40

The levels of CIA Assessment based on Revised Bloom's Taxonomy are:

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSEOUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Explain various data types and operators in C	K1&K2	PSO1
CO2	Summarize Decision Making Branching, looping statements and arrays	K1,K2&K4	PSO3 &PSO 4
CO3	Categorize function, pointers and structures	K2,K3&K4	PSO4 &PSO 5
CO4	Describe Strings and String Handling Functions	K1,K2&K3	PSO4
CO5	Create C program for real life problems	K2&K4	PSO4 &PSO 6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.E.Helena**
2. **Mrs.B.VethamaryJacquline**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER V

Forthosewhojoinedin2019onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST5ME2	C Practical	Practical	2	2

1. To find the area of a square
2. To find the area of a circle
3. To find the area of a triangle
4. To find Simple interest
5. Solving Quadratic equations
6. Checking primes
7. Arranging numbers in ascending order
8. Reversing digits of a number
9. Finding the values of ncr, npr.
10. Palindrome
11. Matrix addition
12. Matrix multiplication
13. Transpose of a matrix
14. Trace of a matrix
15. Alphabeting names
16. Mean and Standard deviation
17. To find Correlation Coefficient
18. Straight line fitting by the method of least squares
19. To print nth Fibonacci number
20. To read a series of words from a terminal

III B.Sc STATISTICS

SEMESTER –V

For those who joined in 2021 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	22ST5ME3	Object Oriented Programming with C++	Lecture	3	3

COURSE DESCRIPTION

This course introduces the student to object-oriented programming through a study of the concepts of program specification and design, algorithm development.

COURSE OBJECTIVES

In the expanding field of computer education, one of the fastest growing, versatile and much sought after languages is C++. This course enables the students to understand the fundamentals of the language, the concepts related to the syntax of the language.

UNIT –I BEGINNING WITH C++, TOKENS, EXPRESSIONS AND CONTROL STRUCTURES, FUNCTIONS IN C++ (9 HRS.)

What is C++ - Applications of C++ - A simple C++ program – More C++ statements – Structure of C++ program – **Tokens – Keywords – Identifiers – Variables** – Operators – Manipulators – Expressions – **Control structures.** Introduction – The main function – **Function prototyping** – Call by reference – Return by reference – Return by reference – Inline function – Default arguments – Const arguments – Function overloading – Friend and virtual functions – Math library functions.

UNIT –II CLASSES AND OBJECTS (9 HRS.)

Introduction – C structures revisited – Specifying a class – Defining member functions – A C++ program with class – Making an outside function inline – Nesting of member functions – Private member functions – Arrays within a class – Memory allocation for objects – Static data members – Static member functions – Arrays of objects – Objects as function arguments – Friendly functions – Returning objects – Const member functions – Pointers to members – Local classes.

UNIT – III CONSTRUCTORS, DESTRUCTORS AND OPERATOR OVERLOADING(9 HRS.)

Introduction – Constructors and destructors - Defining operator overloading – Overloading unary operators - Overloading binary operators - Overloading binary operators using friends – Manipulation of strings using operators – Rules for overloading operators – Type conversions.

UNIT – IV INHERITANCE (9 HRS.)

Introduction – Defining derived classes – Single inheritance – Making a private member inheritable – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance – Virtual base classes – Abstract classes – Constructors in derived classes – Member classes: Nesting of classes.

UNIT –V POINTERS, VIRTUAL FUNCTIONS AND POLYMORPHISM

(9 HRS.)

Introduction – Pointers – Pointers to objects –this pointer – Pointers to derived classes – Virtual functions – Pure virtual functions – Polymorphism.

TEXT BOOK:

1. E. Balagurusamy - *Object Oriented Programming with C++*, Tata McGraw-Hill Publishing Company Limited – Fourth Edition - 2007.
   UNIT I : Chapter 2- 2.1 to 2.4, 2.6, Chapter 3- 3.2 to 3.24

   Chapters 4- 4.1 to 4.11

   UNIT II : Chapter 5- 5.1 to 5.19,

   UNIT III: Chapter 6-6.1 to 6.11 Chapter 7- 7.1 to 7.8,

   UNIT IV: Chapter 8-8.1 to 8.12

   UNIT V : Chapter 9- 9.1 to 9.7

REFERENCES:

1. Robert Lafore – Object-Oriented Programming in Microsoft C++ - Galgotia publication – Third Edition – 2004.
2. Stephen Prata - *C++* primer plus - Galgotia publication pvt. Ltd. – 1997.

3. **COURSE CONTENTS & LECTURE SCHEDULE:**
4.

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 BEGINNING WITH C++, TOKENS, EXPRESSIONS AND CONTROL STRUCTURES, FUNCTIONS IN C++				
1.1	What is C++, Applications of C++, A simple C++ program, More C++ statements, Structure of C++ program and example programs.	2	Chalk & Talk	Black Board
1.2	Tokens, Keywords, Identifiers, Variables, Operators, Manipulators Expressions, Control structures. (self study)	1	Discussion	Black Board
1.3	Introduction, The main function, Function prototyping (self study) Call by reference, Return by reference	4	Chalk & Talk	Black Board
1.4	Inline function, Default arguments, Const arguments and example programs.	1	Chalk & Talk	Black Board
1.5	Function overloading, Friend and virtual functions, library functions and example programs.	1	Chalk & Talk	Black Board
UNIT -2 CLASSES AND OBJECTS				
2.1	Introduction, C structures revisited , Specifying a class, Defining member functions	1	Chalk & Talk	Black Board
2.2	A C++ program with class , Making an outside function inline ,Nesting of member functions , Private member functions, programs	1	Chalk & Talk	Black Board
2.3	Arrays within a class, Memory allocation for objects, Static data members, Static member functions, programs.	3	Chalk & Talk	Black Board
2.4	Arrays of objects, Objects as function arguments, Friendly functions , Returning objects, programs.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.4	Const member functions , Pointers to members , Local classes, programs.	2	Chalk & Talk	Black Board
UNIT -3 CONSTRUCTORS, DESTRUCTORS AND OPERATOR OVERLOADING				
3.1	Introduction, Constructors and destructors, programs.	1	Chalk & Talk	Black Board
3.2	Defining operator overloading , Overloading unary operators , Overloading binary operators , Overloading binary operators using friends, programs	2	Chalk & Talk	Black Board
3.3	Manipulation of strings using operators , Rules for overloading operators, programs	4	Chalk & Talk	Black Board
3.4	Type conversions, programs	2	Chalk & Talk	Black Board
UNIT -4 INHERITANCE				
4.1	Introduction , Defining derived classes and programs.	1	Chalk & Talk	Black Board
4.2	Single inheritance , Making a private member inheritable , Multilevel inheritance and programs	4	Chalk & Talk	Black Board
4.3	Multiple inheritance , Hierarchical inheritance , Hybrid inheritance and programs	2	Chalk & Talk	Black Board
4.4	Virtual base classes , Abstract classes, Constructors in derived classes, Member classes: Nesting of classes and programs.	2	Chalk & Talk	Black Board
UNIT -5 POINTERS, VIRTUAL FUNCTIONS AND POLYMORPHISM				
5.1	Introduction , Pointers , Pointers to objects and programs.	2	Chalk & Talk	Black Board
5.2	this pointer , Pointers to derived classes and programs.	3	Chalk & Talk	Black Board
5.3	Virtual functions , Pure virtual functions and programs.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.4	Polymorphism and programs.	2	Chalk & Talk	Black Board

evels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non cholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are :**

  K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Define the features of C++ supporting object oriented programming	K1	PSO1
CO 2	Describe classes and objects	K1, K2	PSO2
CO 3	Distinguish Constructors and Destructors and Explain overloading concepts	K1 & K3	PSO4
CO 4	Classify Inheritance in C++	K1, K2, K3	PSO4
CO 5	Design C++ programs for real life situations	K2 & K4	PSO5

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	2	3	2	2	2
CO3	2	2	2	3	2
CO4	2	2	2	3	2
CO5	2	2	2	2	3

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2

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

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr. E. Helena**
2. **Mrs. J. Annaal Mercy**

Forwarded By

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER V

Forthosewhojoinedin2021onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	22ST5ME4	C++ Practicals	Practical	2	2

1. To find the area of a square
2. To find the area of a circle
3. To find the area of a triangle
4. To find Simple interest
5. Solving Quadratic equations
6. Checking primes
7. Arranging numbers in ascending order
8. Reversing digits of a number
9. Finding the values of ncr, npr.
10. Palindrome
11. Matrix addition

12. Matrix multiplication
13. Transpose of a matrix
14. Trace of a matrix
15. Alphabeting names
16. Mean and Standard deviation
17. To find Correlation Coefficient
18. Straight line fitting by the method of least squares
19. To print nth Fibonacci number
20. To read a series of words from a terminal

III B.Sc STATISTICS

SEMESTER –V

(For those who joined in 2021 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST5SB3	Practical Statistics - II	Lecture & Practical	2	2

COURSE DESCRIPTION

The course provides an application based on Sampling theory, MLEs, Analysis of time series and index numbers

COURSE OBJECTIVES

To expose the students to the analysis of statistical techniques in real life situations.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

CO1. Analyze the problems based on confidence interval for proportions, mean, variances and correlation coefficient.

CO2. Apply and interpret the methods of curve fitting and time series.

CO3. Analyze the problem based on sampling.

1. Simple random sampling with & without replacement.
2. Comparison of simple and stratified with systematic sampling method
3. Ratio Method
4. Regression estimator method

5. Confidence interval for proportions means and variances based on Normal distribution.
6. Confidence intervals for means, variances, correlation coefficient
7. Problems based on MLEs.
8. Fitting of a straight line, second degree and Parabola, exponential
9. Analysis of Time Series
10. Index Numbers - Chain index numbers-consumer price index numbers

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

EVALUATION PATTERN

UG CIA Components

The levels of CIA

C1	-	Test (CIA 1)	-	10 Mks
C2	-	Test (CIA 2)	-	10 Mks
C3	-	Assignment	-	5 Mks
C4	-	Open Book Test/PPT	-	5 Mks
C5	-	Quiz	-	5 Mks
C6	-	Attendance	-	5 Mks

Assessment based on Revised Bloom's Taxonomy are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Analyze the problems based on confidence interval for proportions, mean, variances and correlation coefficient	K1	PSO1& PSO2
CO 2	Apply and interpret the methods of curve fitting and time series.	K1, K2	PSO5 & PSO6
CO3	Analyze the problem based on sampling.	K3	PSO4 & PSO5

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	3	3
CO2	3	3	2	2
CO3	3	2	2	3
CO4	1	3	2	3

CO5	**2**	**2**	**1**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Mrs.K.Bhuvaneswar**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER V

Forthosewhojoinedin2019onwards

Employability-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	**19ST5SB4**	**Statistical software – SPSS**	**Practical**	**2**	**2**

COURSEDESCRIPTION

The course is introduced to learn a programming language which helps to handle all aspects of data analysis using statistical software SPSS.

