# 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

# (2023-2024 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**<br><br>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 chosen fields. |
| **PEO2** | **ACADEMIC EXCELLENCE**<br><br>To provide a conducive environment to unleash their hidden talents andto nurture the spirit of critical thinking and encourage them to achieve their goal. |
| **PEO3** | **EMPLOYABILITY**<br><br>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**<br><br>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**<br><br>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**<br>Analyse, design and develop solutions by applying from fundamental concepts of basic sciences and expertise in discipline. |
| PO2 | **PROBLEM SOLVING**<br>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**<br>Develop prudent decision-making skills and mobility to work in teams to solve multifaceted problems. |
| PO4 | **EMPLOYABILITY**<br>Self-study acclimatize them to observe effective interactive practices for practical learning enabling them to be a successful science graduate. |
| PO5 | **LIFE LONG LEARNING**<br>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 2023-2024 Onwards)

| Semester | Part | Course | Course Title | Course Code | Inst. Hrs. / week | Credits | Exam | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Hrs. | Marks | | |
| | | | | | | | | Int | Ext | |
| I | I | Language Course-I (LC) | பொதுத்தமிழ் - I | 23ULT1 | 6 | 3 | 3 | 25 | 75 | 100 |
| | | | Hindi ka Samanya Gyan our Nibandh | 23ULH1 | | | | | | |
| | | | Poetry, Grammar and History of Sanskrit Literature | 23ULS1 | | | | | | |
| | | | Foundation Course: Paper I-French I | 23ULF1 | | | | | | |
| | II | English Language Course – I (ELC) | General English-I | 23UE1 | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course – I (CC) | Algebra and Trigonometry | 23UMA1CC1 | 4 | 4 | 3 | 25 | 75 | 100 |
| | | Core Course – II (CC) | Differential Calculus | 23UMA1CC2 | 5 | 4 | 3 | 25 | 75 | 100 |
| | | First Allied Course – I (AC) | Mathematical Statistics | 23UMA1AC1 | 5 | 4 | 3 | 25 | 75 | 100 |
| | | First Allied Course – II (AP) | Programming Language using MATLAB (P) | 23UMA1AC2P | 2 | 2 | 3 | 40 | 60 | 100 |
| | IV | Ability Enhancement Compulsory Course-I (AECC) | Value Education | 23UGVE | 2 | 2 | - | 100 | - | 100 |
| | | | | **Total** | **30** | **22** | | | | **700** |
| II | I | Language Course-II (LC) | பொதுத்தமிழ் -II | 23ULT2 | 6 | 3 | 3 | 25 | 75 | 100 |
| | | | Hindi Literature and Grammar-II | 22ULH2 | | | | | | |
| | | | Prose, Grammar and History of Sanskrit Literature | 23ULS2 | | | | | | |
| | | | Basic French-II | 22ULF2 | | | | | | |
| | II | English Language Course – II (ELC) | General English-II | 23UE2 | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course – III (CC) | Differential Equations and Laplace Transforms | 23UMA2CC3 | 4 | 4 | 3 | 25 | 75 | 100 |
| | | Core Course – IV (CC) | Integral Calculus | 23UMA2CC4 | 4 | 4 | 3 | 25 | 75 | 100 |
| | | Core Practical –I (CP) | Statistics with Excel (P) | 23UMA2CC1P | 2 | 2 | 3 | 40 | 60 | 100 |
| | | First Allied Course – III (AC) | Applied Statistics | 23UMA2AC3 | 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** | **22** | | | | **800** |

# I SEMESTER

**CORE COURSE – I (CC)**

**ALGEBRA AND TRIGONOMETRY**

**(2023-2024 Onwards)**

| Semester I | Internal Marks: 25 | | | External Marks:75 |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs /Week** | **CREDITS** |
| **23UMA1CC1** | **ALGEBRA AND TRIGONOMETRY** | **CORE** | **4** | **4** |

**Course Objective**

- Basic ideas on the Theory of Equations, Matrices and Number Theory.
- Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.
- Understanding of how Hyperbolic functions can be used as a powerful tool in solving problems in science.

