

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF MATHEMATICS



TANSCHÉ - CBCS With OBE

BACHELOR OF SCIENCE

PROGRAMME CODE - M

COURSE STRUCTURE

(w.e.f. 2023 – 2024 Batch onwards)

E.M.G. YADAVA WOMENS COLLEGE, MADURAI -14.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

(Re –accredited (3rd Cycle) with Grade A⁺ and CGPA 3.51 by NAAC)**TANSCHÉ – CBCS WITH OBE****DEPARTMENT OF MATHEMATICS –UG****COURSE STRUCTURE**

(w.e.f. 2023 – 2024 Batch onwards)

Semester	Part	Course Code	Course Title	Teaching hrs. (per week)	Duration of Exam (hrs.)	Marks Allotted			Credits
						CIA	SE	Total	
III	I	23OU1TA3/ 23OU1HIN3	Tamil/Hindi	6	3	25	75	100	3
	II	23OU2EN3	General English-III	6	3	25	75	100	3
	III	23OUMA31	CC-5 :Vector Calculus and Applications	5	3	25	75	100	4
		23OUMA32	CC-6: Differential Equations and Applications	4	3	25	75	100	4
		23OUMAGECH3/ 23OUMAGECS3	GEC-3: Chemistry for Physical Sciences-III / Python Programming	3	3	25	75	100	3
	IV	23OUMAGECH3P /23OUMAGECS3P	Chemistry Practical for Physical Sciences –III / Python Programming Lab	2	3	40	60	100	2
		23OUMASEC31P	SEC-4: Latex Lab	2	3	40	60	100	2
		23OUMASEC32	SEC-5: Mathematics for Competitive Examinations	1	2	25	75	100	1
			AECC: Environmental Studies	1	-	-	-	-	-
IV	I	23OU1TA4/ 23OU1HIN4	Tamil/Hindi	6	3	25	75	100	3
	II	23OU2EN4	General English-IV	6	3	25	75	100	3
	III	23OUMA41	CC-7 : Industrial Statistics	4	3	25	75	100	4
		23OUMA42	CC-8: Elements of Mathematical Analysis	4	3	25	75	100	4
		23OUMAGECH4/ 23OUMAGECS4	GEC-4: Chemistry for Physical Sciences-IV/ Introduction to Data Science	3	3	25	75	100	3
	IV	23OUMAGECH4P /23OUMAGECS4P	GEC-4: Chemistry Practical for Physical Sciences-IV/ Data Science Lab	2	3	40	60	100	2
		23OUMASEC41P	SEC-6 R Programming Lab	2	3	40	60	100	2
		23OUMASEC42P	SEC:7 Statistics using MS Excel Lab	2	3	40	60	100	2
		23OU4EV4	AECC: Environmental Studies	1	2	25	75	100	2

Department of Mathematics						II B.Sc.		
Sem.	Category	Course Code	Course Title	Credits	Contact Hours/week	CIA	SE	Total
III	Core	23OUMA31	Vector Calculus and Applications	4	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- Knowledge about differentiation of vectors and on differential operators.
- Knowledge about derivatives of vector functions.
- Skills in evaluating line, surface and volume integrals.
- The ability to analyse the physical applications of derivatives of vectors.
- Utilize vector calculus techniques to model and solve real-life situations and engineering problems.

Course Content:

UNIT- I: Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product.

UNIT- II: The vector operator 'del', The gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors – simple applications.

UNIT- III: Laplacian operator, Vector identities - Line integral - simple problems.

UNIT -IV: Surface integral - Volume integral – Applications.

UNIT -V: Gauss divergence Theorem, Stoke's Theorem, Green's Theorem in two dimensions – Applications to real life situations.

Book for study:

Vector Analysis by P. Duraipandian and Kayalal Pachaiyappa- S.Chand Publication

Chapters:

UNIT I: Chapter 2: sections 2.1 to 2.3

UNIT II: Chapter 2: sections 2.4 to 2.7

UNIT III: Chapter 2 sections 2.9 to 2.13 & Chapter 3 sections 3.1 to 3.4

UNIT IV: Chapter 3 Sections 3.5 to 3.7

UNIT V: Chapter 4 sections 4.1 to 4.5

Books for Reference:

1.J.C. Susan, Vector Calculus, , (4th Edn.) Pearson Education, Boston, 2012.

2.A. Gorguis, Vector Calculus for College Students, Xilbius Corporation, 2014.

3.J.E. Marsden and A. Tromba, Vector Calculus, (5th edn.) W.H.Freeman, New York, 1988.

Web Resources/E Books:

1. <https://nptel.ac.in>
2. <https://www.mathwarehouse.com>
3. <https://www.mathhelp.com>
4. <https://www.mathsisfun.com>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz and on the spot test.

Rationale for nature of Course:**Knowledge and Skill:**

1. Differentiation rules for vector functions include the derivative of a sum, product of a scalar and a vector, scalar product, and vector product and line integrals measure the integral of a function along a curve, while surface and volume integrals extend this concept to higher dimensions.
2. Develop the ability to differentiate vector and scalar point functions and compute gradients, divergences, and curls and Apply Gauss's Divergence Theorem, Stokes's Theorem, and Green's Theorem to solve complex problems in physics and engineering.

Activities to be given:

Perform hands-on exercises where you calculate the gradient, divergence, and curl of given scalar and vector functions. Present your results and explain their physical interpretations.

Course Learning Outcome (CLOs)

At the end of the course, the student will be able to:

CLOs	Course Outcomes Statements	Knowledge According to Bloom's Taxonomy (Up to Levels)
CO1	Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products	Up to K4
CO2	Applications of the operator 'del' and to Explain solenoidal and irrotational vectors	Up to K4
CO3	Solve simple line integrals	Up to K4
CO4	Solve surface integrals and volume integrals	Up to K5
CO5	Verify the theorems of Gauss, Stoke's and Green's Two Dimension)	Up to K5

K1- Remembering facts with specific answers.