COURSEOBJECTIVES

To expose the students on the applications of statistical analysis using SPSS

1. Diagrammatic Representation Bar Chart, Pie Diagram
2. Construction of Discrete and Continuous Frequency Tables from raw data
3. Graphical Representation-Histogram, Box-Whiskers plot
4. Descriptive Statistics
5. Simple correlation, Rank correlation,
6. Regression Fitting of Poisson distribution
7. Fitting of Normal distribution
8. Parametric tests–Means, Variances and Proportions
9. Chi–square test for goodness of fit

10. Chi–square test for independence samples

11.Non-ParametrictestsSigntest,Wilcoxontest,Mann-WhitneyUtest,Mediantest,Runtest,KolmogorovSmirnovonesampletest,KruskalWallis

12. ANOVA–oneway and twoway

13. Design of Experiment–CRD,RBD,LSD
Factorial Experiment- experiments with total and partial confounding.

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% ofAssessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10%
K2	2	2	5	-	-	9	-	9	22.5%
K3	3	3	-	-	5	11	-	11	27.5%
K4	3	3	-	5	-	11	-	11	27.5%
NonScholastic	-	-	-	-	-		5	5	12.5%
Total	10	10	5	5	5	35	5	40	100%

CIA	
Scholastic	35
NonScholastic	5
	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	**Understand how to start SPSS and record variables and prepare data for analysis**	K1&K4	PSO1 &PSO2
CO2	Conduct descriptive and basic inferential statistics	K2&K3	PSO3 &PSO4
CO3	Understand the fitness of continuous and discrete distributions	K2&K4	PSO2 &PSO4
CO4	Able to conduct parametric and non-parametric tests	K3&K4	PSO3 &PSO4
CO3	Carry out statistical analysis that can test hypothesis and analyze factorial experiments.	K2&K3	PSO5 &PSO6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2

CO3	**1**	**3**	**2**	**3**
CO4	**1**	**3**	**2**	**3**
CO5	**2**	**2**	**1**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Mrs.K.Bhuvaneswari**
2. **Ms. K. Saranya**

Forwarded

By

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER VI

Forthosewhojoinedin2019onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	**19ST6CC13**	**Statistical Quality Control**	**Lecture**	**5**	**4**

COURSEDESCRIPTION

This course is designed to introduce students to statistical quality control emphasizing those aspects which are relevant for SQC spractical implementation

COURSEOBJECTIVES

TointroducethestudentsthebasicsofStatisticalQualityControlandtoenable themdescribequalitycharacteristicsandrelationships

UNIT–1 STATISTICALQUALITYCONTROL (15HRS.)

Basis of Statistical Quality Control - Definition – Benefits – Process

control and Product control-Control Limits, Specification Limits and tolerance Limits – Control Charts – Control Limits – **Tools for Statistical Quality Control–(**Self Study)- application of theory of runs in quality control.

UNIT–II CONTROLCHARTFORVARIABLES (15HRS.)

Control chart for variables – The General theory of Control Chart – **Definition of Control Chart–Learning Outcomes of the Control Charts –(**Self Study)-$\bar{X}$ and R Charts–Control limits for$\bar{X}$Chart–Control limits for R Chart - Interpretation of control charts X and R. - chart – Basis ofsubgrouping-plottingXandRresults-determiningthetrialcontrollimits

UNIT–III CONTROLCHARTFORATTRIBUTES (15HRS.)

Control chart for attributes–Control chart for fraction defective (p-chart) – Control chart for number of defectives (d-chart) – Interpretation of p chart –Control chart for number of defects per unit (c-chart) – c- charts for variable sample size– Applications of c-chart

UNIT–IVSAMPLINGPLANS (15HRS.)

Acceptanceofsamplingplansforattributes-Producer'sriskandconsumer's risk - concepts of AQL, LTPD, AOQ, AOQL, ATI and ASN – single and double sampling plans - OC, AOQ, ATI curves for single - OC, ASN, ATI curves for Double sampling plans. – Single sampling vs Double sampling plans–Sequential sampling plan.

UNIT–V RELIABILITY (15HRS.)

Reliability: Definition of reliability – Basic elements of reliability –Bath tub curve-Achievement of reliability–Designing for reliability –measurement an of reliability– cost of reliability - maintenance andreliability–MTBF—MTTR–Hazardanalysis–MTTF–qualityandreliability

– Reliability of series, parallel and mixed systems.

TEXTBOOKS:

1. V.K.Kapoor,andS.P.Gupta,*Fundamentalsofappli*

edstatistics,SultanChandandsons(1978).

2. M.Mahajan, Statistical Quality Control(2005).

REFERENCEBOOKS:

1. E.L.Grant,andR.S.LavenWorth,*StatisticalQualityControl*,McGrawHill.

2. R.C.Gupta, *Statistical Quality Control*(1974).

3. D.C.Montgomery,*IntroductiontoStatisticalQualityControl*,JohnWaley&Sons(1983).

4. S.K.Ekambaram,*Statistical basis ofAcceptance sampling*,AsiaPublishingHouse(1963).

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	TeachingPedagogy	Teachinds
UNIT-1STATISTICALQUALITYCONTROL				
1.1	Basis of Statistical Quality Control	2	Lecture	PPT& Whitel oard
1.2	Process control and Product control	3	Lecture	PPT& Whitel oard
1.3	Control Limits, Specification Limits and tolerance Limits	3	Lecture	PPT& Whitel oard
1.4	Control Charts–Control Limits	3	Chalk &Talk	Black rd
1.5	Tools for Statistical Quality Control	2	Discussion	PPT& Whitel oard
1.6	Application of theory of runs in quality	2	Chalk &Talk	Black rd
UNIT-2CONTROLCHARTFORVARIABLES				
2.1	Control chart for variables	2	Chalk &Talk	Black rd

2.2	TheGeneraltheoryofControlChart–DefinitionofControlChart–LearningOutcome‟softheControlCharts	4	Discussion	PPT&Whitelboard
2.3	$\bar{X}$ and R Charts, Control limits for $\bar{X}$Chart	3	Chalk &Talk	Blackrd
2.4	Control limits for R Chart	3	Chalk &Talk	Blackrd
2.5	Interpretation of control charts X and R.- chart–Basis of subgrouping-plotting X and R results	3	Chalk &Talk	Blackrd
UNIT-3CONTROLCHARTFORATTRIBUTES				
3.1	Control chart for attributes – Control chart for fraction defective(p-chart)	3	Chalk &Talk	Blackrd
3.2	Control chart for number of defectives(d-chart)	3	Chalk &Talk	Blackrd
3.3	Interpretation of p chart	3	Chalk &Talk	Blackrd
3.4	Control chart for number of defects per unit(c-chart)	3	Chalk &Talk	Blackrd
3.5	Charts for variable sample size	3	Chalk &Talk	Blackrd
UNIT-4SAMPLINGPLANS				
4.1	Acceptance of sampling plans for attributes	4	Chalk &Talk	Blackrd
4.2	Producer's risk and consumer's risk	3	Chalk &Talk	Blackrd
4.3	Concepts of AQL, LTPD, AOQ, AOQL ,ATI and ASN	4	Chalk &Talk	Blackrd
4.4	Single and double sampling plans, Double sampling plans	4	Chalk &Talk	Blackrd
UNIT-5RELIABILITY				

5.1	Definition–Bath tub curve – Achievement of reliability	3	Chalk &Talk	Black rd
5.2	Designingforreliability– measurementanofreliability– costofreliability	4	Chalk &Talk	Black rd
5.3	Maintenance and reliability–MTBF—MTTR–Hazard analysis–MTTF	4	Chalk &Talk	Black rd
5.4	Quality and reliability–Reliability of series, parallel and mixed systems.	4	Chalk &Talk	Black rd

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% ofAssessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10%
K2	2	2	5	-	-	9	-	9	22.5%
K3	3	3	-	-	5	11	-	11	27.5%
K4	3	3	-	5	-	11	-	11	27.5%
NonScholastic	-	-	-	-	-		5	5	12.5%
Total	10	10	5	5	5	35	5	40	100%

CIA	
Scholastic	35
NonScholastic	5
	40

✓ ThelevelsofCIAAssessmentbasedonRevisedBl

oom'sTaxonomyare:

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSEOUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADRESSEI
CO1	Describe the use of control charts	K1	PSO1&PS 2
CO2	Demonstrate the abilityto design,use and interpret control charts forvariables.	K2	PSO4
CO3	Identify the difference between $\bar{X}$,R, p,npandCcharts.	K1&K3	PSO2 &PSC 5
CO4	Explain the process of acceptance sampling and describe the use of OCcurve.	K1,K2&K3	PSO5
CO5	Make use of the concept of Reliability and examine its uses in problems of quality	K3&K4	PSO5 &PSC 6

	andcost.		

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Mrs.K.Bhuvaneswari**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER –VI

For those who joined in 2019 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST6CC14	Stochastic Processes	Lecture	5	4

COURSE DESCRIPTION

This course covers Markov chains in discrete time, the Poisson process and the Markov processes in continuous time

COURSE OBJECTIVES

To expose the students to the basics of stochastic process and to clarify Markov chain, Poisson process and pure birth

UNIT –I STOCHASTIC PROCESSES (15 HRS.)

Definition of stochastic process, classification of stochastic process according to time parameter space and state space - examples of stochastic process. Concept of Stationary and independent increment process

UNIT –II MARKOV CHAIN (15 HRS.)