**Course Outcomes**

**Course Outcome and Cognitive Level Mapping**

| CO Number | CO Statement<br>On the successful completion of the course, students will be able to | Cognitive Level |
|---|---|---|
| **CO1** | Define and interpret on reciprocal equations | **K1, K2** |
| **CO2** | Illustrate the sum of binomial, exponential and logarithmic series | **K3** |
| **CO3** | Compute Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix. | **K3** |
| **CO4** | Determine the powers and multiples of trigonometric functions in terms of sine and cosine. | **K4** |
| **CO5** | Evaluate the relationship between circular and hyperbolic functions and the summation of trigonometric series. | **K5** |

**Mapping of CO with PO and PSO**

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 |
| **CO4** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 |
| **CO5** | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 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 | Reciprocal Equations - Standard form - To increase or decrease the roots of a given equation by a given quantity- Removal of terms- Horner's method – related problems. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | Binomial Series– The following are the deductions from the Binomial Series - Approximations using Binomial Series- The Exponential Series – The Logarithmic series- related problems. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | Inverse matrix -Characteristic equation – Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | 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+...) - Powers of sines and cosines of $\theta$ in terms of functions of multiples of $\theta$, Expansions of $cos^n\theta$, $sin^n\theta$, $sin^n\theta cos^n\theta$ when n is a positive integer - Expansions of $\sin\theta$ and $\cos\theta$ in a series of ascending powers of $\theta$- related problems. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | Hyperbolic functions – Relation between circular and hyperbolic functions - Inverse hyperbolic functions - Logarithm of complex quantities - related problems. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| VI | **Self Study for Enrichment:** **(Not included for End Semester Examination)** Symmetric function of the roots - Partial Fractions- Rank of a matrix - To resolve into factors the expression $x^n - a^n, x^n + a^n$ - Summation of trigonometric series. | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

## Text Books


1. Manicavachagom Pillay, T.K, Natarajan T, Ganapathy K S (2018). *Algebra, Volume I.* S.Viswanathan (Printers &Publishers), Pvt. Ltd.

2. Sudha S (1998). *Algebra, Analytical Geometry(2D) and Trigonometry*. Emerald Publishers.
3. Manicavachagom Pillay, T.K, Natarajan T, Ganapathy K S (2015). *Algebra, Volume II*. S.Viswanathan (Printers &Publishers), Pvt. Ltd.
4. Narayanan, S, Manicavachagom Pillay, T.K (2013). *Trigonometry*. S.Viswanathan (Printers &Publishers), Pvt. Ltd.

**Chapters and Sections**

| | |
|---|---|
| UNIT-I | Chapter VI: Sections 16-17,19, 30 [1] |
| UNIT-II | Chapter I: Sections 1.1-1.5 [2] |
| UNIT-III | Chapter II: Sections 8, 16 [3] |
| UNIT- IV | Chapter III: Sections 1-5 [4] |
| UNIT- V | Chapter IV: Fully [4] |
| | Chapter V : Section 5 [4] |

**Reference Books**

1. David C. Lay, *Linear Algebra and its Applications*, 3rd Ed., Pearson Education Asia, Indian Reprint, 2020.
2. Frank Ayres JR, *Theory and Problems of Plane and Spherical Trigonometry*, Schaum's Outline Series McGraw-Hill Book Company, 1954.
3. Vittal P.R, Malini V, *Algebra, Analytical Geometry and Trigonometry*, Margham Publications, 2010.