K2- Basic understanding of facts.

K3- Application oriented -Solving Problems.

K4- Analyzing, examining and making presentations with evidence.

K5- Evaluating, making Judgments based on criteria.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	1	2	3	4	5	6
CLO2	3	2	3	1	-	-
CLO3	3	2	3	1	2	-
CLO4	3	3	3	3	-	-
CLO5	3	3	3	3	-	-

1. Basic level

2. Intermediate level

3. Advanced level

Lesson plan:

Unit	Description	Hours	Mode
I	Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product.	12	Chalkboard instruction
II	The vector operator 'del', The gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors – simple applications.	12	Chalkboard instruction
III	Laplacian operator, Vector identities - Line integral - simple problems.	12	Chalkboard instruction
IV	Surface integral - Volume integral – Applications.	12	PPT
V	Gauss divergence Theorem, Stoke's Theorem, Green's Theorem in two dimensions – Applications to real life situations	12	PPT
Total		60 hours	

Course Designer: Dr.G.Alarmelu Mangai

Department of Mathematics						II B.Sc.		
Sem.	Category	Course Code	Course Title	Credits	Contact Hours/week	CIA	SE	Total
III	Core	23OUMA32	Differential Equations and Applications	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- Understand and Solve First-Order Differential Equations:
- Master Higher-Order Differential Equations:
- Tackle Simultaneous and Second-Order Differential Equations:
- Form and Solve Partial Differential Equations (PDEs):
- Apply Special Methods for PDEs

Course Content:

UNIT- I: Ordinary Differential Equations: Variable separable - Homogeneous Equation-Non-Homogeneous Equations of first degree in two variables -Linear Equation - Bernoulli's Equation-Exact differential equations.

UNIT- II: Equation of first order but not of higher degree: Equation solvable for dy/dx - Equation solvable for y -Equation solvable for x - Clairauts' form - Linear Equations with constant coefficients-Particular integrals of algebraic, exponential, trigonometric functions and their products.

UNIT- III: Simultaneous linear differential equations- Linear Equations of the Second Order Complete solution in terms of a known Integrals-Reduction to the Normal Form-Change of the Independent Variable-Method of Variation of Parameters.

UNIT- IV: Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular Integral-General Integral-Lagrange's Linear Equations –Simple Applications

UNIT- V: Special methods – Standard forms-Charpit's Methods – Simple Applications

Book for study:

S. Narayanan and T.K. Manickavachagom Pillay, *Differential Equations and Its Applications*, S. Viswanathan Publishers Pvt.Ltd. 2006

Chapters:

UNIT I: Chapter 2 Sections 1 – 6

UNIT II: Chapter -4 Sections 1, 2.1, 2.2, 3.1 & Chapter 5- Section 4

UNIT III: Chapter 6 Section 6, Chapter 8 Sections 1 – 4

UNIT IV: Chapter 12 Sections 1,2, 3.1, 3.2 and 4

UNIT V: Chapter 12 Sections 5.1, 5.2, 5.3, 5.4 and 6

Books for Reference:

1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
2. G.F. Simmons, Differential equations with applications and historical notes, 2ndEd, Tata Mcgraw Hill Publications, 1991.
3. H.T. H. Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi,1985.
4. Horst R. Beyer, Calculus and Analysis, Wiley, 2010.
5. Braun, M. Differential Equations and their Applications. (3rd Edn.), Springer- Verlag, New York. 1983.

Web Resources/E Books:

1. <https://nptel.ac.in>
2. <https://www.mathwarehouse.com>
3. <https://www.mathhelp.com>
4. <https://www.mathsisfun.com>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz and on the spot test.

Rationale for nature of Course:**Knowledge and Skill:**

- Variable separable, homogeneous, non-homogeneous, linear, Bernoulli's, and exact differential equations form the foundation of solving ordinary differential equations (ODEs) and solving higher-order differential equations and understanding the formation and solution of PDEs are essential for advanced studies in mathematics, physics, and engineering.
- Gain expertise in forming and solving PDEs and applying special methods to practical problems.

Activities to be given:

Work on solving a set of first-order and higher-order differential equations using different methods. Present the solutions and explain the steps involved.

Course Learning Outcome (CLOs)

At the end of the course, the student will be able to:

CLOs	Course Outcomes Statements	Knowledge According to Bloom's Taxonomy (Up to Levels)
CO1	Determine solutions of homogeneous equations, nonhomogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations	Up to K4
CO2	Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products	Up to K4
CO3	Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters	Up to K4
CO4	Form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations	Up to K5
CO5	Explain standard forms and Solve Differential equations using Charpit's method	Up to K5

K1- Remembering facts with specific answers.

K2- Basic understanding of facts.

K3- Application oriented -Solving Problems.

K4- Analysing, examining and making presentations with evidence. K5-

Evaluating, making Judgments based on criteria.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	1	2	3	4	5	6
CLO2	3	1	3	2	1	-
CLO3	3	1	3	2	1	-
CLO4	3	1	3	2	1	-
CLO5	3	1	3	2	2	1

1. Basic level

2. Intermediate level

3. Advanced level

Lesson plan:

Unit	Description	Hours	Mode
I	Ordinary Differential Equations: Variable separable - Homogeneous Equation-Non-Homogeneous Equations of first degree in two variables -Linear Equation - Bernoulli's Equation- Exact differential equations.	12	Chalk board instructions
II	Equation of first order but not of higher degree: Equation solvable for dy/dx - Equation solvable for y -Equation solvable for x - Clairauts' form - Linear Equations with constant coefficients- Particular integrals of algebraic, exponential, trigonometric functions and their products.	12	Chalk board instructions
III	Simultaneous linear differential equations- Linear Equations of the Second Order - Complete solution in terms of a known integrals-Reduction to the Normal form-Change of the Independent Variable-Method of Variation of Parameters.	12	Chalk board instructions
IV	Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral- General integral-Lagrange's Linear Equations -Simple Applications.	12	Chalk board instructions & PPT
V	Special methods – Standard forms- Charpit's Methods – Simple Applications	12	Chalk board instructions & PPT
Total		60 hours	

Course Designer: Mrs.R.R.Subanya

Department of Mathematics						II B.Sc.		
Sem.	Category	Course Code	Course Title	Credits	Contact Hours/week	CIA	SE	Total
III	SEC	23OUMASEC31P	Latex Lab	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- Install and configure LaTeX with Kile and MiKTeX, handling errors.
- Customize document appearance and text formatting professionally.
- Master mathematical typesetting with equations and matrices.
- Create diagrams and graphics using LaTeX.
- Manage advanced document elements including bibliographies, citations, indexes, and glossaries.