Markov chain – definitions and examples – higher transition probabilities – Chapman – Kolmogorov equations (discrete) - simple problems only.

UNIT – III MARKOV CHAIN CONT. (15 HRS.)

Generalization of independent Bernoulli trails: Sequence of chain – Dependent trails – Correlated random walk – Classification of states and chain – Transient and persistent States

UNIT –IV POISSON PROCESS (15 HRS.)

. **Poisson Process – (**Self Study) – Postulates – Properties – Related distributions – exponential, uniform, geometric and **negative binomial distributions – (**Self Study).

UNIT –V BIRTH AND DEATH PROCESS (15 HRS.)

Pure Birth Process – Yule-Fury process – Birth and Death Process – Immigration - Emigration processes

TEXT BOOKS:

1. J. Medhi, *Stochastic Process*, New age International, $4^{t}{}_{h}$ edition (2009).
2. T. Veerarajan, *Probability, Statistics and Random Processes*, Second edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi (2003).

REFERENCE BOOKS:

1. W. Feller, *Introduction to Probability Theory and its Applications*, Volume I, Wiley Eastern Ltd, New York (1972).
2. S. Karlin and H.M.Taylor, *A Fist course in Stochastic Processes*, Academic Press, New York (1975).
3. S.M. Ross, *Stochastic Processes*, John Wiley and Sons, New York (1983).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 STOCHASTIC PROCESS				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.1	Definition of stochastic process	3	Lecture	PPT & White board
1.2	Classification of stochastic process according to time parameter space and state space-	4	Chalk & Talk	Black Board
1.3	Examples of stochastic process	4	Chalk & Talk	Black Board
1.4	Concept of Stationary and independent increment process.	4	Chalk & Talk	Black Board
UNIT -2 MARKOV CHAIN				
2.1	Markov chain	3	Chalk & Talk	Black Board
2.2	Higher transition probabilities	4	Chalk & Talk	Black Board
2.3	Chapman – Kolmogorov equations	4	Chalk & Talk	Black Board
2.4	Simple problems	4	Chalk & Talk	Black Board
UNIT -3				
3.1	Generalization of independent Bernoulli trails: Sequence of chain	4	Chalk & Talk	Black Board
3.2	Dependent trails – Correlated random walk–	4	Chalk & Talk	Black Board
3.3	Classification of states and chain	4	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.4	Transient and persistent States	3	Chalk & Talk	Black Board
UNIT -4 POISSON PROCESS				
4.1	Poisson Process– Postulates	3	Chalk & Talk	Black Board
4.2	Properties – Related distributions	5	Chalk & Talk	Black Board
4.3	Exponential, uniform, geometric and negative binomial distribution	7	Discussion	PPT & White Board
UNIT -5 BIRTH AND DEATH PROCESS				
5.1	Pure Birth Process	3	Discussion	PPT & White Board
5.2	Yule-Fury process	4	Chalk & Talk	Black Board
5.3	Birth and Death Process	4	Chalk & Talk	Black Board
5.4	Immigration - Emigration processes	4	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% Ass me
	T1	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	

	10 Mks.								
K1	**2**	**2**	**-**	**-**	**-**	**4**	**-**	**4**	10
K2	**2**	**2**	**5**	**-**	**-**	**9**	**-**	**9**	22.5
K3	**3**	**3**	**-**	**-**	**5**	**11**	**-**	**11**	27.5
K4	**3**	**3**	**-**	**5**	**-**	**11**	**-**	**11**	27.5
Non Scholastic	**-**	**-**	**-**	**-**	**-**		**5**	**5**	12.5
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are :**

  K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse

EVALUATION PATTERN

	SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Explain the concept of stochastic proc and stationary and appreciate significance	K1 & K2	PSO1& PSO2
CO 2	Compute probabilities of transition between states and identify classes of states in Markov chains and characterize the classes	K1, K2 & K3	PSO3
CO 3	Generalization of independent Bernoulli trails	K1 & K2	PSO5
CO 4	Explain Poisson process and its related distributions	K2 & K4	PSO5 & PSO6
CO 5	Demonstrate the knowledge in Pure and Death process	K1 & K2	PSO5

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	2	3	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	3	2
CO5	2	2	2	2	3	3

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	2	1
CO2	2	3	2	2
CO3	2	2	3	3
CO4	2	2	2	3
CO5	3	2	2	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr. M. Mano Prabha**
2. **Mrs. K. Bhuvaneswari**

Forwarded By

Dr. E. Helena

III B.Sc.STATISTICS
SEMESTER VI
Forthosewhojoinedin2019onwards

Entrepreneurship-60% &Employability-40%

PROGRAMMECODE	COURSECODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST6CC15	Actuarialstatistics	Lecture	5	5

COURSEDESCRIPTION

The course covers the applications of insurance and finance.

COURSEOBJECTIVES

The Actuarial statistics curriculum aims at providing the academics and professional training to students who wish to join the actuarial profession

UNIT–I SIMPLE&COMPOUNDINTEREST (15HRS.)

Elements of simple & compound interest – nominal rate of interesti(m)andeffectiverateofinteresti–Forceofinterestδ-relationshipbetweendifferent rates of interest- expression for δ by use of calculus – relationship between nominal and effective rates of interest - present value – varying rates of interest – equation of value – equated time – **simple discount –discount &discounted value–(**Self Study**).**

UNIT–II ANNUITIES (15HRS.)

Annuities – immediate annuity – annuity due – perpetuity - deferredannuities-presentvalues,accumulatedamountsofannuities. Increasinganddecreasingannuities.

UNIT–III REDEMPTIONOFLOANS (15HRS.)

RedemptionofLoans – Amortization and Sinking Funds - AverageYieldofinterestontheLifeFundofaninsuranceoffice.SimpleProblems

UNIT–IV PREMIUM (15HRS.)

Premiums;generalprinciples,naturalpremiums,office&netpremiums,loadingforexpenseswithandwithoutprofitpremiums,adequacyofpremiums,relativeconsistency.SimpleProblems.

UNIT–V POLICYVALUES (15HRS.)

Policyvalues-etrospectiveandprospectivepolicies;Surplus–sourcesofsurplus,distributionofsurplus.

TEXTBOOKS:

1. Dixit,S.P.,Modi,C.S.,Joshi,R.V.(2000):Mathematical BasisoflifeAssurance,IC-81(PublishedbyInsuranceInstituteofIndia,Bombay-400001).
2. Frank Ayers, J.R. (1983): Theory and problems of mathematics offinance,Schaum"soutlineseries,McGraw-Hillbookcompany,Singapore.

REFERENCEBOOKS:

1. Donald,D.W.A.(1975):CompoundInterestandAnnuitiescertain,Heinemann,London
2. Zima,P.andBrown,R.L.(2005):Theoryandproblemsofmathematicsoffinance,2ndedition,TataMcGraw-Hill.

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-1SIMPLE&COMPOUNDINTEREST				

1.1	Elements of simple & compoundinterest	1	Chalk &Talk	BlackBoard
1.2	nominalrateofinteresti(m)andeffectiverateofinteresti	2	Chalk &Talk	BlackBoard
1.3	Forceofinterestδ	1	Lecture	PPT& White board
1.4	relationshipbetweendifferentratesofinterest	2	Chalk &Talk	BlackBoard
1.5	expressionforδbyuseofcalculus	2	Chalk &Talk	BlackBoard
1.6	relationshipbetweennominalandeffectiveratesofinterest	2	Lecture	PPT& White board
1.7	presentvalue,varyingratesofinterest	2	Chalk &Talk	BlackBoard
1.8	equationofvalue,equatedtime	2	Chalk &Talk	BlackBoard
1.9	simplediscount,discount&discountedvalue	1	Discussion	PPT& White board
UNIT-2ANNUITIES				
2.1	Annuities,immediateannuity,annuitydue	4	Lecture	PPT& White board
2.2	Perpetuity,deferredannuities	3	Lecture	PPT& White board
2.3	Presentvalues,accumulated amountsofannuities	4	Lecture	PPT& White board
2.4	Increasinganddecreasingannuities	4	Lecture	PPT& White board
UNIT-3REDEMPTIONOFLOANS				

3.1	RedemptionofLoans	3	Chalk &Talk	BlackBoard
3.2	AmortizationandSinkingFunds	3	Chalk &Talk	BlackBoard
3.3	Average yieldof intereston theLifeFundofaninsuranceoffice	4	Chalk &Talk	BlackBoard
3.4	SimpleProblems	5	Chalk &Talk	BlackBoard
UNIT-4 PREMIUM				
4.1	Premiums;generalprinciples,naturalpremiums	3	Lecture	PPT& White board
4.2	Officeandnetpremiums	2	Lecture	PPT& White board
4.3	Loadingforexpenseswithandwithoutprofitpremiums	3	Lecture	PPT& White board
4.4	Adequacyofpremiums,relativeconsistency	2	Chalk &Talk	BlackBoard
4.5	SimpleProblems.	5	Chalk &Talk	BlackBoard
UNIT-5POLICYVALUES				
5.1	Retrospectiveandprospectivepolicies	4	Lecture	PPT& White board
5.2	Surplus	3	Lecture	PPT& Whiteboard
5.3	Sourcesofsurplus	4	Lecture	PPT& Whiteboard
5.4	Distributionofsurplus.	4	Lecture	PPT& Whiteboard

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	of ss
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	1(
K2	2	2	5	-	-	9	-	9	22
K3	3	3	-	-	5	11	-	11	27
K4	3	3	-	5	-	11	-	11	27
NonScholastic	-	-	-	-	-		5	5	12
Total	10	10	5	5	5	35	5	40	10

CIA	
Scholastic	**35**
NonScholastic	**5**
	40

- **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC	NON-SCHOLASTIC	MARKS

C1	C2	C 3	C 4	C 5	C 6	CI A	ES E	Total
10	10	5	5	5	5	40	60	100

COURSEOUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADRESSED
CO1	Calculate quantities such as SI &CI, nominal and effective rates of interest and simple discount	K1&K2	PSO1&PS
CO2	Recognize simple assurance and annuities contracts and develop formulae for the present value of payments	K1,K2&K3	PSO3
CO3	Explain the concepts of redemption of loans	K1&K3	PSO5
CO4	Construct the demographic statistics and premiums	K3&K4	PSO5
CO5	Describe the policy values and its types	K2&K4	PSO6

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. Ms.D.K.PonOvya

Forwarded By

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER VI

For those who joined in 2019 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CR ITS
USST	19ST6ME5	Numerical Methods	Lecture	5	

Difference operators– Other difference operators-Relationbetweentheoperators–

COURSEDESCRIPTION

This course enables the students to solve equations using various Numerical Methods

COURSEOBJECTIVES

To enable the students to solve Algebraic, Transcendental, DifferentialEquationsusingvariousNumericalmethodslikeBisection,Runge-Kutta,EulerandTaylor

UNIT–I ALGEBRAICANDTRANSCENDENTALEQUATIONS (15HRS.)

