CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Nationally Accredited with 'A' Grade by NAAC

ISO 9001:2015 Certified

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

AUTONOMOUS SYLLABUS

(2022-2023 and ONWARDS)

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF MATHEMATICS

VISION

To strive for excellence in the mathematical sciences in addition to encourage people to undertake opportunities in transdisciplinary domains.

MISSION

- To enhance analytical and logical problem-solving capabilities.
- To provide excellent mathematical science knowledge for a suitable career and to groom students for national prominence.
- To teach students how to use data analytics.
- To prepare students for transdisciplinary research and applications.
- Value-based education and service-oriented training programmes are used to acquire life skills.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosenfields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES FOR B.Sc Mathematics, B.Sc Physics, B.Sc Chemistry PROGRAMME

After completing a B.Sc., programme, a learner will be able to

PO NO.	On completion of B.Sc Mathematics / B.Sc Physics / B.Sc Chemistry Programme, the students will be able to
PO1	**DOMAIN KNOWLEDGE** Analyse, design and develop solutions by applying from fundamental concepts of basic sciences and expertise in discipline.
PO2	**PROBLEM SOLVING** Ability to think abstractly, to evaluate and concentrates effectively on problem-solving, as well as knowledge of global challenges.
PO3	**CREATIVE THINKING AND TEAM WORK** Develop prudent decision-making skills and mobility to work in teams to solve multifaceted problems.
PO4	**EMPLOYABILITY** Self-study acclimatize them to observe effective interactive practices for practical learning enabling them to be a successful science graduate.
PO5	**LIFE LONG LEARNING** Assure consistent improvement in the performance and arouse interest to pursue higher studies in premium institutions.

PROGRAMME SPECIFIC OUTCOMES FOR B.Sc MATHEMATICS

PSO NO.	The Students of B.Sc Mathematics will be able to	POs Addressed
PSO1	Procure a precise understanding of the mathematical concepts.	PO1, PO3
PSO2	Excel by enhancing interpersonal skills, overcoming procedural challenges and intending career paths.	PO3, PO4
PSO3	Recognize, strengthen and analyse mathematical problems in order to acquire better conclusion.	PO4, PO5
PSO4	Manipulate numerical abilities across a variety of domains.	PO2, PO5
PSO5	Develop and desire to learn more about advanced mathematics and its applications.	PO5

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS
B.Sc MATHEMATICS PROGRAMME STRUCTURE
LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS-LOCF)

(For the candidates admitted from the Academic year 2022-2023 Onwards)

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. / week	Credits	Exam Hrs.	Marks Int	Marks Ext	Total
I	I	Language Course-I (LC)	இக்கால இலக்கியம்	22ULT1	6	3	3	25	75	100
			Hindi Literature & Grammar – I	22ULH1						
			History of Popular Tales, Literature and Sanskrit Story	22ULS1						
			Basic French – I	22ULF1						
	II	English Language Course – I (ELC)	Functional English for Effective Communication – I	22UE1	6	3	3	25	75	100
	III	Core Course – I (CC)	Differential Calculus and Trigonometry	22UMA1CC1	5	4	3	25	75	100
		Core Course – II (CC)	Integral Calculus	22UMA1CC2	4	4	3	25	75	100
		First Allied Course – I (AC)	Mathematical Statistics I	22UMA1AC1	5	4	3	25	75	100
		First Allied Course – II (AP)	Mathematical Statistics (P)	22UMA1AC2P	2	2	3	40	60	100
	IV	Ability Enhancement Compulsory Course-I (AECC)	UGC Jeevan Kaushal-Universal Human Values	22UGVE	2	2	-	100	-	100
		Total			**30**	**22**				**700**
II	I	Language Course-II (LC)	இடைக்கால இலக்கியமும், புதினமும்	22ULT2	5	3	3	25	75	100
			Hindi Literature & Grammar – II	22ULH2						
			Poetry, Textual Grammar and Alankara	22ULS2						
			Basic French – II	22ULF2						
	II	English Language Course – II (ELC)	Functional English for Effective Communication – II	22UE2	6	3	3	25	75	100
	III	Core Course – III (CC)	Differential Equations and Laplace Transforms	22UMA2CC3	5	5	3	25	75	100
		Core Course – IV (CC)	Vector Calculus and Fourier Series	22UMA2CC4	4	4	3	25	75	100
		Core Practical –I (CP)	MATLAB Programming (P)	22UMA2CC1P	2	2	3	40	60	100
		First Allied Course – III (AC)	Mathematical Statistics II	22UMA2AC3	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-II (AECC)	Environmental Studies	22UGEVS	2	2	-	100	-	100
		Ability Enhancement Compulsory Course-III (AECC)	Innovation and Entrepreneurship	22UGIE	2	1	-	100	-	100
		Extra Credit Course	SWAYAM		As per UGC Recommendation					
		Total			**30**	**23**				**800**

III	I	Language Course-III (LC)	காப்பியமும், நாடகமும்	22ULT3	5	3	3	25	75	100
			Hindi Literature & Grammar – III	22ULH3						
			Prose, Textual Grammar and Vakyarachana	22ULS3						
			Intermediate French – I	22ULF3						
	II	English Language Course – II (ELC)	Learning Grammar Through Literature – I	22UE3	6	3	3	25	75	100
	III	Core Course – V (CC)	Analytical Geometry (3D)	22UMA3CC5	4	4	3	25	75	100
		Core Course – VI (CC)	Classical Algebra and Theory of Numbers	22UMA3CC6	5	5	3	25	75	100
		Second Allied Course – I (AC)	Python Programming	22UMA3AC4	5	4	3	25	75	100
		Second Allied Course–II (AP)	Python Programming (P)	22UMA3AC5P	3	2	3	40	60	100
	IV	Generic Elective Course- I (GEC)	Mathematics for Competitive Examinations – I	22UMA3GEC1	2	2	3	25	75	100
			Basic Tamil-I	22ULC3BT1						
			Special Tamil-I	22ULC3ST1						
		Extra Credit Course	SWAYAM	As per UGC Recommendation						
		Total			**30**	**23**				**700**