Course Content:

Unit 1: Latex Basics: What is TeX? -What is LaTeX? -How LaTeX works –**The LaTeX Input**

File: Entering LaTeX Commands-Entering Text-Special Characters-Structure of the Input File-Some LaTeX Vocabulary.

Unit 2: Creating A LaTeX Document: Document Classes-Class Options-Packages-Making a Title Page-Making a Table of Contents-Behind the Scenes: Auxiliary Files-How a Page is Built-Example: Report Class-Example: Letter Class.

Unit 3: Document Layout: Line Spacing-Paragraphs-Text Justification-Margins-Headers, Footers, and page Numbering.

Unit 4: Within the Text: Section Headings-Changing Type Style and Size-Starting New Lines and New Pages-Leaving Horizontal and Vertical Space-Drawing Rules-Footnotes- Centering-Quotations-Reproducing Text As-Is,Lists-Cross References.

Unit 5: Mathematical Equation: In-Line Math-Display Math (for numbered equations)-Equation Environment (for numbered equations)-Eqnarray Environment (for multiline equations)-Array Environment (for matrices, ect.) **Buliding Mathematical Expressions:** Superscripts and Subscripts-Spaces in Math Mode- Dots, Braces, and Bars- Fractions-Radicals, integrals, and Summations-Large Delimiters.

Book for study:

Guide to LATEX, fourth edition, helmut kopka, Patrick W.Daly

Books for Reference:

1. The LaTeX Companion by Frank Mittelbach, Michel Goossens, Johannes Braams, David Carlisle, Chris Rowley, 2004, Addison-Wesley Professional
2. LaTeX: A Document Preparation System by Leslie Lamport, 1994, Addison-Wesley Professional
3. LaTeX Beginner's Guide by Stefan Kottwitz, 2011, Packt Publishing

Web Resources

1. <https://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf>
2. https://www.latex-project.org/help/books/bookpart_tlc2-ch0.pdf
3. <https://www.heinrichfleck.net/latex/Lamport%20.pdf>
4. https://www.math.ucdavis.edu/~tracy/courses/math129/Guide_To_LaTeX.pdf
5. <https://www.maths.tcd.ie/~dwilkins/LaTeXPrimer/GSWLaTeX.pdf>

Pedagogy:

Chalk and Talk, PPT.

Rationale for nature of Course:**Knowledge and Skill:**

LaTeX proficiency requires understanding syntax, professional formatting, mathematical typesetting, package use, citation management, version control integration, error troubleshooting, layout customization, and workflow optimization, honed through practice and engagement.

Entrepreneurial:

Encourage students to explore opportunities for offering LaTeX typesetting and document preparation services to researchers, academics, and professionals, leveraging their expertise for freelance or consulting work.

Activities to be given:

1. Create a document template incorporating various LaTeX features such as sections, equations, tables, and citations, then ask learners to populate it with content to practice formatting and typesetting.
2. Assign a collaborative writing task where students use LaTeX with version control to collectively draft and edit a document, fostering teamwork and proficiency in collaborative workflows.

Course Learning Outcome (CLOs)

At the end of the course, the student will be able to:

CLOs	Course Outcomes Statements	Knowledge According to Bloom's Taxonomy (Up to Levels)
CO1	Introduction to LaTeX basics.	K1 to K3
CO2	Creating structured LaTeX documents effectively	K1 to K3
CO3	Controlling document layout and formatting efficiently.	K1 to K4
CO4	Formatting text and elements within documents	K1 to K3
CO5	Mastering mathematical typesetting in LaTeX.	K1 to K4

K1- Remembering facts with specific answers.

K2- Basic understanding of facts.

K3- Application oriented -Solving Problems.

K4- Analyzing, examining and making presentations with evidence.

K5- Evaluating, making Judgments based on criteria.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	2	3	-
CLO2	3	3	1	2	2	-
CLO3	3	2	2	3	3	-
CLO4	3	3	2	1	2	-
CLO5	3	3	3	3	3	-

2. Basic level

2. Intermediate level

3. Advanced level

Lesson plan:

Unit	Description	Hours	Mode
I	What is TeX? -What is LaTeX? -How LaTeX works – The LaTeX Input File: Entering LaTeX Commands-Entering Text-Special Characters-Structure of the Input File- Some LaTeX Vocabulary.	6	Chalk and Talk & PPT
II	Document Classes-Class Options-Packages-Making a Title Page-Making a Table of Contents-Behind the Scenes: Auxiliary Files-How a Page is Built-Example: Report Class-Example: Letter Class.	6	Chalk and Talk
III	Line Spacing-Paragraphs-Text Justification-Margins-Headers, Footers, and page Numbering.	6	Chalk and talk & PPT
IV	Section Headings-Changing Type Style and Size-Starting New Lines and New Pages-Leaving Horizontal and Vertical Space-Drawing Rules-Footnotes- Centering-Quotations-Reproducing Text As-Is,Lists-Cross References.	6	Chalk and Talk & PPT
V	In-Line Math-Display Math (for numbered equations)-Equation Environment (for numbered equations)-Eqnarray Environment (for multiline equations)-Array Environment (for matrices, ect.) Buliding Mathematical Expressions: Superscripts and Subscripts-Spaces in Math Mode- Dots, Braces, and Bars- Fractions-Radicals, integrals, and Summations-Large Delimiters.	6	
Total		30 hours	

Course Designer: Mrs.R.Revathi

Department of Mathematics						II B.Sc.		
Sem.	Category	Course Code	Course Title	Credits	Contact Hours/week	CIA	SE	Total
III	SEC	23OUMASEC32	Mathematics for Competitive Examinations	1	1	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

1. Strengthen Fundamental Mathematical Skills.
2. Enhance problem solving in speed and accuracy.
3. Develop Efficient in solving Technique.
4. Improve Analytical Thinking.
5. To attain ability for attending Competitive Examination.