Introduction-Bisectionmethod-Iteration method – Regula-falsimethod–Newton-Raphsonmethod.(Noderivations).

UNIT–II SIMULTANEOUSLINEARALGEBRAICEQUATIONS (15HRS.)

Introduction- – Gauss Elimination method – Gauss Jordan method –Calculation of inverse of a matrix – Gauss Jacobi Iteration method – Gauss-Seideliterationmethod.(Noderivations).

UNIT–III FINITEDIFFERENCES&INTERPOLATION (15HRS.)

(SelfStudy)-Newton‟sforwardInterpolationformula-**Newton'sbackwardInterpolationformula –(**Self Study) –GaussforwardInterpolationformula-**GaussbackwardInterpolationformula–(**Self Study) –Stirling‟s formula - Lagrange‟s interpolation formula – Divideddifference Newton‟s Divided difference formula – Inverse interpolation.(Noderivations)

UNIT–IV NUMERICALDIFFERENTIATIONANDINTEGRATION (15HRS.)

DerivativesusingNewton‟s forward difference formula-DerivativesusingNewton‟sbackwarddifferenceformula-DerivativesusingCentraldifferenceformula-Maximaandminimaoftheinterpolatingpolynomial-NumericalIntegration–TrapezoidalRule–Simpson‟sonethirdrule.(Noderivations

UNIT–V NUMERICALSOLUTIONOFDIFFERENTIALEQUATION (15HRS.)

Taylorseriesmethod–Picard‟smethod–Euler‟smethod–ModifiedEuler‟s method- Runge -Kuttamethods –Second order Runge-Kutta method-HigherorderRunge-KuttamethodPredictor-Correctorformulae-Milne‟sPredictor-Correctorformulae-Adam‟sPredictor-Correctorequations.(Noderivations

TEXTBOOK:

M.K.Venkataraman,*NumericalMethodsinScienceand Engineering*,TheNationalpublishingcompany,fifthedition.

REFERENCES:

1. S.Arumugam, ThangapandiIsaac and A. Soma Sundaram, *NumericalAnalysis*,NewGammaPublishingHouse(2007).
2. S.S.Sastry,*IntroductoryMethodsofNumericalanalysis*,PrenticeHallofIndiaPrivateLimited(1991)

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-1ALGEBRAICANDTRANSCENDENTALEQUATIONS				
1.1	Bisectionmethod	3	Chalk &Talk	BlackBoard

1.2	Iterationmethod	4	Chalk &Talk	BlackBoard
1.3	Regula-falsimethod	4	Chalk &Talk	BlackBoard
1.4	Newton-Raphsonmethod	4	Chalk &Talk	BlackBoard
UNIT-2 SIMULTANEOUSLINEARALGEBRAICEQUATIONS				
2.1	GaussEliminationmethod	3	Chalk &Talk	BlackBoard
2.2	GaussJordan method	3	Chalk &Talk	BlackBoard
2.3	Calculationofinverseofamatrix	3	Chalk &Talk	BlackBoard
2.4	GaussJacobiIterationmethod	3	Chalk &Talk	BlackBoard
2.5	Gauss-Seideliterationmethod	3	Chalk &Talk	BlackBoard
UNIT-3FINITEDIFFERENCES&INTERPOLATION				
3.1	Differenceoperators	1	Chalk&Talk	BlackBoard
3.2	Newton‟sforwardInterpolationformulaandNewton‟sbackwardInterpolationformula	3	Chalk &Talk	BlackBoard
3.3	GaussforwardInterpolationformulaandGaussbackward	3	Chalk &Talk	BlackBoard
	Interpolationformula			
3.4	Stirling‟sformula	3	Chalk &Talk	BlackBoard
3.5	Lagrange‟sinterpolationformulaDivideddifference	2	Chalk &Talk	BlackBoard
3.6	Newton‟sDivideddifferenceformula–Inverseinterpolation	3	Chalk &Talk	BlackBoard
UNIT -4 NUMERICAL DIFFERENTIATION AND INTEGRATION				

4.1	DerivativesusingNewton‟sforward difference formula-DerivativesusingNewton‟sbackwarddifferenceformula	4	Chalk &Talk	BlackBoard
4.2	Derivatives using Centraldifferenceformula	3	Chalk &Talk	BlackBoard
4.3	Maximaandminimaoftheinterpolatingpolynomial	3	Chalk &Talk	BlackBoard
4.4	NumericalIntegration:TrapezoidalRule	2	Chalk &Talk	BlackBoard
4.5	Simpson‟sonethirdrule	3	Chalk &Talk	BlackBoard
UNIT-5NUMERICALSOLUTIONOFDIFFERENTIALEQUATION				
5.1	Taylorseriesmethod	2	Chalk &Talk	BlackBoard
5.2	Picard‟smethod–Euler‟smethod	2	Chalk &Talk	BlackBoard
5.3	ModifiedEuler‟smethod-Runge-Kuttamethods	2	Chalk &Talk	BlackBoard
5.4	SecondorderRunge-Kuttamethod-HigherorderRunge-KuttamethodPredictor-	3	Chalk &Talk	BlackBoard
5.5	Correctorformulae-Milne‟sPredictor	3	Chalk &Talk	BlackBoard
5.6	Correctorformulae-Adam‟sPredictor	3	Chalk &Talk	BlackBoard

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% Assesment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	0%
K2	2	2	5	-	-	9	-	9	.5%

K3	**3**	**3**	**-**	**-**	**5**	**11**	**-**	**11**	.5%
K4	**3**	**3**	**-**	**5**	**-**	**11**	**-**	**11**	.5%
NonScholastic	**-**	**-**	**-**	**-**	**-**		**5**	**5**	.5%
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	0%

CIA	
Scholastic	**35**
NonScholastic	**5**
	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				**NON-SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	**COURSEOUTCOMES**	**KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)**	**PSOsADDRESSED**
	Solve algebraic and transcendental		PSO1&PSO2

CO1	equations using various methods	K1&K2	
CO2	Identify the various methods of solving simultaneous linear algebraic equations	K1,K2&K3	PSO3
CO3	Recognize difference operators and apply the concept of interpolation.	K1&K3	PSO4
CO4	Compute the values of the derivatives at some point using numerical differentiation and integration.	K3&K4	PSO3
CO5	Compute numerical solution of differential equation	K3&K4	PSO3

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Mrs.R.Rajeswari**
2. **Mrs.R.JenoviRosaryDeepa**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS
SEMESTER VI

Forthosewhojoinedin2019onwards

Skill Development-100%

PROGRAMMECODE	COURSECODE	COURSETITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST6ME6	Multivariate Analysis	Lecture	5	5

COURSEDESCRIPTION

The course covers multivariate normal distribution, hotelling T^2 statistics, multivariate classification and discrimination analysis, principal components and cluster analysis.

COURSEOBJECTIVES

Toderivestatisticalinferencebasedonmultivariatestatisticalanalysis.

UNIT–I MULTIVARIATENORMALDISTRIBUTION (15HRS.)

Multivariatenormaldistributionanditsproperties-**MaximumLikelihoodEstimatorsof parameters, distribution of sample meanvector–(**SelfStudy),sampledispersionmatrix.

UNIT–IIPARTIALANDMULTIPLECORRELATIONCOEFFICIENTS(15HRS.)

Partialandmultiplecorrelationcoefficients-Nulldistribution-Applicationintesting.Null distribution of Hotelling‟s T2 statistics.Applicationintestsonmeanvectorforoneandmoremultivariatenormalpopulationsandalsoonequalityofthecomponentsofameanvectorinamultivariatenormalpopulation

UNIT–III CLASSIFICATIONANDDISCRIMINATION (15HRS.)

Classificationanddiscriminationproceduresfordiscriminationbetweentwomultivariatenormalpopulations– LinearDiscriminantfunction,MahalanobisDistance,testsassociatedwithDiscriminant functions, probabilities of misclassification and their estimation,classificationintomorethantwomultivariatenormalpopulations.

UNIT–IV PRINCIPALCOMPONENTANALYSIS (15HRS.)

PrincipalcomponentAnalysis,Canonicalvariablesandcanonicalcorrelation, clustering-similarity measures- hierarchical algorithms- SingleLinkage,Non-hierarchicalClustering

UNIT–V CONTINGENCYTABLES (15HRS.)

ContingencyTables,CorrespondenceAnalysisforTwo DimensionContingencyTable.

TEXT:

1. T.W.Anderson,*AnIntroductionToMultivariateStatistical Analysis*,2ndEditionWiley(1983).
2. R.JohnsonandWichern*AppliedMultivariateStatisticalAnalysis*,Pearson,6thedition(2008).

REFERENCES:

1. Brain S. Everitt and Graham Dunn, *AppliedMultivariateDataAnalysis*,2ndEdition(2001)
2. NeilH.Timm,*AppliedMultivariateAnalysis*,Springer(2002).
3. VerlagDallasE.Johnson,*AppliedMultivariateMethodsFo*

rDataAnalysts,DuxburyPress(1998).