**Web References**

1. **https://www.youtube.com/watch?v=0HwGGTdrBzg**
2. **https://www.youtube.com/watch?v=BydVprh9NgQ**
3. **https://www.youtube.com/watch?v=r-b4m2-yCt0**
4. **https://www.youtube.com/watch?v=IcBXhQNx4fY**
5. **https://www.youtube.com/watch?v=ZjBcmEeUWXg**

**Pedagogy**

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

**Course Designer**

Dr. R.Divya

**CORE COURSE – II (CC)**

**DIFFERENTIAL CALCULUS**

**(2023-2024 Onwards)**

| Semester I | Internal Marks: 25 | | External Marks:75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSETITLE** | **CATEGORY** | **Hrs /Week** | **CREDITS** |
| **23UMA1CC2** | **DIFFERENTIAL CALCULUS** | **CORE** | **5** | **4** |

## Course Objective

- **Explore** the basic skills of the students with mathematical methods formatted for their major concepts and train them in basic Differentiation.
- **Analyze** mathematical statements and expressions.
- **Evaluate** the fundamental concepts of differentiation, successive differentiation, and their applications.

## Course Outcomes

## Course Outcome and Cognitive Level Mapping

| CO Number | CO Statement<br>On the successful completion of the course, students will be able to | Cognitive Level |
|---|---|---|
| **CO1** | Explain the concepts of Calculus. | **K1, K2** |
| **CO2** | Classify the problem models in the respective area. | **K3** |
| **CO3** | Solve various types of problems in the corresponding stream. | **K3** |
| **CO4** | Identify the properties of solutions in the core area. | **K3** |
| **CO5** | Discover the applications of 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 | 2 |
| **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 | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Successive Differentiation**: Introduction (Review of basic concepts) – The $n^{th}$ derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the $n^{th}$ derivative of a product – A complete formal proof by induction. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| II | **Partial Differentiation**: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| III | **Partial Differentiation (Continued)**: Homogeneous functions – Partial derivatives of a function of two functions – Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| IV | **Envelope:** Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter – Family of curves will contain two parameters and the two parameters are connected by a relation. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| V | **Curvature:** Definition of Curvature – Circle, Radius and Centre of Curvature – Cartesian formula for the radius of curvature – The coordinates of the centre of curvature – Evolutes and Involute – Radius of Curvature when the curve is given in Polar Co-ordinates | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| VI | **Self -Study for Enrichment:**<br>**(Not included for End Semester Examination)**<br>Meaning of Derivative : Geometrical interpretation– Feynman's method of differentiation – Taylor's expansion of f(x,y) – p-r equation : pedal equation of a curve. | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |

## Text Book

1. Narayanan.S Manicavachagom Pillay.T.K**.** (2019). *Calculus Volume-I*. Ananda Book Depot.

## Chapters and Sections

| | | |
|---|---|---|
| UNIT-I | Chapter III | Sections 1.1-1.6, 2.1,2.2 |
| UNIT-II | Chapter VIII | Sections 1.1-1.5 |
| UNIT-III | Chapter VIII | Sections 1.6 ,1.7,4,5 |
| UNIT-IV | Chapter X | Sections 1.1-1.4 |
| UNIT-V | Chapter X | Sections 2.1-2.6 |

## Reference Books


1. Rawat.K.S.(2006). *An Differential Calculus*.1st Edition, Daryaganj, Newdelhi-2:AdhyayanPulishers and distributors, j m d House,Murarlal stre.
2. Arumugam. S and Issac. (2014). *Calculus*. New Gamma Publishing House.
3. Bali. N.P. (2010). *Differential Calculus*. Laxmi Publications (P) Ltd. New Delhi.


## Web References

1. **https://www.youtube.com/watch?v=s8hVridQ5IA**
2. **https://freevideolectures.com/course/4224/nptel-integral-vector-calculus/34**
3. **https://www.youtube.com/watch?v=IQJ0UiM91Z4**
4. **https://www.youtube.com/watch?v=AXqhWeUEtQU**
5. **https://www.youtube.com/watch?v=j5VGo1n8KBY&list=PLpklqhIbn1jrIbgS6UckW39WE04bAFjOS**
6. **https://archive.nptel.ac.in/courses/111/104/111104095/**

## Pedagogy

Chalk and Talk, Power point presentation, Group Discussion, Seminar, Assignment and Quiz.