15 Days INTERNSHIP during Semester Holidays

IV	I	Language Course-IV (LC)	பண்டைய இலக்கியமும், உரைநடையும்	22ULT4	6	3	3	25	75	100
			Hindi Literature & Functional Hindi	22ULH4						
			Drama, History of Drama Literature	22ULS4						
			Intermediate French - II	22ULF4						
	II	English Language Course – IV (ELC)	Learning Grammar Through Literature - II	22UE4	6	3	3	25	75	100
	III	Core Course – VII(CC)	Sequences and Series	22UMA4CC7	5	5	3	25	75	100
		Core Course – VIII(CC)	Methods in Numerical Analysis	22UMA4CC8	5	5	3	25	75	100
		Second AlliedCourse– III (AC)	Internet of Things	22UMA4AC6	4	3	3	25	75	100
		Internship	Internship	22UMA4INT	-	2	-	-	-	100
	IV	Generic Elective Course- II (GEC)	Mathematics for Competitive Examinations – II	22UMA4GEC2	2	2	3	25	75	100
			Basic Tamil-II	22ULC4BT2						
			Special Tamil-II	22ULC4ST2						
		Skill Enhancement Course – I (SEC)	Statistical Tools and Techniques - R Programming (P)	22UMA4SEC1P	2	2	3	40	60	100
		Extra Credit Course	SWAYAM	As per UGC Recommendation						
		Total			**30**	**25**				**800**

		Core Course – IX (CC)	Abstract Algebra	22UMA5CC9	6	6	3	25	75	100
		Core Course – X (CC)	Real Analysis	22UMA5CC10	5	5	3	25	75	100
		Core Course – XI (CC)	Statics	22UMA5CC11	5	5	3	25	75	100
	III	Core Course XII (CC)	Discrete Mathematics	22UMA6CC12	5	5	3	25	75	100
V		Discipline Specific Elective – I (DSE)	A. Operations Research	22UMA5DSE1A	5	4	3	25	75	100
			B. Astronomy	22UMA5DSE1B						
			C. Artificial Intelligence	22UMA5DSE1C						
	IV	Ability Enhancement Compulsory Course-IV (AECC)	UGC Jeevan Kaushal - Professional Skills	22UGPS	2	2	-	100	-	100
		Skill Enhancement Course – II (SEC)	LaTeX (P)	22UMA5SEC2P	2	2	3	40	60	100
		Extra Credit Course	SWAYAM		As per UGC Recommendation					
		Total			**30**	**29**				**700**
		Core Course – XIII (CC)	Linear Algebra	22UMA6CC13	5	5	3	25	75	100
		Core Course – XIV(CC)	Complex Analysis	22UMA6CC14	5	5	3	25	75	100
		Core Course –XV (CC)	Dynamics	22UMA6CC15	4	4	3	25	75	100
		Core Course –XVI (CC)	Cyber Security	22UGCS	5	4	3	25	75	100
VI	III	Discipline Specific Elective – II (DSE)	A. Graph Theory	22UMA6DSE2A	5	4	3	25	75	100
			B. Number Theory	22UMA6DSE2B						
			C. Fundamentals of Big Data Analytics	22UMA6DSE2C						
		Project	Project Work	22UMA6PW	5	4	-	-	100	100
	V	Gender Studies	Gender Studies	22UGGS	1	1	-	-	-	100
		Extension activity		22UGEA	0	1	0	-	-	-
		Total			**30**	**28**				**700**
		Grand Total			**180**	**150**				**4400**

Note:

Part – I-Language – Tamil/Hindi/French/Sanskrit

Part – II- English

List of Allied Courses:

Allied Course I- Mathematical Statistics

Allied Course II- Computer Science

Part	Course	No. of Courses	Credits	Total Credits
I	Tamil/ Other Language	4	12	12
II	English	4	12	12
III	Core (Theory& Practical)	16+1	77	109
	Project Work	1	4	
	Internship	1	2	
	First Allied	3	9	
	Second Allied	3	9	
	DSE	2	8	
IV	GEC	2	4	15
	SEC	2	4	
	AECC-I -Universal Human Values	1	2	
	AECC-II-Environmental Studies	1	2	
	AECC-III-Innovation and Entrepreneurship	1	1	
	AECC-IV- Professional Skills	1	2	
V	Gender Studies	1	1	02
	Extension Activities	–	1	
		44		**150**

The Internal and External marks for Theory and practical papers are as follows:

Subject	Internal Marks	External Marks
Theory	25	75
Practical	40	60

FOR THEORY:

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks].

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks].

FOR PRACTICAL:

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks].

The passing minimum for University Examinations shall be 40% out of 60 marks [i.e. 24 marks].

SEMESTER I

CORE COURSE – I (CC)

DIFFERENTIAL CALCULUS AND TRIGONOMETRY

(2022-2023 Onwards)

Semester I	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs /Week**	**CREDITS**
22UMA1CC1	**DIFFERENTIAL CALCULUS AND TRIGONOMETRY**	**CORE**	**5**	**4**

Course Objective

- **Compute** mathematical quantities using differential calculus and **interpret** their meaning.
- **Explore** fundamental concepts of single variable calculus
- **Apply** calculus concepts to solve real-world problems such as optimization and related rates problems.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Explain the basic concepts of differentiation, extreme functions of two variables.	K2
CO2	Apply the concept of differentiation for explaining curvature/.	K3
CO3	Explore the solution of problems from a mathematical perspective.	K3
CO4	Associate various types of hyperbolic and inverse hyperbolic functions and Solve problems in summation of trigonometric series.	K4
CO5	Examine the conceptual understanding and fluency with trigonometric functions, techniques and manipulations necessary for success in calculus.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	2	1
CO2	3	2	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT I **(15 HOURS)**

Successive Differentiation:

The nth derivative – Standard results – Method of splitting the fractional expressions into partial fractions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the nth derivative of a product – A complete formal proof by induction.