4. William.R.DillonandMathewGoldstein*MultivariateAna lysisMethodsandApplications*,JohnWeily(1984).

COURSECONTENTS&LECTURESCHEDULE:

Modul eNo.	Topic	No.ofLe ctures	Teaching Pedagogy	Teaching Aids
UNIT-1 MULTIVARIATENORMALDISTRIBUTION				
1.1	Multivariatenormaldistributionandi tsproperties	4	Lecture	PPT& White board
1.2	MaximumLikelihood Estimatorsofparameters	6	Discussion	PPT& White board
1.3	Distribution of sample meanvector,sampled ispersionmatrix	5	Chalk &Talk	BlackBo ard
UNIT-2PARTIALANDMULTIPLECORRELATIONCOEFFICIENTS				
2.1	Partialandmultiplecorrelationcoeffic ients-Nulldistribution	4	Chalk &Talk	BlackBo ard
2.2	Application in testing ofHotelling‟sT2stati stics	4	Chalk &Talk	BlackBo ard
2.3	Applicationintests on meanvectorforoneandmoremultivariat enormalpopulations	4	Chalk &Talk	BlackBo ard
2.4	equalityofthecomponentsofameanvect orinamultivariatenormalpopulation	3	Chalk &Talk	BlackBo ard
UNIT-3CLASSIFICATIONANDDISCRIMINATION				
3.1	Classificationanddiscriminationproce duresfordiscriminationbetweentwomu ltivariatenormalpopulations	5	Chalk &Talk	BlackBo ard

3.2	Lineardiscriminantfunction,Mahalanobisdistance,testsassociatedwithdiscriminantfunctions	5	Chalk &Talk	BlackBoard
3.3	Probabilitiesofmisclassificationand their estimation, classificationintomorethantwo multivariatenormalpopulations	5	Chalk &Talk	BlackBoard
UNIT-4PRINCIPALCOMPONENTANALYSIS				
4.1	PrincipalcomponentAnalysis	3	Lecture	PPT& White board
4.2	Canonicalvariablesandcanonicalcorrelation	3	Chalk &Talk	BlackBoard
4.3	Clustering-similaritymeasures	3	Chalk &Talk	BlackBoard
4.4	Hierarchicalalgorithms	3	Lecture	PPT& White board
4.5	Single Linkage, Non-hierarchicalCluster	3	Chalk &Talk	BlackBoard
UNIT-5CONTINGENCYTABLES				
5.1	ContingencyTables	7	Chalk &Talk	BlackBoard
5.2	CorrespondenceAnalysisforTwoDimensionContingencyTable	8	Chalk &Talk	BlackBoard

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% Assesment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	0%
K2	2	2	5	-	-	9	-	9	.5%

K3	**3**	**3**	**-**	**-**	**5**	**11**	**-**	**11**	.5%
K4	**3**	**3**	**-**	**5**	**-**	**11**	**-**	**11**	.5%
NonScholastic	**-**	**-**	**-**	**-**	**-**		**5**	**5**	.5%
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	0%

CIA	
Scholastic	**35**
NonScholastic	**5**
	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				**NON–SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Derive the important properties of multivariate normal distribution.	K1	PSO1&PSO2
CO2	Compute hotelling T^2 statistics test on mean vector and multivariate normal population.	K2&K4	PSO5
CO3	Understand how to assess the efficacy of a classification and discrimination analysis.	K2&K3	PSO5
CO4	Introduce principal components analysis and clustering methods.	K1,K3&K4	PSO6
CO5	Explain and Analyse contingency tables.	K1,K3&K4	PSO6

MappingofC0swithPSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	2	2	2	3	2
CO3	2	2	2	2	3	2
CO4	2	2	2	2	2	3
CO5	2	2	2	2	2	3

MappingofC0swithPOs

CO/ PSO	PO1	PO2	PO3	PO4
CO1				
CO2				
CO3				
CO4				
CO5				

Note: ♦StronglyCorrelated–**3**

♦ModeratelyCorrelated–**2**

♦ WeaklyCorrelated-**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Mrs.K.Bhuvaneswari**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER VI

For those who joined in 2019 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST6ME7	Regression Analysis	Lecture	5	5

COURSEDESCRIPTION

This course focuses on building a greater understanding on statistical tools for applying the linear regression model and its generations.

COURSEOBJECTIVES

Toexposethestudentstoregressionmodelsapplicabletoreallifesituation.

UNIT–I CORRELATION (15HRS.)

Partialandmultiplecorrelationcoefficients,relationshipsamongsimple,multipleandpartialcorrelationcoefficients–biserialcorrelationcoefficients.

UNIT–II SIMPLELINEARREGRESSIONMODEL-I (15HRS.)

Simplelinearregressionmodel:Descriptionofthedatamodel–estimationofparametersbyleastsquaremethodandtest of hypothesis –indexoffit–predictedvaluesandstandarderrors – evaluation of fit –analysisofresiduals.

UNIT–III SIMPLELINEARREGRESSIONMODEL-II (15HRS.)

Effect of outliers in simple regression – model, adequacy and residualplots–deletionofdatapoints–**transformationof variables – transformationtoachievelinearity** (Self Study) – transformation tostabilizevariance–removalofheterogeneity–principlesofweightedleastsquares.

UNIT–IV MULTIPLELINEARREGRESSION (15HRS.)

Multiplelinearregressions:DescriptionoftheDatamodel–propertiesofleastsquaresestimators – predicted values and

standard errors inmultipleregression–generalizedleastsquares.

UNIT–V INFERENCE ON GLM (15HRS.)

InferenceonGLM:Testof hypothesis on the linear model – Assumptionabouttheexplanatoryvariable– testingasubsetofregressioncoefficientequalstozero– testingofequalityofregressioncoefficients.

TEXTBOOK:

D.C.Montgomery,E.APeck,.andG.G.Vining,*Introductiont olinearregressionanalysis*,thirdedition,JohnWileyandSons ,Inc.(2003).

REFERENCES:

1. N.R.Draper,. and H.Smith, *Applied Regression Analysis*, thirdedition,JohnWileyandSons,Inc.(2003).
2. J.Johnson, *Econometric methods*, third edition, McGraw-HillInternational(1984).
3. V.K.Kapoor, and S.C.Gupta, *Fundamentals of Mat hematicalStatistics*,SultanChandandSons(2007).

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-1CORRELATION				
1.1	Partialandmultiplecorrelationcoefficients	5	Chalk &Talk	BlackBoard
1.2	Relationshipsamongsimple,multipleandpartialcorrelationcoefficients	5	Lecture	PPT& White board
1.3	Biserialcorrelationcoefficients	5	Chalk &Talk	BlackBoard
UNIT-2SIMPLELINEARREGRESSIONMODEL–I				

2.1	Descriptionofthedatamodel	1	Chalk &Talk	BlackBoard
2.2	Estimationofparametersbyleastsquaremethod	3	Chalk &Talk	BlackBoard
2.3	Testofhypothesis	3	Chalk &Talk	BlackBoard
2.4	Indexoffit	2	Chalk &Talk	BlackBoard
2.5	Predictedvaluesandstandarderrors–evaluationoffit	3	Chalk &Talk	BlackBoard
2.6	Analysisofresiduals.	3	Chalk &Talk	BlackBoard
UNIT-3SIMPLELINEARREGRESSIONMODEL–II				
3.1	Effectofoutliersinsimpleregression	3	Chalk &Talk	BlackBoard
3.2	Model,adequacyandresidualplots	3	Chalk &Talk	BlackBoard
3.3	Deletionofdatapoints	3	Chalk &Talk	BlackBoard
3.4	Transformationofvariables–transformationtoachievelinearity	3	Discussion	PPT
3.5	Transformationtostabilizevariance	2	Discussion	PPT
3.6	Removalofheterogeneity	2	Chalk &Talk	BlackBoard
3.7	Principlesofweightedleastsquares.	2	Chalk &Talk	BlackBoard
UNIT-4MULTIPLELINEARREGRESSION				
4.1	DescriptionoftheDatamodel	3	Chalk &Talk	BlackBoard
4.2	Propertiesofleastsquaresestimators	4	Chalk &Talk	BlackBoard

4.3	Predictedvaluesandstandarderrorsin multipleregression	5	Chalk &Talk	BlackBoard
4.4	Generalizedleastsquares.	3	Chalk &Talk	BlackBoard
UNIT-5INFERENCEONGLM				
5.1	Testofhypothesisonthelinearmodel	4	Chalk &Talk	BlackBoard
5.2	Assumptionabouttheex planatoryvariable	3	Chalk &Talk	BlackBoard
5.3	testingasubsetofregressioncoefficient equalstozero	4	Chalk &Talk	BlackBoard
5.4	Testingofequalityofregressioncoefficients	4	Chalk &Talk	BlackBoard

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% Assesment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	0%
K2	2	2	5	-	-	9	-	9	.5%
K3	3	3	-	-	5	11	-	11	.5%
K4	3	3	-	5	-	11	-	11	.5%
NonScholastic	-	-	-	-	-		5	5	.5%
Total	10	10	5	5	5	35	5	40	0%

CIA	
Scholastic	**35**
NonScholastic	**5**

	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Classify and compute simple,multiple and partial correlation.	K1&K3	PSO1&PSO2
CO2	Evaluate the regression model and estimate the standard error	K2&K4	PSO3
CO3	Apply multiple linear regression analysis and classify simple linear regression analysis and multiple linear regression analysis	K2&K4	PSO5

CO4	Test equality of regressioncoefficients	K2,K3&K4	PSO3 &PSO 5
CO5	Understand the inference on GLM	K2&K4	PSO4& PSO5

MappingofC0swithPSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	2	2	1	2
CO2	2	1	**3**	2	2	2
CO3	1	3	2	2	**3**	1
CO4	2	2	**3**	2	**3**	2

MappingofC0swithPOs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	2	1
CO2	1	1	3	1
CO3	1	2	1	3
CO4	2	1	2	3

Note: ♦StronglyCorrelated–**3**

♦ModeratelyCorrelated–**2**

♦ WeaklyCorrelated-**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms.D.K.PonOvya**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER VI

Forthosewhojoinedin2019onwards

Skill Development-100%

PROGRAMMECODE	COURSECODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST6ME8	Operations Research	Lecture	5	5

COURSEDESCRIPTION

This helps in solving indifferent environments that needs decisions.

COURSEOBJECTIVES

Toaimatfamiliarizingthestudentswithquantitativetoolsandtechniques, which are frequently applied to business decision making and toprovideaformalquantitativeapproachtoproblemsolving.

UNIT–I SEQUENCINGPROBLEM (15HRS.)