## Course Designer

Dr.L.Mahalakshmi

# FIRST ALLIED COURSE –I (AC)

# MATHEMATICAL STATISTICS

**(2023-2024 Onwards)**

| Semester I | Internal Marks:25 | | External Marks:75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **23UMA1AC1** | **MATHEMATICAL STATISTICS** | **ALLIED** | **5** | **4** |

## 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<br>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 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 | 2 |
| **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–Pair wise Independent Events–Mutually Independent Events– Baye's theorem. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| II | **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. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |

| | | | | |
|---|---|---|---|---|
| III | **Mathematical Expectation**<br>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. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| IV | **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. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| V | **Special Continuous Probability Distributions:**<br>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. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| VI | **Self-Study for Enrichment: (Not included for End Semester Examinations)**<br>Extension of Multiplication Law of Probability– Independent Random Variables –Generating Functions– Poisson 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.

## Chapters and Sections

| | |
|---|---|
| UNIT-I | Chapter 4: Section 4.1 to 4.8 (omit 4.7.1) [1] |
| UNIT-II | Chapter 5: Sections 5.1 to 5.5.3, 5.5.5 [1] |
| UNIT-III | Chapter 6: Sections 6.1 to 6.8 [1] |
| UNIT-IV | Chapter 8: Sections 8.1 to 8.3, 8.4 (8.4.1 to 8.4.7) [2] |
| UNIT-V | Chapter 9: Sections 9.1 and 9.2 (9.2.1 to 9.2.8, 9.2.14) [2] |

## Reference Books

1. Pillai.R.S.N & 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=PLpEFfNAthorfHzVYKNREgtWJp2R1vTZfj**
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 Designers

1. Dr. S. Sasikala
2. Dr. R. Radha

**FIRST ALLIED COURSE –II (AP)**

**PROGRAMMING LANGUAGE USING MATLAB (P)**

**(2023-2024 Onwards)**

| Semester I | Internal Marks: 40 | | External Marks: 60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs /Week** | **CREDITS** |
| **23UMA1AC2P** | **Programming Language Using MATLAB (P)** | **ALLIED PRACTICAL** | **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 Outcomes**

**Course Outcome and Cognitive Level Mapping**

| CO Number | CO Statement<br>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 of 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 |

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

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

**Listings:**

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

**Web References**

1. **https://www.youtube.com/watch?v=EF4wmV5xBM0**
2. **https://www.youtube.com/watch?v=XsrhAO3r3VY**
3. **https://www.youtube.com/watch?v=aEjeuj5jfLU**
4. **https://www.youtube.com/watch?v=ZBafH5fss1E**
5. **https://www.youtube.com/watch?v=XtiAC4adozQ**
6. **https://www.youtube.com/watch?v=kt8QSkt-M6c**
7. **https://www.youtube.com/watch?v=pi6Dkvs6rP4**
8. **https://www.youtube.com/watch?v=YzEp0jiVyYs**
9. **https://www.youtube.com/watch?v=LFoutvnfP6A**
10. **https://youtu.be/rqWPw21E90A**
11. **https://youtu.be/CUdL4-tJy58**

**Pedagogy**

Power point presentations, Live Demo, Hands on Training.

**Course Designer**

Dr. C. Saranya

# II SEMESTER

**CORE COURSE – III (CC)**
**DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS**
**(2023-2024 Onwards)**

| Semester II | Internal Marks: 25 | | External Marks:75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSETITLE** | **CATEGORY** | **Hrs / Week** | **CREDITS** |
| **23UMA2CC3** | **DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS** | **CORE** | **4** | **4** |

## Course Objective

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

## Course Outcomes

## Course Outcome and Cognitive Level Mapping

| CO Number | CO Statement<br>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.