UNIT II **(15 HOURS)**

Curvature:

Curvature – Circle, radius and centre of curvature – Cartesian formula for the radius of curvature – The coordinates of the centre of curvature – Evolute and Involute – Radius of curvature when the curve is given in polar coordinates.

UNIT III **(15 HOURS)**

Expansions:

Expansions of $cos\ n\theta$ and $sin\ n\theta$ -Expansion of $tan\ n\theta$ in powers of $tan\ \theta$ –Expansion of $tan(\ A + B + C + ...)$ (omitting examples on formation of equations) – Powers of sines and cosines of θ in terms of functions of multiples of θ – Expansions of $cos^n\theta$ when n is a positive integer – Expansions of $sin^n\theta$ when n is a positive integer – Expansions of $sin\theta$ and $cos\theta$ in a series of ascending powers of θ .

UNIT IV **(15 HOURS)**

Hyperbolic functions:

Hyperbolic functions – Relation between hyperbolic functions – Relations between hyperbolic functions and circular functions – Inverse hyperbolic functions.

UNIT V **(15 HOURS)**

Derivatives for Graphing and Applications:

Maxima and Minima:

Maxima and Minima of functions of two variables – Working Rule – Lagrange's method of undetermined multiplier

Tracing of Curves – Tracing of curves whose equation is in Cartesian coordinates.

UNIT VI

Self Study for Enrichment:

Meaning of the Derivative: Geometrical interpretation – Meaning of the sign of the differential coefficient - *p-r* equation: Pedal equation of a curve – The expansions of sin θ and cos θ to find the limits of certain expressions – Logarithms of complex quantities: Logarithms of complex quantities – To find the logarithm of $x+iy$ – General value of logarithm of $x+iy$ – Tracing of Curves : Polar Equation.

Text Books

1. Narayanan. S, .Manicavachagom Pillay. T. K. (2015). *Calculus Volume I*. S. Viswanathan (Printer & publishers) Pvt Ltd.

2. Narayanan. S, .Manicavachagom Pillay. T. K. (2013). *Trigonometry*. S. Viswanathan (Printer & publishers) Pvt Ltd.

UNIT-I   Chapter III: Sections 1.1 – 1.6, 2.1, 2.2 [1]

UNIT-II   Chapter X: Sections 2.1 – 2.6 [1]

UNIT-III   Chapter III: Sections 1 - 4, 4.1, 5 [2]

UNIT- IV   Chapter IV: Sections 1,2,2.1,2.2,2.3 [2]

UNIT- V   Chapter VIII: Sections 4, 4.1,5 [1]

                Chapter XIII: Sections 1.1 & 1.2 [1]

Reference Books

1. Arumugam. S and Issac. (2014). *Calculus*. New Gamma Publishing House.

2. Singaravelu. A. (2003). *Differential Calculus and Trigonometry*. A.Singaravelu and R.Ramaa 1st edition, Nagapattinam, R Publication.

3. Bali. N.P. (2010). *Differential Calculus*. Laxmi Publications (P) Ltd. New Delhi.

Web Links

1. **https://www.youtube.com/watch?v=s8hVridQ5IA**

2. **https://www.youtube.com/watch?v=KijGLjxKlsY**

3. **https://www.youtube.com/watch?v=IQJ0UiM91Z4**

4. **https://www.youtube.com/watch?v=43cMRs2pat4**

5. **https://www.youtube.com/watch?v=mAC88G_cc_M**

6. **https://www.youtube.com/watch?v=CioY8ElsjO4**

7. **https://youtu.be/zExo4_TpOAw**

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designer

1. Dr. P. Sudha

CORE COURSE – II (CC)

INTEGRAL CALCULUS

(2022-2023 Onwards)

Semester I	Internal Marks: 25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
22UMA1CC2	INTEGRAL CALCULUS	CORE	4	4

Course Objective

- **Analyze** the properties of definite integral and Reduction formulae.
- **Explore** the order of Integration, Triple Integrals, Beta and Gamma functions.
- **Apply** Geometrical Applications of Integration of area under plane curve.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Apply the concepts of double, triple integrals.	K3
CO2	Distinguish the concepts of Beta and Gamma functions.	K3
CO3	Apply the concept of definite integral to solve various problems.	K3
CO4	Interpret the definite integral geometrically as the area under a plane curve.	K3
CO5	Evaluate the types of integration.	K5

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	2	2	3	2
CO2	3	2	3	3	2	2	2	3	3	3
CO3	3	3	3	3	3	2	3	2	2	2
CO4	3	2	3	3	2	3	3	3	2	2
CO5	3	3	3	3	3	2	2	2	3	3

"1" – Slight (Low) Correlation ¬ "2" –   Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT I   **(12 HOURS)**

Integration: Integration of rational algebraic functions: $\int \dfrac{dx}{ax^2 + bx + c}$ $-$ $\int \dfrac{lx + m}{ax^2 + bx + c} dx$ $-$

Integration of Irrational functions $\int \dfrac{px + q}{\sqrt{ax^2 + bx + c}} dx$ $-$ Any expression of the form

$\int \dfrac{dx}{(x - k)\sqrt{ax^2 + bx + c}} - \int \dfrac{dx}{a + b \cos x}$ (Integration of these types only)

UNIT II   **(12 HOURS)**

Properties of Definite Integrals – Integration by parts – Reduction formulae.