Introduction–problemof sequencing – Basic terms used insequencing-Processingnjobsthroughtwomachines–**Processingnjobsthroughkmachines-Processing 2 jobs through k machines** (SelfStudy).

UNIT–II GAMESANDSTRATEGIES (15HRS.)

Introduction – Two person zero sum games – Some basic terms - Themaximin-minimaxprinciple–Gameswithoutsaddlepoints– mixedstrategies–Graphicalsolutionof2xnandmx2games–Dominanceproperty – Arithmetic method for n x n game – General solution of m x nrectangulargames.

UNIT–III INVENTORYCONTROL (15HRS.)

Introduction–TheInventorydecisions– Cost associated withinventories– Factorsaffectinginventorycontrol-EconomicOrderQuantity(EOQ) – Deterministic inventory problems with no shortages - Deterministicinventoryproblemswithshortages–Probabilisticinventoryproblems

UNIT–IV QUEUINGTHEORY (15HRS.)

Introduction-Queuingsystem– ElementsofQueuingsystem–Operating characteristics of queuing system – Probability distributions inqueuing systems – Classification of queuing models – Definition of transientand steady states – Poisson queuing systems –Model I (M/M/1):(∞ / FIFO) –ModelII(M/M/I):(∞/SIRO)-ModelIII(M/M/1):(N/FIFO).

UNIT–VNETWORKSCHEDULINGBYPERT/CPM (15HRS.)

Introduction – Network and basic components – Logical sequencing –Rulesofnetworkconstruction–Criticalpathanalysis– probabilityconsiderationsinPERT

TEXTBOOK:

UNITI-Chapter12:Sections12.1to12.6

UNITII-Chapter17:Sections17.1to17.9

UNITIII-Chapter19:Sections19.1to19.7,19:12.1,19:12.2

UNITIV-Chapter20:Sections20.1to20.8(UptomodelIII)

UNITV-Chapter21:Sections21.1to21.6

REFERENCES:

1. PremKumarGuptaandD.SHira,*ProblemsinOperationsResearch*,SultanChand&Co.Ltd.,Revisededition(2009).
2. P.KGuptaandManMohan,*ProblemsinOperationsResearch*,SultanChand&Sons(2007).

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	Teaching Pedagogy	TeachingAids
UNIT-1SEQUENCINGPROBLEM				
1.1	Problemofsequencing	2	Chalk&Talk	BlackBoard
1.2	Basictermsusedinsequencing	2	Chalk &Talk	LCD
1.3	Processingnjobsthroughtwomachines	4	Lecture	PPT& White board
1.4	Processingnjobsthroughkmachines	4	Discussion	BlackBoard
1.5	Processing2jobsthroughkmachines.	3	Discussion	BlackBoard
UNIT-2GAMESANDSTRATEGIES				
2.1	Twopersonzerosumgames	1	Chalk &Talk	BlackBoard
2.2	Themaximin-minimaxprinciple	1	Chalk &Talk	BlackBoard
2.3	Gameswithoutsaddlepoints	3	Chalk &Talk	BlackBoard

2.4	mixedstrategies	2	Chalk &Talk	BlackBoard
2.5	Graphicalsolutionof2xnandmx2games	2	Chalk &Talk	BlackBoard
2.6	Dominanceproperty– Arithmeticmethodfornxngame –	3	Chalk &Talk	BlackBoard
2.7	Generalsolutionofmxnrectangulargames	3	Chalk &Talk	BlackBoard
UNIT-3 INVENTORYCONTROL				
3.1	TheInventorydecisions	1	Chalk &Talk	BlackBoard
3.2	Costassociatedwithinventories	1	Chalk &Talk	BlackBoard
3.3	Factorsaffectinginventorycontrol	1	Chalk &Talk	BlackBoard
3.4	EconomicOrderQuantity(EOQ)	3	Chalk &Talk	BlackBoard
3.5	Deterministicinventoryproblemswithnoshortages	3	Chalk &Talk	BlackBoard
3.6	Deterministicinventoryproblemswithshortages	3	Chalk &Talk	BlackBoard
3.7	Probabilisticinventoryproblems	3	Chalk &Talk	BlackBoard
UNIT-4 QUEUINGTHEORY				
4.1	Queuingsystem	3	Chalk &Talk	BlackBoard
4.2	ElementsofQueuingsystem	3	Chalk &Talk	BlackBoard
4.3	Operatingcharacteristicsofqueuingsystem	3	Chalk &Talk	BlackBoard
4.4	Probabilitydistributionsinqueuingsystems	3	Chalk &Talk	BlackBoard

4.5	Classificationofqueuing	3	Chalk &Talk	BlackBoard
UNIT-5NETWORKSCHEDULINGBYPERT/CPM				
5.1	Networkandbasiccomponents	2	Lecture	PPT& White Board
5.2	Logicalsequencing	4	Chalk&	Black
			Talk	Board
5.3	Rulesofnetworkconstruction	4	Chalk &Talk	BlackBoard
5.4	Criticalpathanalysis–probabilityconsiderations	5	Chalk &Talk	BlackBoard

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% Assesment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	0%
K2	2	2	5	-	-	9	-	9	.5%
K3	3	3	-	-	5	11	-	11	.5%
K4	3	3	-	5	-	11	-	11	.5%
NonScholastic	-	-	-	-	-		5	5	.5%
Total	10	10	5	5	5	35	5	40	0%

CIA	
Scholastic	35
NonScholastic	5
	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Define sequencing problem and apply it to solve real life problems.	K1	PSO1&PSO2
CO2	Solve problems in decision making.	K1&K2	PSO3
CO3	Apply inventory control to solve practical problems.	K1&K3	PSO5

CO4	Classify queuing models.	K2&K4	PSO5
CO5	Explain CPM and PERT to plan schedule and control project activities.	K2&K4	PSO5 &PSO 6

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Mrs.R.JenoviRosaryDeepa**
2. **Mrs.B.VethamaryJacquline**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER VI

Forthosewhojoinedin2019onwards

Skill Development-50% &Employability-50%

PROGRAMMECODE	COURSECODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST6ME9	Industrial Statistics	Lecture	5	5

COURSEDESCRIPTION

This course is concerned with maintaining and improving the quality of goods and services

COURSEOBJECTIVES

This course enables the students competent to undertake industrialresearches

UNIT–I INVENTORYPLANNING (15HRS.)

.

Inventoryplanning:Conceptofplannedinventorypolicies:Deterministicmodels-Policywheninventorylevelsarereviewedcontinuously and demands occur uniformly with and without shortage costsEconomicorderquantity.

UNIT–II PRODUCTIONPLANNING (15HRS.)

. Policy for production planning when inventory levels are reviewedperiodicallyStochasticmodelsSingleperiodmodelwithnosetupcosthaving zero or non-zero initial stock {(s,S) policy} Solving special cases usingcomputerpackages.

UNIT–III FORECASTING (15HRS.)

Forecasting:Conceptofforecastingand its applications inmanufacturingand non manufacturing industrial situations
Differentmethodsofforecastingincludingaverage,lastvalue,weightedaverage(exponentialsmoothing)**Forecastinginpresenceoflineartrends**

usingleastsquaremethods(SelfStudy)-
ForecastinginpresenceofseasonaleffectsSolvingspecialcasesus
ingcomputerpackage.

UNIT–IV RELIABILITY (15HRS.)

.

Reliability:Definitionsandrelationshipsbetweensurvival function,hazard function, hazard rate of a non-negative random variable - Parametricdistributions:Weibull,amma,LognormalandExpone ntialaslifetimedistributions - Concept of aging, IFR, IFRA classes of distributions and theirdual.

UNIT–V STRUCTUREFUNCTIONS (15HRS.)

Coherentsystemasbinaryfunction:Minimalcutandpathse ts(vectors)-
Representationofstructurefunctionofseries,parallelandkoutofn: Gsystemsofindependentcomponents-Minimalcut and pathstructurefunctions-
DualofacoherentstructureDerivationofreliabilitiesofabovestru ctures.

TEXTBOOK:

1. H.A.Taha,*OperationsResearch*,MacmillanPublishingCo.(1999).
2. F.S.HillerandG.J.Libermann,*IntroductiontoOperations Research*,6thEdition,McGrawHill(1995).
3. L.J.BainandEnghardt,*StatisticalAnalysisofReliabilityan dLifeTestingModels*,MarckelDekker(1991).

REFERENCES:

1. S.Zacks,*IntroductiontoReliabilityAnalysis,Probabilitym odelsandStatisticalmethods*,SpringerVerlag(1992).
2. R.E.BarlowandF.Proschan,*StatisticaltheoryofReliabilitya ndLifetesting:Probabilitymodels*,Holt,RinehartandWinsto

n(1975)

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.ofLectures	Teaching Pedagogy	TeachingAids
UNIT-1 INVENTORYPLANNING				
1.1	Concept of planned inventory policies	2	Chalk &Talk	BlackBoard
1.2	Deterministicmodels	2	Chalk &Talk	LCD
1.3	Policywheninventorylevelsare reviewed continuously and demands occur uniformly with shortagecosts	4	Chalk &Talk	BlackBoard
1.4	Policywheninventorylevelsare reviewed continuously and demands occur uniformly withoutshortagecosts	4	Chalk &Talk	BlackBoard
1.5	Economicorderquantity	3	Chalk &Talk	BlackBoard
UNIT-2 PRODUCTIONPLANNING				
2.1	Policyfor production planning when inventory levels are reviewedperiodically	5	Chalk &Talk	BlackBoard
2.2	StochasticmodelsSingleperiod model with no set up cost havingzero	5	Chalk &Talk	BlackBoard
2.3	Non-zero initial stock {(s,S) policy} Solving special cases usingcomputerpackages.	5	Chalk &Talk	BlackBoard
UNIT-3FORECASTING				
3.1	Concept of forecasting and its applications in manufacturing	3	Chalk &Talk	BlackBoard

	and non manufacturing			
	industrialsituations			
	Different methods of forecasting			
3.2	including average, last value, weighted average(exponential	3	Chalk &Talk	BlackBoard
	smoothing)			
	Forecastinginpresenceoflinear			
3.3	trends using least square methods	3	Discussion	BlackBoard
3.4	Forecasting in presence of seasonaleffects	3	Discussion	BlackBoard
3.5	Solving special cases using computerpackage	3	Chalk &Talk	BlackBoard
UNIT-4RELIABILITY				
4.1	Definitions and relationships between survival function, hazardfunction,	3	Chalk &Talk	BlackBoard
4.2	Hazard rate of a non-negative randomvariable	2	Chalk &Talk	BlackBoard
4.3	Weibull,amma,Lognormaland Exponential as life time distributions	5	Chalk &Talk	BlackBoard
4.4	Concept of aging, IFR, IFRA classesofdistributionsandtheir dual	5	Chalk &Talk	BlackBoard
UNIT-5STRUCTUREFUNCTIONS				
	Coherent system as binary			