**Syllabus**

| 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 $e^{ax}$, $\cos ax$ or $\sin ax$, $e^{ax}V$, $x^m$ – Linear equations with variable coefficients – Methods of finding particular integrals – Method of Variation of Parameters. | 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 | **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. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| V | **Inverse laplace transforms:** The Inverse Transforms –Modification of results in Laplace Transform to get the inverse Laplace Transform - Use of Laplace Transforms in solving ODE with constant coefficients – The Laplace transform can also be used to solve systems of differentiable equations- Laplace transforms can be used to solve differential equations with variable coefficients. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

| | | | | |
|---|---|---|---|---|
| VI | **Self Study for Enrichment:**<br>**(Not included for End Semester Examination)**<br>Equations that do not contain *x* explicitly- Equations that do not contain *y* explicitly - Special method of evaluating the P.I. when X is of the form $x^m$ –Solving of few standard forms from Charpit's method - Certain equations involving integrals can also be solved by Laplace transform. | - | 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.

**Chapters and Sections**

| | |
|---|---|
| UNIT-I | Chapter IV: Sections 1 – 3. |
| | Chapter II: Section 6. |
| UNIT-II | Chapter V: Sections 1-5 (Omit 5.5). |
| | Chapter VIII: Section 4. |
| UNIT-III | Chapter XII: Sections 1-6. |
| UNIT- IV | Chapter IX: Sections 1-5. |
| UNIT- V | Chapter IX: Sections 6-10. |

**Web References**


1. Raisinghania M.D. (2008). *Ordinary and Partial Differential Equations.*S.Chand & Company.
2. Zafar Ahsan.(2006). Differential Equation and Their Applications (Second Edition). Prentice Hall of India Private Limited.
3. Dr.S.Arumugam, A Thangapandi Isaac (2014). Differential Equations and Applications. New Gamma Publishing House.


**Web References**

1. **https://youtu.be/aYrsPeE7NLQ**
2. **https://youtu.be/913LV_0QDO0**
3. **https://youtu.be/JEyzQtRPnjk**
4. **https://youtu.be/2LyY4t0Gfvs?si=Bq9dFIA4dHSQdSRg**
5. **https://youtu.be/UzaBAA3VJOY?si=MUQxwUqrykVZzkSt**

**Pedagogy**

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

**Course Designer**

Dr. R.Divya

**CORE COURSE – IV (CC)**

**INTEGRAL CALCULUS**

**(2023-2024 Onwards)**

| Semester II | Internal Marks: 25 | | External Marks:75 | |
|---|---|---|---|---|
| COURSE CODE | COURSE TITLE | CATEGORY | Hrs /Week | CREDITS |
| 23UMA2CC4 | 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<br>On the successful completion of the course, students will be able to | Cognitive Level |
|---|---|---|
| CO1 | Identify the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae. | K1, K2 |
| CO2 | Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution. | K3 |
| CO3 | Evaluate double and triple integrals and problems using change of order of integration. | K4 |
| CO4 | Explain beta and gamma functions and to use them in solving problems of integration. | K5 |
| CO5 | Discover the applications of Integral Calculus. | 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 | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Integration:** Integration of rational algebraic functions – Rule(a), Rule(b), Rule(c) – Integration of irrational functions – Case(i), Case(ii) only. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | **Integration:** Integration by parts – Reduction formulae – Bernoulli's formula. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | **Multiple Integrals:** Definition of the double integral – Evaluation of the double integral – Double integrals in polar co-ordinates – Triple integrals. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | **Improper integrals: Beta and Gamma functions:** Definitions – Convergence to $\Gamma(n)$ - Recurrence formula of Gamma functions – Properties of Beta functions - Relation between Beta and Gamma functions. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | **Geometrical Applications of Integration:** Areas under plane curves: Cartesian co-ordinates – Area of a closed curve – Areas in polar co-ordinates. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| VI | **Self -Study for Enrichment: (Not included for End Semester Examination)** Integration of the form $\sqrt{ax^2+bx+c}$ and $(px+q)\sqrt{ax^2+bx+c}$ - Integration as summation - Applications of multiple integrals - Applications of Gamma functions to multiple integrals – Approximate Integration: Trapezoidal rule. | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