UNIT III   **(12 HOURS)**

Multiple Integrals: Definition of the double integrals – Evaluation of the double Integrals – Triple Integrals

UNIT IV   **(12 HOURS)**

Improper Integrals: Beta and Gamma functions: Definition – convergence of $\Gamma(n)$ – Recurrence formula for gamma functions – Properties of Beta functions – Relation between Beta and Gamma functions – Definite integrals using Gamma functions

UNIT V   **(12 HOURS)**

Geometrical Applications of Integration – Areas under plane curves: Cartesian Co-ordinates – Area of a closed curve – Examples – Area in polar co-ordinates

UNIT VI

Self-study for Enrichment:

$\int \dfrac{dx}{a \cos x + b \sin x}$ – Bernoulli's formula – Applications of Multiple Integrals – Applications of Gamma functions to multiple integrals – Approximate Integration.

Text Books

1. Narayanan, S. & Manicavachagom Pillay, T.K.(2015), Calculus, Volume II, S. Viswanathan (Printers & publishers) Pvt Ltd**.**

UNIT – I   Chapter 1: Sections 7.3 (Type I & II) 8 - Case II and case V, 9

UNIT – II   Chapter 1: Sections 11, 12, 13 (13.1 – 13.9)

UNIT –III   Chapter 5: Sections 2.1, 2.2 & 4

UNIT – IV   Chapter 7: Sections: 2.1 – 2.3, 3 – 5

UNIT –V   Chapter 2: Sections 1.1 – 1.4

Reference Books

1. Shanti Narayan, Integral Calculus (2002), S. Chand & Company Ltd
2. Shanti Narayan & Mittal, P. K (2008) Integral Calculus, S. Chand & Company Ltd
3. Singh, U. P. Srivastava, R. J & Siddiqui, N. H. (2011) Integral Calculus, Wistom Press.

Web Links

1. https://youtu.be/w-T90XSM90s
2. https://youtu.be/VXSn6EY9klg
3. https://youtu.be/2l-_SV8cwsw
4. https://youtu.be/bLhxQldbWW8
5. https://youtu.be/4KDenLHggDM
6. https://youtu.be/db7d_a0wiUg
7. https://youtu.be/zFy-OpajEtA
8. https://youtu.be/j6A44yQrGfU
9. https://youtu.be/scKJXbQpePM
10. https://youtu.be/FsC3do74Ulo

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designer

1. Dr. P. Shalini

FIRST ALLIED COURSE –I (AC)

MATHEMATICAL STATISTICS I

(2022-2023 Onwards)

Semester I	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs / Week**	**CREDITS**
22UMA1AC1	**MATHEMATICAL STATISTICS I**	**ALLIED**	**5**	**4**

Course Objective

- **Enable** the students to acquire the knowledge of statistics.
- **Analyze** the properties of various statistical functions.
- **Explore** the concepts of some statistical distributions.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Apply Student's t, Fisher's t and F statistics to derive their probability Distribution..	K3
CO2	Analyze how correlation is used to identify the relationships between variables and how regression analysis is used to predict outcomes.	K3
CO3	Solving mean, median, mode, moments and moment generating functions of discrete and continuous distributions.	K3
CO4	Distinguish between a discrete and a continuous random variable.	K4
CO5	Examine the various properties of expectation, variance and the concept of covariance.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	2	1
CO2	3	2	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

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Syllabus

UNIT I (18 HOURS)

Random Variables and Distribution Functions

Random Variable – Distribution Functions – Properties of Distribution Function – Discrete Random Variable – Probability Mass Function – Discrete Distribution Function – Continuous Random Variable – Probability Density Function – Various Measures of Central Tendency, Dispersion, Skewness and Kurtosis for Continuous Probability Distribution – Continuous Distribution Function – Joint Probability Mass Function and Marginal and Conditional Probability Function – Joint Probability Distribution Function – Joint Density Function, Marginal Density Function - The Conditional Distribution Function and Conditional Probability Density Function.

UNIT II (15 HOURS)

Mathematical Expectation

Mathematical Expectation – Addition Theorem of Expectation – Multiplication Theorem of Expectation – Co-variance – Expectation of a Linear Combination of Random Variables – Variance of a Linear Combination of Random Variables – Expectation of a Continuous random variable – Conditional Expectation & Conditional Variance.

UNIT III (14 HOURS)

Generating Functions

Moment Generating Function – Theorems on moment Generating Functions– Cumulants– Additive Property of Cumulants – Effect of Change of Origin and Scale on Cumulants – Characteristic Function – Properties of Characteristic Function.

UNIT IV (13 HOURS)

Correlation and Linear Regression

Introduction – Meaning of Correlation – Scatter Diagram – Karl Pearson's Co-efficient of Correlation: Limits for Correlation Co-efficient – Assumptions Underlying Karl Pearson's Correlation Co-efficient – Rank Correlation : Spearman's Rank Correlation Co- efficient – Tied or Repeated Ranks – Repeated Ranks (continued) - Introduction – Linear Regression : Regression Co-efficient - Properties of Regression Co-efficient – Angle between two lines of Regression.