Course Content:

Unit-I

Problems on Numbers

Unit II

Problems on Ages

Unit III

Profit and Loss

Unit IV

Ratio and Proportion

Unit V

Averages

Book for Study:

R.S. Aggarwal, *Quantitative Aptitude*, S. Chand and Company Ltd., New Delhi, 2017

Chapters:

Unit I : Chapter - 7

Unit II : Chapter - 8

Unit III : Chapter - 11

Unit IV : Chapter - 12

Unit V : Chapter - 6

Books for Reference:

1. Dr.M.Manoharan, Dr.C.Elango and Prof K.L.Eswaran, *Business Mathematics*, Palani paramount Publications, Reprint 2013.
2. U. Mohan Rao, *Quantitative Aptitude for Competitive Examinations*, Scitech Publications, 2016.
3. R.S. Aggarwal *Modern Approach to Verbal & Non-Verbal Reasoning*, Reprint 2018

Web Resources/E Books

<https://www.safalta.com/quantitative-aptitude-chapter-wise-e-book>

<https://www.pdfdrive.com/quantitative-aptitude-books.html>

<https://pdfexam.com/arihant-quantitative-aptitude-book-pdf-free-download/>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz and on the spot test.

Rationale for nature of Course:**Knowledge and Skill:**

To make students able to identify, formulate, analyze and solve problems.

Activities to be given:

We will be providing students with intellectual problems, group discussion and also insist them to check reference books and web resources.

Course learning Outcomes (CLO's):

At the end of the course, the student will be able to:

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy(Up to K Levels)
CO1	Understand the basic concepts of Numbers & Simplifications	K1 to K3
CO2	Analyse the significance of problems on ages	K1 to K3
CO3	Identify the usage of Profit and Loss	K1 to K4
CO4	To determine Ratio and Proportion	K1 to K3
CO5	Apply the knowledge of problems related to Averages	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	1	2	3	3
CLO2	3	2	2	1	3	3
CLO3	3	1	1	2	3	3
CLO4	3	1	2	3	3	3
CLO5	3	1	1	2	3	3

1-Basic Level

2-Intermediate Level

3-Advanced Level

LESSON PLAN:

Unit	Description	Hrs	Mode
I	Problems on Numbers	3	Chalk and Talk, problem solving, Tutorials
II	Problems on Ages	3	Chalk and Talk, Problem Solving
III	Profit and Loss	3	Chalk and Talk, Quiz
IV	Ratio and Proportion	3	Chalk and Talk, quiz, group discussion
V	Averages	3	Chalk and Talk, Quiz
Total		15 hours	

Course Designer: Mrs.D.Selvamathi

Department of Mathematics						II B.Sc.		
Sem.	Category	Course Code	Course Title	Credits	Contact Hours/week	CIA	SE	Total
IV	Core	23OUMA41	Industrial Statistics	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- Understand and Apply Moments, Skewness, and Kurtosis
- Analyse Correlation and Regression
- Apply Probability Concepts
- Understand the Random Variables
- Calculate and Interpret Some Special Distributions

Course Content:

UNIT I: Moments, Skewness and Kurtosis: Moments – Skewness and Kurtosis - **Curve Fitting:** Principle of least squares.

UNIT II: Correlation and Regression: Correlation – Rank Correlation – Regression – Correlation Coefficient for a bivariate frequency Distribution.

UNIT III: Probability: Probability – Conditional Probability.

UNIT IV: Random Variables: Random Variables- Discrete Random Variable – Mathematical Expectation of Continuous Random Variable — Moment Generating Function-Characteristic Function.

UNIT V: Some Special Distributions – Binomial Distributions, Poisson Distribution and Normal Distribution.

Book for study:

S. Arumugam & A. Thangapandi Isaac *Statistics*, New Gamma Publications Pvt Ltd (July 2011)

Chapters:

Unit I: Chapter 4: Sections (4.1 to 4.2)
Chapter 5: Sections (5.1)

Unit II: Chapter 6: Sections (6.1 to 6.4)

Unit III: Chapter 11: Sections (11.1 to 11.2)

Unit IV: Chapter 12: Sections (12.1 to 12.6)

Unit V: Chapter 13: Sections (13.1 to 13.3)

Books for Reference:

1. Bali N.P., *Statistics*, (New Edition), Firewall Media
2. Gupta S.P., *Statistical methods*, Sultan Chand & Sons Educational Publishers (2004).
3. Pillai R.S.N., Bagavathi V., *Statistics*, 17th Edition, S. Chand and Company LTD., Ram Nagar, New Delhi – 110 055 (2005)
4. Sankaranarayanan T., Joseph A. Mangaladoss, *Statistics and its Applications*, Presi and Presi Publications, Laxmi Publications(P) Ltd

Web Resources/E Books:

1. <https://math.iisc.ac.in/~manju/UGstatprob16/statprob.pdf>
2. <https://t.ly/YLTuZ>
3. <https://t.ly/5Oyjy>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz and on the spot test.

Rationale for nature of Course:**Knowledge and Skill:**

Knowledge and skill in statistical quality control, analysis of time series, analysis of variance, and experimental design enable data-driven decision-making and process optimization. **Employability:**

This expertise enhances employability across industries seeking professional's adept at improving quality, efficiency, and productivity through informed analysis and experimentation.