## Text Book

1. Narayanan.S Manicavachagom Pillay.T.K**.** (2021). *Calculus Volume II.* Ananda Book Depot.

## Chapters and Sections

| | | | |
|---|---|---|---|
| UNIT-I | Chapter 1 | : | Sections 7.1- 7.4, 8(Page No. 40-46) |
| UNIT-II | Chapter 1 | : | Sections 12, 13, 14, 15.1. |
| UNIT-III | Chapter 5 | : | Sections 2.1, 2.2, 3.1, 3.2, 4. |
| UNIT-IV | Chapter 7 | : | Sections 2.1 - 2.3, 3, 4. |
| UNIT-V | Chapter 2 | : | Sections 1.1 – 1.4 |

## Reference Books


1. Shanti Narayan & Mittal, P. K (2008). *Integral Calculus,* S. Chand & Company Ltd.
2. Singh. U. P. Srivastava, R. J & Siddiqui, N. H. (2011). *A Text Book of Integral Calculus*, Wistom Press.
3. Singh. J. P. (2014) *Calculus*, Ane Books Pvt. Ltd.


## Web References

1. **https://youtu.be/GIGJdvdrdhs?si=-zflb8uCpb7Aw0WT**
2. **https://youtu.be/ocgjfF2AboA?si=8NMu-wdGBn9Yij9F**
3. **https://youtu.be/5SuPKa3Q9BM?si=taJPIYim2zdBJqZA**
4. **https://youtu.be/rCQZjpoVJ-o?si=VCw5630f1FEcLRh-**
5. **https://youtu.be/xU1HBisdJJs?si=nChZzYPOKF8foCPT**
6. **https://math.mit.edu/~nehcili/data/mat136_integration.pdf**
7. **https://www.academia.edu/31132415/MA_210_lecture_notes_INTEGRATION_TECHNIQUES_pdf**

## Pedagogy

Chalk and Talk, Power point presentation, Group Discussion, seminar, Assignment and Quiz.

## Course Designer

Dr. P. Sudha

**CORE PRACTICAL –I (CP)**

**STATISTICS WITH EXCEL (P)**

**(2023-2024 Onwards)**

| Semester II | Internal Marks: 40 | | External Marks:60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs / Week** | **CREDITS** |
| **23UMA2CC1P** | **STATISTICS WITH EXCEL (P)** | **CORE PRACTICAL** | **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<br>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 different types of statistical problems using Excel. | **K3** |
| **CO3** | Make use of formulas, including the use of built-in functions. | **K3** |
| **CO4** | Compute Statistical data's using Excel. | **K3** |
| **CO5** | Analyze the concepts of statistical methods and apply it to the real-life problems. | **K4** |

### 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. Moments and Kurtosis.
6. Fitting of a Binomial Distribution.
7. Fitting of a poisson distribution.
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.

**Web References**

1. **https://youtu.be/rRGJZp6GLsY**
2. **https://youtu.be/6dw3KNn0dYw**
3. **https://youtu.be/L9TiYC6tQmU**
4. **https://youtu.be/rAKu30EtVg8**
5. **https://youtu.be/GzUNF0PspYw**
6. **https://youtu.be/vqvBX0fe0S8**
7. **https://youtu.be/bcUW8kELOLw**
8. **https://youtu.be/sPgm9e8pDQM**
9. **https://youtu.be/7Y1g340tcbU**
10. **https://youtu.be/L_a8Z0BVjyM**
11. **https://youtu.be/0Bjf8LKnSOA**
12. **https://youtu.be/BlS11D2VL_U**

**Pedagogy**

Power point presentations, Live Demo, Hands on training.

**Course Designer**

Dr. C. Saranya

**FIRST ALLIED COURSE – III (AC)**
**APPLIED STATISTICS**
**(2023-2024 Onwards)**

| Semester II | Internal Marks: 25 | | External Marks:75 | |
|---|---|---|---|---|
| COURSE CODE | COURSE TITLE | CATEGORY | Hrs /Week | CREDITS |
| 23UMA2AC3 | APPLIED STATISTICS | ALLIED | 4 | 3 |

## Course Objective

- **Define** the notion of measures of central tendency, measures of dispersion.
- **Explore** the fundamental concepts correlation and regression.
- **Apply** the idea of large sample tests and small sample tests in various fields.