UNIT V (15 HOURS)

Exact Sampling Distributions

Chi-Square Distribution: Introduction – Derivation of the Chi-Square Distribution(χ^2) –M.G.F. of Chi-Square Distribution : Cumulant Generating Function of χ^2 -Distribution – Limiting Form of χ^2-Distribution for–Characteristic Function of χ^2 -Distribution – Mode and Skewness of χ^2-Distribution – Additive Property of χ^2 Variates – Chi- Square Probability Curve – Students 't' Distribution : Derivation of the Students 't' Distribution – Fisher's 't' – Distribution

of Fisher's 't' – Constants of t-distribution – Limiting Form of t-distribution – F- Distribution : Derivation of Snedecor's F- Distribution – Constants of F– Distribution – Mode and Points of Inflexion of F- Distribution.

UNIT VI

Self-Study for Enrichment:

Independent Random Variables – Uniqueness Theorem of Characteristic Function – Limits for the Rank Correlation Coefficient – Graph of t-distribution – Critical Values of t .

Text Books

1. Gupta, S.C. & Kapoor, V.K. (2004). *Elements Of Mathematical Statistics*. Sultan Chand & Sons, New Delhi.

2. Gupta, S.C. & Kapoor, V.K. (2015). *Fundamentals Of Mathematical Statistics*. Sultan Chand & Sons, New Delhi.

UNIT-I   Chapter 5: Sections 5.1 to 5.5.3, 5.5.5 [1]

UNIT-II   Chapter 6: Sections 6.1 to 6.8 [1]

UNIT-III   Chapter 6: Sections 6.9 to 6.11.1 [1]

UNIT- IV   Chapter 10: Sections 10.1 to 10.4.2 & 10.7, 10.7.1 to 10.7.3 [2]

                    Chapter 11: Sections 11.1 to 11.2.3 [2]

UNIT- V   Chapter 15: Sections 15.1 to 15.3.6 [2]

                    Chapter 16: Sections 16.2 to 16.2.5, 16.5, 16.5.1 to 16.5.3 [2]

Reference Books

1. Pillai, R.S.N. Pillai & Bhagavathi. (2008). *Statistics, Theory and Practice*. S.Chand & Sons.

2. Bhishma Rao, G.S.S. (2011). *Probability and Statistics*. Scitech Publications (India) Pvt Ltd.

3. Veerarajan, T. (2010). *Probability, Statistics and Random Processes*. Tata McGraw Hill Education Private Limited.

Web Links

1. https://www.youtube.com/watch?v=YXLVjCKVP7U
2. https://www.youtube.com/watch?v=xTpHD5WLuoA
3. https://www.youtube.com/watch?v=wjwLTNYOuI4
4. https://www.youtube.com/watch?v=zmyh7nCjmsg
5. https://www.youtube.com/watch?v=ux8zQvWWLk

Pedagogy

Power point Presentations, Group Discussions, Seminar, Quiz, Assignment and Smart Classroom.

Course Designer

1. Ms. V. ManiMozhi

MATHEMATICAL STATISTICS (P)

(2022-2023 Onwards)

Semester I	Internal Marks: 40		External Marks:60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs / Week**	**CREDITS**
22UMA1AC2P	**MATHEMATICAL STATISTICS (P)**	**ALLIED**	2	2

Course Objective

- **Understands** the basic concepts in quantitative data analysis.
- **Apply** the technical knowledge to **interpret** and **solve** the problems.
- **Explore** the ideas of Excel in Statistics.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Explore various statistical concepts in Excel.	K3
CO2	Solve the Measures of Central Tendency and Measures of Dispersion using Excel.	K3
CO3	Compute Correlation and Regression co-efficient between two data sets and their applications.	K3
CO4	Analyze the concepts of testing the hypothesis and apply the test to the real-life problems.	K4
CO5	Make use of formulas, including the use of built-in functions.	K3

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	1	2	3	2	2	2	3	2	2	2
CO2	1	2	3	2	2	2	3	2	2	2
CO3	1	2	3	2	2	2	3	2	2	2
CO4	1	2	3	2	2	2	3	2	2	2
CO5	1	2	3	2	2	2	3	2	2	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

LIST OF PROGRAMS

1) Arithmetic Mean, Geometric Mean and Harmonic Mean.
2) Median and Mode.
3) Quartile Deviation and Mean Deviation.
4) Standard Deviation and Co-efficient of Variation.
5) Karl Pearson's Co-efficient of Skewness.
6) Bowley's Co-efficient of Skewness.
7) Moments and Kurtosis.
8) Karl Pearson's Co-efficient of correlation.
9) Rank Correlation.
10) Fit the regression line.
11) Test the hypothesis for the difference between two sample means.
12) Test the hypothesis for single proportion.
13) Test the significance of hypothesis using 't' test.
14) Test the significance of hypothesis using 'F' test.
15) Test the significance of hypothesis using chi-square test.

Text Books

1. Asha Chawla**. &** Seema Malik**. (2017).** *Statistical Analysis with MS Excel***.** Avichal Publishing Company.

Reference Books

1. Web Tech Sol. (2010). *Mastering Microsoft Excel Functions and Formulas*. Khanna Book Publishing Company.
2. Neil J. Salkind. (2015). *Excel Statistics a Quick Guide*. SAGE Publications, Inc.
3. Charles Zaiontz. (2015). Statistics using Excel Succinctly. E-Book**.**

Web links

1. https://www.youtube.com/watch?v=2rEhWFhSqnI
2. https://www.youtube.com/watch?v=L9TiYC6tQmU
3. https://www.youtube.com/watch?v=v5kYz3ADPBI
4. https://www.youtube.com/watch?v=9cXluqvGe8c
5. https://www.youtube.com/watch?v=egAvfCZTpz8
6. https://www.youtube.com/watch?v=7Y1g340tcbU
7. https://www.youtube.com/watch?v=_QnsH74zXhA
8. https://www.youtube.com/watch?v=BlS11D2VL_U
9. https://www.youtube.com/watch?v=_WNUfgZipww

10. https://www.youtube.com/watch?v=j966OJol0iA

11. https://www.youtube.com/watch?v=mUycvaTRrCw

12. https://www.youtube.com/watch?v=ckcUt3EyD-Q

Pedagogy

Power point presentations, Live Demo, Hands on training.