Activities to be given:

Organize group projects where participants design experiments, collect data, and analyze results to optimize processes, fostering practical application of statistical techniques for problem-solving and decision-making, enhancing employability across industries.

Course Learning Outcome (CLOs)

At the end of the course, the student will be able to:

CLOs	Course Outcomes Statements	Knowledge According to Bloom’s Taxonomy (Up to Levels)
CO1	To determine the principle of least squares	Up to K4
CO2	To compute Correlation Regression, Bivariate Frequency Distribution.	Up to K4
CO3	To analyse the Conditional Probability.	Up to K4
CO4	To determine Random Variables.	Up to K5
CO5	To gain the knowledge of Binomial Distributions, Poisson Distribution and Normal Distribution.	Up to K5

K1- Remembering facts with specific answers.

K2- Basic understanding of facts.

K3- Application oriented -Solving Problems.

K4- Analysing, examining and making presentations with evidence.

K5- Evaluating, making Judgments based on criteria.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	3	1	3	3
CLO2	3	2	3	2	3	3
CLO3	3	2	3	2	3	3
CLO4	3	2	3	1	3	3
CLO5	3	1	3	2	3	3

1. Basic level

2. Intermediate level

3. Advanced level

Lesson plan:

Unit	Description	Hours	Mode
I	Moments – Skewness and Kurtosis - Curve Fitting :Principle of least squares – Fitting a Straight Line – Fitting a Second Degree Parabola.	12	Chalk board instructions
II	Correlation – Rank Correlation – Regression – Correlation Coefficient for a bivariate frequency Distribution.	12	Chalk board instructions
III	Probability – Conditional Probability.	12	Chalk board instructions
IV	Random Variables- Discrete Random Variable – Mathematical Expectation of Continuous Random Variable – Moment Generating Function- Characteristic Function.	12	Chalk board instructions
V	Binomial Distributions, Poisson Distribution and Normal Distribution.	12	PPT
Total		60 hours	

Course Designer: Dr.P.Vidhya

Department of Mathematics						II B.Sc.		
Sem.	Category	Course Code	Course Title	Credits	Contact Hours/week	CIA	SE	Total
IV	Core	23OUMA42	Elements of Mathematical Analysis	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- Identify and characterize sets and functions and Understand, test and analyse the convergence and divergence of sequences, series.
- Understand metric spaces with suitable examples

UNIT- I: Sets and Functions: Sets and elements- Operations on sets- functions- real valued functions- equivalence- countability real numbers- least upper bounds.

UNIT- II: Sequences of Real Numbers: Definition of a sequence and subsequence-limit of a sequence – convergent sequences– divergent sequences- bounded sequences-monotone sequences

UNIT- III: Operations on convergent sequences – operations on divergent sequences – limit superior and limit inferior -Cauchy sequences.

UNIT- IV: Series of Real Numbers: Convergence and divergence – series with nonnegative terms- alternating series-conditional convergence and absolute convergence- tests for absolute convergence.

UNIT- V: Limits and Metric Spaces: Limit of a function on a real line - Metric spaces - Limits in metric spaces – Continuous Functions on Metric Spaces: Function continuous at a point on there a Line-Function continuous on a metric space.

Book for study:

Richard R. Goldberg, *Methods of Real Analysis*, Oxford and IBH Publishing, (1 January 2020).

Chapters:

- UNIT- I Chapter 1 Sections 1.1 – 1.7
 UNIT- II Chapter 2 Sections 2.1 – 2.6
 UNIT- III Chapter 2 Sections 2.7 – 2.10
 UNIT- IV Chapter 3 Sections 3.1 – 3.4 and 3.6
 UNIT- V Chapter 4 Sections 4.1 – 4.3,
 Chapter 5 Sections 5.1 – 5.3

Books for Reference:

1. T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2. R.G. Bartle and D. R Sherbet, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
3. E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4. K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.

Web Resources/E Books:

1. <https://nptel.ac.in>
2. <https://www.mathwarehouse.com/>
3. <https://www.mathhelp.com/>
4. <https://www.mathsisfun.com/>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz and surprise test.

Rationale for nature of Course:

Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)

Knowledge and Skill:

Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Activities to be given:

Work in groups to classify different sets as countable or uncountable. Provide justifications for your classifications and discuss the concepts of sequences like monotone convergent, divergent and Cauchy.

Course Learning Outcome (CLOs)

At the end of the course, the student will be able to:

CLOs	Course Outcomes Statements	Knowledge According to Bloom’s Taxonomy (Up to Levels)
CO1	Explain in detail about sets and functions, equivalence and countability and the LUB axiom	Up to K4
CO2	Explain Sequence and Subsequence of real numbers and to find the limit of sequence to test for convergent, divergent, bounded and monotone sequences	Up to K4
CO3	Explain the operations on convergent and divergent sequences and to Explain the concepts of limit superior and limit inferior and the notion of Cauchy sequences	Up to K4
CO4	Classify the series of real numbers and the alternating series and their convergence and divergence, the conditional convergence and absolute convergence and solve problems on convergence of the sequences	Up to K5
CO5	Explain about the metric spaces and functions continuous on a Metric space	Up to K5

- K1- Remembering facts with specific answers.
- K2- Basic understanding of facts.
- K3- Application oriented -Solving Problems.
- K4- Analyzing, examining and making presentations with evidence.
- K5- Evaluating, making Judgments based on criteria.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	3	1	2	3
CLO2	3	2	3	1	1	2
CLO3	3	2	3	1	2	1
CLO4	3	3	3	3	3	2
CLO5	3	3	3	3	2	1

1. Basic level
2. Intermediate level
3. Advanced level

Lesson plan:

Unit	Description	Hours	Mode
I	Sets and Functions: Sets and elements- Operations on sets- functions- real valued functions- equivalence-countability real numbers- least upper bounds	12	Chalk & board instruction
II	Sequences of Real Numbers: Definition of a sequence and subsequence-limit of a sequence – convergent sequences–divergent sequences- bounded sequences-monotone sequences	12	Chalk & board instruction
III	Operations on convergent sequences – operations on divergent sequences – limit superior and limit inferior-Cauchy sequences.	12	Chalk & board, instruction
IV	Series of Real Numbers: Convergence and divergence– series with non –negative terms-alternating series-conditional convergence and absolute convergence- tests for absolute convergence.	12	Chalk & board ,instruction, PPT
V	Limits and Metric Spaces: Limit of a function on a real line - Metric spaces - Limits in metric spaces – Continuous Functions on Metric Spaces: Function continuous at a point on there a line-Function continuous on a metric space.	12	Chalk & board, instruction, PPT
Total		60 hours	

Course Designer: Mrs. D.Selvamathi

Department of Mathematics						II B.Sc.		
Sem.	Category	Course Code	Course Title	Credits	Contact Hours/week	CIA	SE	Total
IV	SEC	23OUMASEC41P	R Programming Lab	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- Learn the fundamental concepts of statistics and their applications using R.
- Develop proficiency in using R for Generating data and Manipulating objects.
- Understand the concepts of graphical function.
- Interpret statistical results accurately and communicate findings effectively.
- To equip the students in R Programming.

Course Content:

Unit I: A few concepts before starting: How R works, Creating, listing and deleting the objects in memory, The on-line help.

Unit II: Data with R: Objects, Reading data in a file, Saving data , **Generating data:** Regular sequences, Random sequences, **Manipulating objects:** Creating objects, Converting objects, Operators, Accessing the values of an object: the indexing system, Accessing the values of an object with names, The data editor, Arithmetic's and simple functions, Matrix computation.

Unit III: Graphics with R: Managing graphics, Opening several graphical devices, Partitioning a graphic, **Graphical functions:** Low-level plotting commands, Graphical parameters, A practical example, The grid and lattice packages.

Unit IV: Statistical analyses with R: A simple example of analysis of variance, Formulae, Generic functions, Packages.

Unit V: Programming with R in practice: Loops and vectorization, Writing a program in R, Writing your own functions.

Book for Study

R for Beginners by Emmanuel Paradise (12th September 2005)

Books for Reference:

The Book of *R* - *A First course in programming and statistics* by TILMAN M. DAVIES

Web Resources:

- https://onlinecourses.nptel.ac.in/noc19_ma33/preview
- https://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf
- https://web.itu.edu.tr/~tokerem/The_Book_of_R.pdf
- <https://www.coursera.org/learn/r-programming>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz and on the spot test.

Rationale for nature of Course:

Knowledge and Skill:

- Understand key statistical concepts such as descriptive statistics, probability distributions, hypothesis testing and regression analysis.
- Develop proficiency in R programming for data manipulation, analysis, and visualization

Activities to be given:

Work on real-world data sets to perform comprehensive statistical analysis using R. Present your findings through detailed reports and visualizations.

Course Learning Outcome (CLOs)

At the end of the course, the student will be able to:

CLOs	Course Outcomes Statements	Knowledge According to Bloom’s Taxonomy (Up to Levels)
CO1	To learn the basic concepts of R	Up to K3
CO2	Understand data with R	Up to K3
CO3	Gain the knowledge of Graphics with R	Up to K3
CO4	Illustrate the Statistical analyses with R	Up to K3
CO5	Develop the Knowledge of R Programming.	Up to K3

K1- Remembering facts with specific answers.

K2- Basic understanding of facts.

K3- Application oriented -Solving Problems.

K4- Analyzing, examining and making presentations with evidence.

K5- Evaluating, making Judgments based on criteria.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	3	2	-
CLO2	3	3	2	3	2	-
CLO3	3	3	3	3	2	-
CLO4	3	3	3	3	2	-
CLO5	3	3	2	3	2	-

1. Basic level

2. Intermediate level

3. Advanced level

Lesson plan:

Unit	Description	Hours	Mode
I	How R works, Creating, listing and deleting the objects in memory, The on-line help.	6	Chalkboard instruction & PPT
II	Objects, Reading data in a file, Saving data , Generating data: Regular sequences, Random sequences, Manipulating objects: Creating objects, Converting objects, Operators, Accessing the values of an object: the indexing system, Accessing the values of an object with names, The data editor, Arithmetic's and simple functions, Matrix computation.	6	Chalkboard instruction & PPT
III	Managing graphics, Opening several graphical devices, Partitioning a graphic, Graphical functions: Low-level plotting commands, Graphical parameters, A practical example, The grid and lattice packages.	6	Chalkboard instruction & PPT
IV	A simple example of analysis of variance, Formulae, Generic functions, Packages.	6	Chalkboard instruction & PPT
V	Loops and vectorization, Writing a program in R, Writing your own functions.	6	Chalkboard instruction & PPT
Total		30 hours	

Course Designer: Mrs.R.Revathi

Department of Mathematics						II B.Sc.		
Sem.	Category	Course Code	Course Title	Credits	Contact Hours/week	CIA	SE	Total
IV	SEC	23OUMASEC42P	Statistics using MS Excel Lab	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- To provide proficiency in Excel basics, advanced functions, and data management.
- To compute descriptive statistics using Pivot Tables, visualize data with diagrams
- To calculate central tendency, dispersion, skewness, and kurtosis.
- To enhance data analysis and interpretation capabilities.

Course Content:**Unit I:**

Basics of Excel - Data entry, editing and saving, establishing and copying formulae, Built in Functions - copy and paste, Find and Replace, Sorting.

Unit II:

Basics of Excel - Built in Functions - Filtering, Conditional formatting and creating Hyperlinks, Exporting to MS word document

Unit III:

Computation of descriptive Statistics using Pivot table - Univariate.

Unit IV:

Data visualization through diagrams.