## Course Outcomes

## Course Outcome and Cognitive Level Mapping

| CO Number | CO Statement<br>On the successful completion of the course, students will be able to | Cognitive Level |
|---|---|---|
| CO1 | Define measures of central tendency, correlation, regression, measures of dispersion, large and small sample tests. | K1 |
| CO2 | Explain the basic concepts of measures of central tendency, measures of dispersion, correlation, regression, large and small sample tests. | K2 |
| CO3 | Apply the various concepts of correlation, regression, measures of central tendency & dispersion and sampling tests for solving the problems. | K3 |
| CO4 | Solve the problems using measures of central tendency and dispersion, correlation, regression, large and small sample tests. | K3 |
| CO5 | Examine the given data and interpret the results. | 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 | 2 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |

"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 | **Measures of Central Tendency:** Arithmetic Mean – Properties of Arithmetic Mean – Merits and Demerits of Arithmetic Mean – Weighted Mean – Median – Merits and Demerits of Median – Mode – Merits and Demerits of Mode – Geometric Mean - Merits and Demerits of Geometric Mean – Harmonic Mean - Merits and Demerits of Harmonic Mean – Selection of an Average – Partition Values. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| II | **Measures of Dispersion:** Measures of Dispersion – Range – Quartile Deviation – Mean Deviation – Standard Deviation and Root Mean Square Deviation – Relation between Standard Deviation and Root Mean Square Deviation – Different Formulae for Calculating Variance – Theorem (Variance of the Combined Series) - Coefficient of Dispersion – Coefficient of Variation. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| III | **Correlation and Regression:** Karl Pearson Coefficient of Correlation – Limits of Correlation Coefficient – Rank Correlation – Repeated Ranks – Regression – Lines of Regression – Regression Curves – Regression Coefficients – Properties of Regression Coefficients. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| IV | **Sampling and large Sample Tests:** Tests of Significance for Large Samples - Sampling of Attributes – Test for Single Proportion – Test of Significance for Difference of Proportions – Test of Significance for Single Mean – Test of Significance for Difference of means – Test of Significance for the Difference of Standard Deviations. (Problems Only). | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| V | **Exact Sampling Distribution:** Chi-square Test as a Test for Population Variance – Chi-square Test of Goodness of Fit – Independence of Attributes – Test for Single Mean – F-test for Equality of Population Variance. (Problems Only). | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| VI | **Self Study for Enrichment:** **(Not included for End Semester Examinations)** Graphical Location of Partition Values – Moments – Probable Error of Correlation Coefficient – Angle between two Lines of Regression – Standard Error of sample Mean – Applications of Chi-square Distribution – Applications of t-distribution – Applications of F-distribution. | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |

## Text Book

1. Gupta.S.C and Kapoor.V.K. (2003). *Elements of Mathematical Statistics (Third Edition)*. Sultan Chand & Sons Educational Publishers, New Delhi.

## Chapters and Sections

| | |
|---|---|
| UNIT-I | Chapter 2: Sections 2.5 – 2.11 (Omit 2.11.1) |
| UNIT-II | Chapter 3: Sections 3.3 – 3.8 |
| UNIT-III | Chapter 10: Sections 10.3, 10.6 & 10.7 (10.7.1 – 10.7.4) |
| UNIT- IV | Chapter 12: Sections 12.8, 12.9, 12.13 – 12.15 |
| UNIT- V | Chapter 13: Sections 13.5.1 – 13.5.3 |
| | Chapter 14: 14.2.6, 14.2.7, 14.3.2 |

## Reference Books


1. Pillai.R.S.N & 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://tinyurl.com/yu57nmb5**
2. **https://youtu.be/pSm9mgi65l4**
3. **https://youtu.be/BiLIcCtXmm0**
4. **https://youtu.be/xTpHD5WLuoA**
5. **https://tinyurl.com/yb57hh5e**
6. **https://tinyurl.com/h3nbyj35**
7. **https://rb.gy/muaxp**

## Pedagogy

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

## Course Designer

Dr. S. Vidhya