5.1	function:Minimalcutandpath sets(vectors)	3	Chalk &Talk	BlackBoard
5.2	Representationofstructurefunction of series, parallel and koutofn:Gsystemsof independentcomponents	3	Chalk &Talk	BlackBoard
5.3	Minimalcutandpathstructure functions	3	Chalk &Talk	BlackBoard
5.4	Dualofacoherentstructure	3	Chalk &Talk	BlackBoard
5.5	Derivation of reliabilities of abovestructures.	3	Chalk &Talk	BlackBoard

Levels	C1	C2	C3	C4	C5	TotalScholasticMarks	NonScholasticMarks C6	CIA Total	% ofAssessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10%
K2	2	2	5	-	-	9	-	9	22.5%
K3	3	3	-	-	5	11	-	11	27.5%
K4	3	3	-	5	-	11	-	11	27.5%
NonScholastic	-	-	-	-	-		5	5	12.5%
Total	10	10	5	5	5	35	5	40	100%

CIA	
Scholastic	35
NonScholastic	5

	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Summarize the concept of deterministic models when the demands occur uniformly with and without shortage costs.	K1	PSO1&PSO2
CO2	Explain the policy for production planning when inventory levels are reviewed periodically	K1&K2	PSO3 &PSO 4

CO3	Understand minimal cut and path structure functions	K2&K3	PSO5
CO4	Demonstrate the concept of forecasting and its applications in manufacturing and nonmanufacturing industrial situations.	K1,K2&K3	PSO5 &PSO 6
CO5	Classify survival functions andhazardfunctions	K2&K4	PSO5

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	2	2
CO5	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	1	3
CO2	3	1	3	2
CO3	1	3	2	3
CO4	1	3	2	3
CO5	2	2	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms.D.K.PonOvya**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

For those who joined in 2020 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	22ST6ME10	Econometrics	Lecture	5	5

COURSE DESCRIPTION

This course provides the basic principles of econometric models

COURSE OBJECTIVES

This course enables the students to use economic methods in several areas like engineering sciences, biological sciences, medical sciences, geo-sciences, agriculture sciences etc

UNIT –ITHE SIMPLE REGRESSION MODEL

Model with one explanatory variable: Definition, scope and objectives of Econometrics. Linear model with one independent variable - Least squares estimators of regression coefficients, properties of least squares estimators - analysis of variance to regression model

UNIT – II MULTIPLE REGRESSION ANALYSIS: INFERENCE

Model with more variables:Linear model with more than one explanatory variables – assumptions – estimation of model parameter - Least squares

estimators and their properties. Hypothesis testing – test the overall significance of the regression – Testing the individual regression coefficients

UNIT – III RESIDUAL ANALYSIS

Adequacy of Model:Model adequacy checking – residual analysis – residuals – standardized residuals – residual plot – normal probability plot – plot of residuals against estimated response. A formal test for lack of fit of the model

UNIT – IV MULTICOLLINEARITY

Multicollinearity: Meaning and sources – consequences of multicollinearity. Test for detecting multicollinearity – Examining the correlation matrix – Variance Inflation factor – Eigen values of X ' X.

UNIT – V AUTOCORRELATION

Autocorrelation: Meaning of serial independence – sources of autocorrelation – first order autoregressive scheme – consequences of autocorrelation – Durbin – Watson test – analysing the model in the presence of autocorrelation

TEXT BOOK:

1. Montgomery, D.C. Peck, E.C. and Vining, G.G. (2003) Introduction to Linear Regression Analysis(3/e), Wiley Eastern, New Delhi
2. Gujarati, D. N., Dawn C Porter and SangeethaKunasekar, (2016), Basic Econometrics, Fifth Edition, McGraw Hill Publisher, New York
3. Goldberger, A.S. (1964): Econometrics theory. John Wiley & Sons, New Delhi

REFERENCES:

1. Castle, J. and Shephard, N. (2009).The Methodology and Practice of Econometrics.OUP Oxford Publications
2. Kelejion, H.H. and Oates, W.E. (1988). Introduction to Econometrics, Principles and Applications. Harper and Row Publishers Inc., New York
3. Maddala, G.S. and KajalLagari (2009). Introduction to Econometrics.

John Wiley & Sons

4. Madnani, G.M.K. (2008): Introduction to Econometrics: Principles and Applications. Oxford and IBH Publishing

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 THE SIMPLE REGRESSION MODEL				
1.1	Model with one explanatory variable: Definition, scope and objectives of Econometrics.	4	Chalk & Talk	Black Board
1.2	Linear model with one independent variable	3	Chalk & Talk	Black Board
1.3	Least squares estimators of regression coefficients,	4	Chalk & Talk	Black Board
1.4	properties of least squares estimators	3	Chalk & Talk	Black Board
1.5	Analysis of variance to regression model	4	Chalk & Talk	Black Board
UNIT -2 MULTIPLE REGRESSION ANALYSIS: INFERENCE				
2.1	Model with more variables: Linear model with more than one explanatory variables.	5	Chalk & Talk	Black Board
2.2	Assumptions and estimation of model	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	parameter - Least squares estimators and their properties.			
2.3	Hypothesis testing ,overall significance of the regression	5	Chalk & Talk	Black Board
2.4	Testing the individual regression coefficients	5	Chalk & Talk	Black Board
UNIT 3 RESIDUAL ANALYSIS				
3.1	Adequacy of Model: Model adequacy checking ,residual analysis , residuals	5	Chalk & Talk	Black Board
3.2	standardized residuals , residual plot	3	Chalk & Talk	Black Board
3.3	Normal probability plot – plot of residuals against estimated response.	5	Chalk & Talk	Black Board
3.4	A formal test for lack of fit of the model	5	Discussion	Black Board
UNIT 4 MULTICOLLINEARITY				
4.1	Multi collinearity: Meaning and sources – consequences of multi collinearity.	4	Chalk & Talk	Black Board
4.2	Test for detecting multi collinearity	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.3	Examining the correlation matrix	4	Chalk & Talk	Black Board
4.4	Variance Inflation factor	4	Chalk & Talk	Black Board
4.5	Eigen values of X ' X.	3	Chalk & Talk	Black Board
UNIT 5 AUTOCORRELATION				
5.1	Autocorrelation: Meaning of serial independence	5	Lecture	PPT & White board
5.2	Sources of autocorrelation	3	Lecture	PPT & White board
5.3	First order autoregressive scheme – consequences of autocorrelation	5	Lecture	PPT & White board
5.4	Durbin & Watson test – analysing the model in the presence of autocorrelation	5	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment

	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non cholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are :**

  K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total

10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Ability to perform analyses of economic data based on broad knowledge of the linear regression model	K3 & K4	PSO1
CO 2	Estimate and test regression model	K1 & K2	PSO5
CO 3	Assess the appropriateness of a linear regression model by defining residuals and examining the residual plot graphs	K3 & K4	PSO3
CO 4	Check the existence of multicollinearity in a data set can lead to less reliable results due to larger standard errors	K1 & K4	PSO5 &PSO6
CO 5	Articulate the null and alternative hypotheses for the Durbin-Watson (DW) test	K4	PSO5

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	2	2	3	2
CO3	2	2	3	2	2	2
CO4	2	2	2	2	3	3
CO5	2	2	2	2	3	2

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	2	2	2	3
CO3	2	2	2	3
CO4	2	3	2	2
CO5	2	2	2	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr. M. Mano Prabha**

Forwarded By

III B.Sc STATISTICS

SEMESTER –VI

(For those who joined in 2021 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	23ST6SB5	Practical Statistics - III	Lecture & Practical	2	2

COURSE DESCRIPTION

The course provides an application related to the testing of hypothesis, design of experiments, demography and Actuarial statistics

COURSE OBJECTIVES

To expose the students to the analysis of statistical techniques in real life situations.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

CO1. Analyze the problems based on testing of hypothesis

CO2. Examine various non parametric tests.

CO3. Apply and interpret the methods of ANOVA, factorial experiments, CRD, RBD and LSD.

1. Non-Parametric test-Sign test, Wilcoxon test, Mann-Whitney U test, Median test, Run test, Kolmogorov- Smirnov one sample test, Kruskal-Wallis test.
2. ANOVA-One way &Two way
3. Design of experiments-CRD,RBD,LSD
4. Missing Plot
5. Factorial experiment-experiments with completely confounding
6. Factorial experiment-experiments with partially confounding

7. Fertility measurement-CBR-TFR
8. Mortality measurements –CDR-Infant mortality rate
9. Construction of Life tables.
10. Premiums- general principles-natural premiums- office & net premiums, Policy Values –surplus.

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

	SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

UG CIA Components

C1	-	Test (CIA 1)	-	10 Mks
C2	-	Test (CIA 2)	-	10 Mks
C3	-	Assignment	-	5 Mks
C4	-	Open Book Test/PPT	-	5 Mks
C5	-	Quiz	-	5 Mks
C6	-	Attendance	-	5 Mks

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Analyze the problems based on testing of hypothesis	K1	PSO1& PSO2
CO 2	Examine various non parametric tests	K1, K2	PSO5 & PSO6
CO3	Apply and interpret the methods of ANOVA, factorial experiments, CRD, RBD and LSD.	K3	PSO4 & PSO5

MappingofC0swithPSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	2	2	2	2
CO3	2	2	2	2	3	3

MappingofC0swithPOs

CO/ PSO	PO1	PO2	PO3	PO4
	3	3	2	3
	2	1	3	2
	3	3	1	1

CO1				
CO2				
CO3				

Note: ♦StronglyCorrelated–**3**
♦ModeratelyCorrelated–**2**
♦ WeaklyCorrelated-**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms. D.K.Pon Oviya**

ForwardedBy

Dr.E.Helena

III B.Sc. STATISTICS

SEMESTER VI

Forthosewhojoinedin2019onwards

Entreprenuership-50% &Employability-50%

PROGRAMMECODE	COURSECODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19ST6SB6	StatisticalSoftware –R	LectureandPractical	2	2

COURSEDESCRIPTION

The course is introduced to learn a programming language which helps to handle all aspects of statistical software.