Unit V:

Computation of central tendency and dispersion measures, Coefficient of Variation for ungrouped and grouped data and Computation of Coefficients of Skewness, Kurtosis using MS-Excel and interpretation.

Book for study:

1. *Office Automation*, Dr.P.Rizwan Ahmed, Margham Publications,(2016)

Books for Reference:

1. Flash CS4 and MS EXCEL 2007 by Kogent Learning Solutions Inc. (2009)

Web Resources:

- <http://mathforum.org>, <http://ocw.mit.edu/ocwweb/Mathematics>,
- <http://www.opensource.org>, www.mathpages.com

Pedagogy:

Rationale for nature of Course:

Knowledge and Skill:

Participants will gain knowledge in Excel basics, advanced functions, and data visualization. Skills include data entry, formula application, filtering, conditional formatting, and exporting to Word. They will also learn to compute descriptive statistics, central tendency, dispersion, skewness, and kurtosis, enhancing their data analysis and interpretation capabilities.

Activities to be given:

Activities include data entry and editing exercises, formula creation, and application tasks. Participants will practice using built-in functions, sorting, filtering, and conditional formatting. use Pivot Tables for statistics. Visualization tasks involve creating diagrams, and statistical exercises cover central tendency, dispersion, skewness, and kurtosis.

Course Learning Outcome (CLOs)

At the end of the course, the student will be able to:

CLOs	Course Outcomes Statements	Knowledge According to Bloom’s Taxonomy (Up to Levels)
CO1	Participants will master essential Excel skills, including data entry, editing, and saving.	K1 to K3
CO2	Enhancing their data manipulation and presentation capabilities.	K1 to K3
CO3	Participants will be able to compute univariate descriptive statistics using Pivot Tables	K1 to K4
CO4	Participants will learn to create various diagrams for data visualization, improving their ability to present data in an understandable and visually appealing manner	K1 to K3
CO5	Participants will develop skills to calculate and interpret measures of central tendency, dispersion, skewness, and kurtosis	K1 to K4

- K1- Remembering facts with specific answers.
- K2- Basic understanding of facts.
- K3- Application oriented -Solving Problems.
- K4- Analyzing, examining and making presentations with evidence.
- K5- Evaluating, making Judgments based on criteria.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	2	3	-
CLO2	3	3	1	2	2	-
CLO3	3	2	2	3	3	-
CLO4	3	3	2	1	2	-
CLO5	3	3	3	3	3	-

1. Basic level 2. Intermediate level 3. Advanced level

Lesson plan:

Unit	Description	Hours	Mode
I	Basics of Excel - Data entry, editing and saving, establishing and copying formulae, Built in Functions - copy and paste, Find and Replace, Sorting.	6	Chalkboard instruction & PPT
II	Basics of Excel - Built in Functions - Filtering, Conditional formatting and creating Hyperlinks, Exporting to MS word document	6	Chalkboard instruction & PPT
III	Computation of descriptive Statistics using Pivot table - Univariate.	6	Chalkboard instruction & PPT
IV	Data visualization through diagrams	6	Chalkboard instruction & PPT
V	Computation of central tendency and dispersion measures, Coefficient of Variation for ungrouped and grouped data and Computation of Coefficients of Skewness, Kurtosis using MS-Excel and interpretation	6	Chalkboard instruction & PPT
Total		30 hours	

Course Designer: Mrs.S.Selvi

(For Computer Science, B C A., & Data Science and Analytics Major)

Sem	Course	Sub Code	Title of the Paper	Lecture hours per week	Duration of Exam hrs.	Marks Allotted			
						C.A	S.E	Total	Credits
III	B.Sc. Computer Science	23OUCSGEMA3	Generic Elective-3 Statistical Methods and its Application	4	3	25	75	100	3
III	B.Sc. Data Science and Analytics	23OUCSDGEMA3	Generic Elective-3 Discrete Mathematics- I	4	3	25	75	100	3
III	B.C.A	23OUCAGEMA3	Generic Elective-1 Numerical Methods	4	3	25	75	100	3
IV	B.Sc. Computer Science	23OUCSGEMA4	Generic Elective-4 Resource Management Techniques	4	3	25	75	100	3
IV	B.Sc. Data Science and Analytics	23OUCSDGEMA4	Generic Elective-4 Discrete Mathematics - II	4	3	25	75	100	3
IV	B.C.A	23OUCAGEMA4	Generic Elective-2 Resource Management Techniques	4	3	25	75	100	3

Department of Mathematics			Class: II B.Sc. Computer Science					
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
III	GEC	23OUCSGEMA3	Statistical Methods and its Application	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

1. To provide students with an overview of Statistics.
2. Basic ideas and concepts in Statistics.
3. Knowledge to find Statistical methods and interpret the results.
4. Under the Mathematical tools that are needed to solve problems.
5. To equip the students in solving real time problems.

Course Content:

Unit I: Measures of Dispersion: Measures of Dispersion.

Unit II: Moments Skewness and Kurtosis: Moments - Skewness and Kurtosis (Problems Only)

Unit III: Correlation and Regression: Correlation - Rank Correlation - Regression

Unit IV: Interpolation: Finite Differences-Newton's Formula-Lagrange's formula

Unit V: Probability: Probability - Conditional probability

Books for study:

S. Arumugam and A. Thangapandi Issac, Statistics, New Gamma Publishing House, Palayamkottai (July 2011)

Chapters:

Unit I: Chapter 3: Section 3.1

Unit II: Chapter 4: Section 4.1 & 4.2

Unit III: Chapter 6: Section 6.1 to 6.3

Unit IV: Chapter 7: Section 7.1 to 7.3

Unit V: Chapter 11: Section 11.1 & 11.2

Books for Reference:

1. Dr. Gupta.S.P., "*Statistical methods*", Sultan Chand & Sons, Educational Publishers, New Delhi (2008).
2. Pillai R.S.N., Bagavathi V., "*Statistics*", 7th Edition, S. Chand and Company Ltd (2014).
3. Veerarajan T., "*Probability, Statistics and Random Processes*", 3rd Edition, Tata McGraw Hill Education Pvt Ltd.