Course Designers

1. Dr. P. Saranya
2. Dr. C. Saranya

SEMESTER II

CORE COURSE – III (CC)

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

(2022-2023 Onwards)

Semester II	Internal Marks: 25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
22UMA2CC3	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	CORE	5	5

Course Objective

- **Explain** the basics of Ordinary Differential Equations.
- **Emphasize** in the field of Partial Differential Equations.
- **Explore** the mathematical methods formatted for major concepts.

CourseOutcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Explain various notions in ODE, PDE, Laplace transforms.	K1,K2
CO2	Classify the problem models in the respective area.	K3
CO3	Identify the properties of solutions in the field of mathematics.	K3
CO4	Solve various types of problems involving differential equations.	K3
CO5	Analyze the applications of the Differential equations in practical life.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	2	3
CO2	3	2	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Equations of the first order but of higher degree:** Equations solvable for dy/dx – Equations solvable for y – Equations solvable for x – Clairaut's form – Extended form of Clairaut's form – Exact differential equations – Conditions of integrability of $M\,dx + N\,dy = 0$ – Practical rule for solving an exact differential equation – Rules for finding integrating factors - simple problems.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Linear equations with constant coefficients:** Definition – The operator D – Complementary function of a linear equation with constant coefficients – Particular integral – General method of finding P.I. – Special methods for finding P.I. of the forms e^{ax}, $\cos ax \text{ or } \sin ax$, $e^{ax}V$, x^m – Linear equations with variable coefficients – Methods of finding particular integrals – Method of Variation of Parameters (Omit third & higher order equations).	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Partial differential equations of the first order:** Classification of Integrals – Derivation of partial differential equations – By elimination of constants – By elimination of an arbitrary function – Lagrange's method of solving the linear equation – Special methods for some standard forms $F(p, q) = 0$, $F(x, p, q) = 0$, $F(y, p, q) = 0$, $F(z, p, q) = 0$, $f_1(x, p) = f_2(y, q)$ Clairant's form – Equations reducible to the standard forms – Charpit's method .	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	**Partial differential equations of higher order:** Introduction – Homogeneous differential equation – Methods of finding C.F. – Methods of finding P.I. of the forms	15	CO1, CO2, CO3, CO4,	K1, K2, K3, K4

	e^{ax+by}, $x^r y^s$, $\sin(ax+by)$ or $\cos(ax+by)$, $e^{ax+by} \varphi(x,y)$.		CO5	
V	**Laplace transforms & inverse laplace transforms:** Definition – Piecewise continuity – Sufficient conditions for the existence of the Laplace Transforms – Basic results – Laplace Transform of periodic functions – Some general theorems & simple applications – Evaluation of certain integrals using Laplace Transform – The Inverse Laplace Transforms –Modification of results in Laplace Transform to get the inverse Laplace Transform - Use of Laplace Transforms in solving ODE with constant coefficients.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** Equations that do not contain x explicitly- Equations that do not contain y explicitly- Equations homogeneous in x and y - Special method of evaluating the P.I. when X is of the form x^m –Solving of few standard forms from Charpit's method - Methods of finding P.I. of the forms $\sin ax \sin by$ or $\cos ax \cos by$ - Use of Laplace Transforms in solving system of differential equations.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Narayanan, S and Manicavachagom Pillay, T.K (2016). *Differential Equations And Its Applications.* S.Viswanathan Publishers Pvt. Ltd.

2. Arumugam, S and Thangapandi Isaac, A (2014). *Differential Equations And Applications.* New Gamma publishing House.

UNIT-I   Chapter IV: Sections 1 - 3 [1]

                    Chapter II: Section 6 [1].

UNIT-II   Chapter V: Sections 1-5 [1] (Omit 5.5)

                    Chapter VIII: Section 4 [1] (Omit 6.1)

UNIT-III   Chapter XII: Sections 1-6 [1]

UNIT- IV   Chapter V: Sections 1-2 [2]

UNIT- V   Chapter IX: Sections 1-8 [1]

Reference Books

1. Raisinghania M.D. (2008). *Ordinary and Partial Differential Equations.*S.Chand & Company**.**

Web Links

1. https://youtu.be/aYrsPeE7NLQ
2. https://youtu.be/913LV_0QDO0
3. https://youtu.be/JEyzQtRPnjk
4. https://youtu.be/6rTtLQr8uq0
5. https://youtu.be/ZDHmF5PBk-8

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

CourseDesigner

1. Dr. R.Divya

CORE COURSE – IV (CC)
VECTOR CALCULUS AND FOURIER SERIES
(2022-2023 Onwards)

Semester II	Internal Marks: 25		External Marks:75		
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs /Week**	**CREDITS**	
22UMA2CC4	VECTOR CALCULUS AND FOURIER SERIES	CORE	4	4	