COURSEOBJECTIVES

Toexposethestudentsontheapplicationsofstatisticalanalysisusingstatisticalpackage.

1. DiagrammaticRepresentationBarChart,PieDiagram
2. ConstructionofDiscreteandContinuousFrequencyTablesfromrawdata
3. GraphicalRepresentation-Histogram,Box-Whiskersplot
4. DescriptiveStatistics
5. Simplecorrelation,Rankcorrelation,
6. RegressionFittingofPoissondistribution
7. FittingofNormaldistribution
8. Parametrictests–Means,VariancesandProportions
9. Chi–squaretestforgoodnessoffit
10. Chi–squaretestforindependencesamples
11. Non- Parametric tests Sign test, Wilcoxon test, Mann-Whitney Utest, Median test, Run test, Kolmogorov Smirnov one sample test,KruskalWallis
12. ANOVA–onewayandtwoway

13. DesignofExperiment–CRD,RBD,LSD

14. FactorialExperiment-2^2, 2^3 experimentswithtotalandpartialconfounding.

REFERENCEBOOKS:

1. SudhaPurohit,SharadDGoreandShailajaR.Deshmukh,NarosaPublishingHouse,NewDelhi(2015).

2. Jured.P.Lander,*R for everyone,advance Analyticsand Graphics*,Addison-Wesley,USA(2014).

3. Onlinehelpmanualsandothermaterialsavailablein R projectsitewillformbasisforthecourse

Levels	C1	C2	C3	C4	C5	TotalScholastic Marks	NonScholastic Marks C6	CIA Total	% ofAssessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10%
K2	2	2	5	-	-	9	-	9	22.5%
K3	3	3	-	-	5	11	-	11	27.5%
K4	3	3	-	5	-	11	-	11	27.5%
Non Scholastic	-	-	-	-	-		5	5	12.5%
Total	10	10	5	5	5	35	5	40	100%

CIA	
Scholastic	**35**
NonScholastic	**5**
	40

- ✓ **ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomyare:**

K1-Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

EVALUATIONPATTERN

	SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSEOUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsDRESSEI
CO1	To impart efficient Data Handling Techniques	K1&K3	PSO1&PS 2

CO2	To equip students to Statistical Programming Skills based on examples and data sets	K2&K4	PSO4 &PSC 5
CO3	Able to apply parametric and non-parametric tests.	K3&K4	PSO4 &PSC 5
CO4	Able to explore results using ANOVA and ANOCOVA	K2&K4	PSO4 &PSC 5
CO5	Understang Facorial experiments	K4	PSO5

MappingofC0swithPSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**2**	**2**
CO2	**2**	**2**	**2**	**3**	**3**	**2**
CO3	**2**	**2**	**2**	**3**	**3**	**2**

MappingofC0swithPOs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	2	3
CO2	2	1	2	2
CO3	3	2	1	2

Note: ♦StronglyCorrelated–**3**
♦ModeratelyCorrelated–**2**
♦ WeaklyCorrelated-**1**

COURSEDESIGNER:

1. **Dr.P.Vetriselvi**
2. **Ms. D. K. Pon Oviya**

Forwarded By

Dr.E.Helena

I B.Sc. STATISTICS

For those who joined in 2021 onwards

Skill Development-40% &
Entreprenuership-60%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDI
USST	22ST2SL1	Quantitative Aptitude & Data Interpretation	Self Study		2

COURSE DESCRIPTION

This course is designed to make the students learn the basics of statistics

COURSE OBJECTIVES

To enable the students understand the origin and the need of statistics and the statistical data.

UNIT –I TABLES AND GRAPHS (6 HRS.)

Data Tables, Bar graphs, Line graphs, pie graphs

UNIT –II INTERPRETATION AND ANALYSIS OF DATA BASED ON TEXT

(6 HRS.

Venn diagram, caselets data interpretations, histogram

UNIT –III PERMUTATION AND COMBINATION (6 HRS.)

Permutation - Combination

UNIT –IV STOCKS AND SHARES (6 HRS.)

Stock- capital, share andshareholders, dividend, face value and market value, brokerage

UNIT –V TRUE DISCOUNT, BANKER'S DISCOUNT (6 HRS.)

Present worth, true discount, banker‟s discount and banker‟s gain

TEXT:

R.S Aggarwal, Quantitative Aptitude, New Delhi, S.Chand and company Ltd, 2006, Chapters:

(Sections 21,22,29,32,33,36-39).

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Can interpret the data in picture format	K1	PSO1
CO2	Understand Venn diagram and Casselet data.	K2	PSO2
CO3	Able to compute Permutations and Combination.	K3	PSO3
CO4	Understand the share value and brokerage.	K2	PSO4
CO5	Able to find the present worth , bankers' discount and gain.	K3	PSO3

III B.Sc. STATISTICS

For those who joined in 2019 onwards

Entreprenuership-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	19UGSLST2	Bio Statistics	Self Study	-	

COURSE DESCRIPTION

This course covers the basic tools for the collection, analysis and presentation of data in all areas of public health.

COURSE OBJECTIVES

To enable the students describe the roles of biostatistics serves inpublic health and biomedical research

UNIT –I STUDY DESIGN

Introduction to study designs – Different types of observational studies – Experimental studies, Epidemiology – Odds – Odds ratio – Confidence interval for odds ratio – Relative risk

UNIT – II CHI-SQUARE TEST

Chi-Square test: Diagnostic Procedures with Threshold model. Measuring the accuracy of diagnosis – Sensitivity, Specificity, ROC curve.

UNIT – III CLINICAL TRAILS

Clinical Trials: Introduction – Different Phases of Clinical Trials - Purpose – Duration Cost - Drug Regulatory Bodies

UNIT – IV SURVIVAL DISTRIBUTIONS

Survival Time, Survival Distributions- Hazard Function- Exponential – Gamma – Type I and Type II Censoring, Progressive Censoring –Estimation of Parameters with Numerical Examples.

UNIT – V

Estimating Survival Function and Variance using Kaplan Meier Method – Comparison of Survival Distribution – Log Rank Test forComparing Two Groups

TEXT BOOK:

Dawson, Beth & Robert, G (2001) ; Basic & Clinical Biostatistics Mcgraw-Hill

2. Ellisa T.Lee (1992): Statistical Methods For Survival Data Analysis
3. Friedman, L.M, Forbes, C.D, And Demats, D.L(TT): Fundamental ofClinical Trials, Springer.

REFERENCES:

1. David G. Kleinbawn (1996): Survival Analysis, Springer.
2. Mathews, J.N.S. (2006): Introducing To Randomized ControlledClinical Trials, Chapman and Hall.
3. Steven Diantadosi (2000): Clinical Trials – A MethodologicalPerspective, John Willey.
4. Stephan Sann (2000) : Statistical Issues In Drug Development, JohnWiley

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Understand the study design and its risk value.	K1	PSO1
CO2	Measures the accuracy of diagnosis through chi-square method.	K2&K3	PSO2
CO3	Estimate the different phases of cinical trials	K3	PSO3

CO4	Understand the survival distributions and its parameters.	K2	PSO4
CO5	Able to estimate the survival function and its variance using various methods	K3& K4	PSO5 &PSO 6

III B.Sc. STATISTICS

For those who joined in 2019 onwards

Entreprenuership-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USST	**19UGSLST1**	**Official Statistics**	**Self Study**	**-**	

COURSE DESCRIPTION

This paper gives an idea about variousmethods in whichStatistics are being collected in different sectors Goal :

COURSE OBJECTIVES

To enable the students to understand how the statistics arecollected, recorded and published

UNIT –I OFFICIAL STATISTICS

Official Statistics: Definition – Growth of Indian Statistics – Statistical organizations of India: Central Statistical Organisation (CSO) – Divisions of Central Statistical Organisation – Functions – Publications.

UNIT – II SURVEY ORGANISATION

National Sample Survey Organisation (NSSO) – Divisions of NSSO – Functions of NSSO – Procedure for collection of information – Agriculture Statistics, Yield Statistics – Official series: Traditional method, Random Sampling Method – NSS Series – Forest Statistics, Fisheries Statistics – Defects in agricultural Statistics.

UNIT – III NATIONAL INCOME

National income: Definition – Methods of estimating national income: The Income method, the Output method and the Expenditure method – Uses of National income estimates – Difficulties of estimation.

UNIT – IV SOCIAL ACCOUNTING

Social accounting – Population statistics – Sources – Different methods of collecting population census – Methods of enumeration – Meritsand demerits of De Facto method, Merits and demerits of the De Jure system.

UNIT – V PRICE STATISTICS

Price Statistics: Wholesale prices, Retail prices, Uses and limitations of price statistics. Industrial Statistics: Main Sources of industrial Statistics – Limitations.

TEXT BOOK:

R.S.N. Pillai and V. Bagavathi (1995), Statistics, Third Edition, S.Chand & Company, New Delhi – 110 055.

REFERENCES:

1. Central Statistical Organization (2011), Statistical Systems in India,Department of Statistics, Ministry of Planning, New Delhi.
2. Goon, A.M. Gupta, M.K and Das Gupta, B.(1986), Fundamentals ofStatistics, Volume II, The World Press Private Limited, Calcutta.

3. COURSE OUTCOMES

4. On the successful completion of the course, students will be able to:

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Understand the function of various Indian statistical organisations.	K1	PSO1
CO2	Knows the procedure of collecting informations	K2&K3	PSO2

CO3	Able to understand the method of National Income and its estimates.	K3	PSO4
CO4	Find different methods of collecting population census.	K3&K4	PSO3& PSO4
CO5	Understand various sources and limitations of Industrial statistics.	K3& K4	PSO6