Course Objective

- **Explain** the basics principles of vector calculus.
- **Explore** the mathematical methods with vector integration.
- **Understand** the concepts and properties of Fourier Series.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Remember and recall the concepts of Vector Calculus and Fourier Series.	K1
CO2	Solve various types of problems in the Core area.	K3
CO3	Explain the concepts of odd and even functions.	K3
CO4	Describe the development of series.	K3
CO5	Examine the concepts of integration for finding solution.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	2	3	3	2	3	3	2	2	3
CO3	3	2	3	3	2	3	3	3	3	2
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Vector Differentiation:** Vector valued function of a single scalar variable. **Differential Operators:** Definition – The Vector differential operator – The operator $a.\nabla$, where a is a unit vector – The Gradient of a scalar point function – Equation of tangent plane and normal –Divergence and Curl of a vector .	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Vector Integration:** Vector Integration – Line integrals-Normal Surface Integral $\int_S \vec{F}.\hat{n}.dS$ - Flux across a Surface-Volume Integral $\int_V F.dV$ (Simple Problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Vector Integration:** Gauss's Divergence Theorem $\int_S \vec{F}.\hat{n}.dS = \int_V div\ \vec{F}dV$ - Stoke's theorem $\int_c \vec{F}.\hat{n}.d\vec{r} = \int_S curl\ \vec{F}.\hat{n}dS$ - Green's theorem - Stoke's theorem in space.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	**Fourier series:** Fourier series – definition - Fourier Series expansion of periodic functions with Period 2π and period 2a – Odd & even functions in Fourier Series.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	**Fourier series:** Half- range Fourier Series – definition - Development in Cosine series - Development in Sine series - Change of interval.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** Theorems on differentiation- Properties of grad ϕ - Stoke's theorem in Cartesian form - Properties of odd and even functions- Combination of Series.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Khanna. M.L., *Vector Calculus*, Jai Prakash Nath and Co., 8th Edition, (1986).

2. Narayanan.S, Manicavachagam Pillai. T.K., *Calculus*, Vol.III, S.Viswanathan (Printers and Publishers) Pvt Limited, (2014).

UNIT-I	Chapter I: Section 1 [1]
	Chapter II: Sections 2-4, 6,7[1]
UNIT-II	Chapter III: Sections 1 – 4 [1]
UNIT-III	Chapter III: Sections 5 - 7 [1]
UNIT- IV	Chapter IV: Sections 1-3 [2]
UNIT- V	Chapter IV: Sections 4-6 [2]

Reference Books

1. Duraipandiyan. P & Lakshmi Duraipandian, *Vector Analysis*, Emarald Publishers (1998).

2. Vittal. P.R. & V.Malini, *Vector Analysis*, Margham Publications (2014).

3. Sankarappan. S & Arulmozhi. G. (2006). *Vector Calculus, Fourier Series and Fourier Transforms,* Vijay Nicole imprints Private Limited, Chennai.

Web References:

1. https://www.youtube.com/watch?v=FfJtVvQtqTM&list=PLU6SqdYcYsfJz9FAzbgoc Ijlkw4NXAar-

2. https://www.youtube.com/watch?v=9LqzrAHrSS0&list=PLeIE3weEKo4YnuLABA WpfuN9ufYJjg1SR

3. https://www.youtube.com/watch?v=KCS-VTm398I&list=PLhSp9OSVmeyLke5_cby8i8ZhK8FHpw3qs

4. https://www.rtu.ac.in/expert/app/documents/kjangid@rtu.ac.in_51629122020100932a m.pdf

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designer

1. Dr. R. Radha

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CORE PRACTICAL – I (CP)

MATLAB PROGRAMMING (P)

(2022-2023 Onwards)

</div>

Semester II	Internal Marks: 40		External Marks:60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs /Week**	**CREDITS**
22UMA2CC1P	**MATLAB Programming (P)**	**Core Practical – I (CP)**	**2**	**2**

Course Objective

- **Apply** MATLAB as a simulation tool.
- **Compute** mathematical solutions using MATLAB and develop inter-disciplinary skills.
- **Determine** syntax, semantics, data-types and library functions of numerical computing.

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Explain fundamental concepts of MATLAB.	K2
CO2	Illustrate a great numbers of MATLAB commands and how to use them in programming and in many applications in Mathematics.	K2
CO3	Compute simple program for a given problem in MATLAB coding.	K3
CO4	Determine the result and the outcome of any command or script.	K4
CO5	Deduce Mathematical solutions using MATLAB tools.	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	2	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	2	3

<div align="center">

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

</div>

Listings:

1. Finding the leap year.
2. Operations using Matrices (Addition, Subtraction, Multiplication, Transpose and Inverse)
3. Basic plotting of variables (Simple and multiple data set).
4. Sorting of given data.
5. Finding the sum of n numbers, sum of square of n numbers, sum of 'n' odd numbers.
6. Finding the roots of a polynomial equation.
7. Solving system of equations using matrices.
8. Finding the Eigen vectors and Eigen values.
9. Generating Fibonacci series.
10. Vector operations.
11. Evaluation of integrals.
12. Finding the derivatives of given order.
13. Operations on sets.

Web Links

1. https://www.youtube.com/watch?v=_Rd61S1yS24
2. https://www.youtube.com/watch?v=EF4wmV5xBM0
3. https://www.youtube.com/watch?v=XsrhAO3r3VY
4. https://www.youtube.com/watch?v=aEjeuj5jfLU
5. https://www.youtube.com/watch?v=ZBafH5fss1E
6. https://www.youtube.com/watch?v=XtiAC4adozQ
7. https://www.youtube.com/watch?v=kt8QSkt-M6c
8. https://www.youtube.com/watch?v=y4Sy9xo-pFU
9. https://www.youtube.com/watch?v=pi6Dkvs6rP4
10. https://www.youtube.com/watch?v=YzEp0jiVyYs
11. https://www.youtube.com/watch?v=LFoutvnfP6A
12. https://www.youtube.com/watch?v=7BJUX3oIlz0

Pedagogy

Power point presentations, Live Demo, Hands on Training.

Course Designer

1. Dr. P. Saranya

FIRST ALLIED COURSE –III (AC)
MATHEMATICAL STATISTICS II
(2022-2023 and Onwards)

Semester II	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs / Week**	**CREDITS**
22UMA2AC3	**MATHEMATICAL STATISTICS II**	**ALLIED**	**4**	**3**

Course Objectives

- **Enable** in-depth knowledge of probability.
- **Explore** the concepts of some statistical data.
- **Analyse** the properties of discrete and continuous distributions.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Define the basic concepts in probability, some special distributions, and sampling distributions.	K1
CO2	Explain the properties of probability, special distributions and the theory of sampling distributions to find solutions of real-life problems.	K2
CO3	Solve problems in probability, some special distributions and sampling distributions.	K3
CO4	Examine the given data and interpret the results	K4
CO5	Analyze probability, and various distributions in the case of solid conclusions about the values of the population parameter.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	2	1
CO2	3	2	3	3	3	3	3	3	2	3
CO3	3	3	2	3	3	3	3	3	3	3
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

"1" – Slight (Low) Correlation   "2" – Moderate (Medium)Correlation

"3" – Substantial (High) Correlation   "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Theory of probability:** Introduction – Short History – Definitions of Various Terms – Mathematical or Classical or 'a Priori' Probability – Statistical or Empirical Probability – Mathematical Tools: Preliminary Notion of sets – Sets and Elements of Sets – Operations on Sets – Algebra of Sets - Axiomatic approach to Probability – Random Experiment (Sample Space) – Event – Some Illustrations – Algebra of Events – Probability : Mathematical Notion – Probability Function – Laws of Addition of Probabilities – Extension of General Law of Addition of Probabilities – Law of Multiplication or Theorem of Compound Probability - Independent Events – Pairwise Independent Events – Mutually Independent Events – Baye's theorem.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Special Discrete Probability Distributions:** Introduction – Discrete uniform Distribution- Bernoulli Distribution : Moments of Bernoulli Distribution - Binomial Distribution : Moments of Binomial Distribution – Recurrence Relation for the Moments of Binomial Distribution – Factorial Moments of Binomial Distribution –Mean Deviation about Mean of Binomial Distribution – Mode of Binomial Distribution – Moment Generating Function of Binomial Distribution – Additive Property of Binomial Distribution	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Special Discrete Probability Distributions:** Poisson Distribution: The Poisson Process – Moments of the Poisson Distribution – Mode of the Poisson Distribution – Recurrence Relation for Moments of the Poisson Distribution – Moment Generating Function of the Poisson Distribution – Characteristic Function of the Poisson Distribution –	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

	Cumulants of the Poisson Distribution – Additive or Reproductive Property of Independent Poisson Variates.				
IV	**Special Continuous Probability Distributions:** Introduction –Normal Distribution: Normal Distribution as a Limiting Form of Binomial Distribution – Chief Characteristics of the Normal Distribution – Mode of Normal Distribution – Median of Normal Distribution – M.G.F. of Normal Distribution – Cumulant Generating Function (c.g.f.) of Normal Distribution – Moments of Normal Distribution – A Linear Combination of Independent Normal Variates - Fitting of Normal Distribution.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	**Special Continuous Probability Distributions:** Rectangular (or Uniform) Distribution: Moments of Rectangular Distribution – M.G.F. of Rectangular Distribution – Characteristic Function of Rectangular Distribution – Mean Deviation (about Mean) of Rectangular Distribution–Gamma Distribution(only definition)– Beta Distributions of first kind : Constants of Beta Distributions of first kind – Beta Distributions of second kind : Constants of Beta Distributions of Second kind.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	**Self-Study for Enrichment: (Not included for End Semester Examinations)** Extension of Multiplication Law of Probability – Characteristic Function of Binomial Distribution – Cumulants of the Binomial Distribution – Recurrence Relation for Cumulants of Binomial Distribution – Recurrence formula for the Probabilities of Poisson distribution –Log-normal Distribution – Triangular Distribution– Exponential Distribution.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Gupta, S.C. & Kapoor, V.K. (2018). *Elements of Mathematical Statistics*. Sultan Chand & Sons, New Delhi.

2. Gupta, S.C. & Kapoor, V.K. (2014). *Fundamentals of Mathematical Statistics*. Sultan Chand & Sons, New Delhi.

UNIT-I   Chapter 4: Section 4.1 -4.8 (omit 4.7.1)[1]

UNIT-II   Chapter 8: Sections 8.1 to 8.3, 8.4(8.4.1 to 8.4.7) [2]

UNIT-III   Chapter 8: Sections 8.5 (8.5.1 to 8.5.8)[2]

UNIT- IV   Chapter 9: Sections 9.1 and9.2 (9.2.1 to 9.2.8,9.2.14)[2]

UNIT- V   Chapter 9: Sections 9.3, 9.5, 9.6 -9.7[2]

Reference Books

1. Pillai. R.S.N. Pillai & Bhagavathi. (2008). *Statistics, Theory and Practice*. S.Chand & Sons.

2. Bhishma Rao. G.S.S. (2011). *Probability and Statistics*. Scitech Publications (India) Pvt Ltd.

3. Veerarajan. T. (2010). *Probability, Statistics and Random Processes*. Tata McGraw Hill Education Private Limited.

Web References

1. https://www.youtube.com/watch?v=ZKkiCC6uCaU&list=PLpEFfNAthorfHzVYKNRFgtWJp2R1vTZfj

2. https://www.youtube.com/watch?v=jmqZG6roVqU

3. https://www.youtube.com/watch?v=gHBL5Zau3NE

4. https://www.youtube.com/watch?v=3PWKQiLK41M

5. https://www.youtube.com/watch?v=dOr0NKyD31Q

6. https://www.statisticshowto.com/probability-and-statistics/statistics-definitions/uniform-distribution/

Pedagogy

Power Point Presentations, Group Discussions, Seminar, Quiz and Assignment.

Course Designer

1. Ms. V. ManiMozhi