Web Resources /E books

1. <https://openstax.org/details/books/introductory-statistics>
2. <https://nptel.ac.in>

Pedagogy:

Chalk and Talk, PPT, group discussion & Quiz

Rationale for nature of Course:**Knowledge and Skill:**

Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.

Activities to be given:

We will be providing students with intellectual problems, theory application problems, group discussion and other practical works and also insist them to refer web resource and e – books.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K Levels)
CLO1	Discuss about Measures of Dispersion	K1 to K3
CLO2	Classify and discuss Skewness and Kurtosis	K1 to K3
CLO3	Gain the knowledge of Correlation and Regression	K1 to K4
CLO4	Classify and Solve Newton's and lagrange's formula	K1 to K3
CLO5	Understanding the principle of Probability	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented, Justifying the statement and deriving inferences

K4-Examining, analysing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	3	-	-	-
CLO2	2	1	3	1	-	-
CLO3	3	1	3	1	-	-
CLO4	3	1	3	-	-	-
CLO5	3	1	3	-	-	-

1-Basic Level 2- Intermediate Level 3- Advanced Level

Lesson Plan:

Unit	Description	Hours	Mode
I	Measure of Dispersion	12	Chalk and Talk
II	Skewness and Kurtosis	12	Lecture, Problem Solving
III	Correlation and Regression	12	Lecture, Seminar, Quiz
IV	Interpolation Newton's Formula ,Lagrange's Formula	12	Quiz, Lecture, Problem Solving, Tutorial
V	Probability Conditional Probability	12	Lecture ,Quiz, Seminar
Total		60 hours	

Course Designer: N.Uma Maheswari

Department of Mathematics			Class: II B.Sc., DATA SCIENCE AND ANALYTICS					
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CI A	Ext	Total
III	GEC	23OUCSDGEMA3	Discrete Mathematics-I	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- To provide students with an overview of Discrete Mathematics.
- To Understand the Concept of Relations
- To know about the Functions
- Apply the techniques of Matrix Algebra

Course Content:**UNIT- I: Set Theory**

Introduction – Sets – Notation and Description of Sets – Subsets – Venn – Euler Diagram – Operations on sets-Properties of set operations.

UNIT – II: Relations

Relations – Representation of a Relation – Operations on Relations – Equivalence Relation.

UNIT – III: Functions

Function and Operators – One-to-One, Onto Functions – Special Types of Functions – Invertible Functions.

UNIT – IV: Matrix Algebra

Introduction – Basic Definitions- Matrix Operations – Inverse of a Square Matrix.

UNIT– V: Matrix Algebra

Simultaneous Equations – Inverse by Partitioning – Eigen Values and Eigen Vectors

Book for study:

‘*Discrete Mathematics*’ – M.Venkataraman, N.Sridharan and N.Chandrasekaran – The National Publishing Company, May 2009.

Chapters

Chapter 1: Section: 1.1 to 1.7

Chapter 2: Section: 2.2 to 2.5

Chapter 3: Section: 3.1 to 3.4

Chapter 6: Section: 6.1 to 6.3.

Chapter 6: Section: 6.5 to 6.7

Books for Reference:

1. T. Veera Rajan , *Discrete Mathematics with Graph theory & Combinatorics*, First Edition, Tata McGraw -Hill Publications Company Ltd.
2. J. P. Tremblay & R.Manohar,*Discrete Mathematical structure with application to Computer Science*,McGraw Hill Book Company, New York
3. S.Arumugam & S.Ramachandran, *Invitation to Graph theory*, SCITECH PUBLICATIONS(INDIA)PVT.LTD,New Delhi

Web Resources /E books:

1. https://youtube.com/shorts/V0N60gs_sfE?feature=share
2. <http://www2.cs.uh.edu/~arjun/courses/ds/DiscMaths4CompScdf>

Pedagogy:

Chalk and Talk, PPT, group discussion & Quiz

Rationale for nature of Course:

Knowledge and Skill:

Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.

Activities to be given:

We will be providing students with intellectual problems, theory application problems, group discussion and other practical works and also insist them to refer web resource and e – books.

Course learning Outcomes (CLO’s):

CLO	Course Outcomes Statement	Knowledge According to Bloom’s Taxonomy(Up to K Levels)
CLO1	Understand the basic principles of sets and operations in sets	K1 to K3
CLO2	Understand the basic concepts of Relations	K1 to K3
CLO3	Understand the special types of Functions and Invertible Functions.	K1 to K4
CLO4	Understand the concept of Matrix Operations and Inverse of a Square Matrix.	K1 to K3
CLO5	Analyze the concepts of Matrix Algebra	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented, Justifying the statement and deriving inferences.

K4-Examining, analyzing, presentation and make inferences with evidences.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	3	3	3	-
CLO2	3	2	3	3	3	-
CLO3	3	2	3	3	3	-
CLO4	3	2	3	3	3	-
CLO5	3	2	3	3	3	-

1-Basic Level 2- Intermediate Level 3- Advanced Level**Lesson Plan:**

Unit	Description	Hours	Mode
I	Sets – Notation and Description of Sets – Subsets – Venn – Euler Diagram – Operations on sets.	12	PPT, Chalk and Talk.
II	Relations – Representation of a Relation – Operations on Relations – Equivalence Relation.	12	PPT ,Chalk and Talk, Assignment sand Group discussion
III	Function and Operators – One-to-One, Onto Functions – Special Types of Functions – Invertible Functions.	12	PPT, Chalk and Talk, Assignment s
IV	Introduction – Basic Definitions- Matrix Operations – Inverse of a Square Matrix.	12	PPT, Chalk and Talk, Assignment s
V	Simultaneous Equations – Inverse by Partitioning – Eigen Values and Eigen Vectors	12	Assignment Seminar and Group discussion
Total		60 hours	

Course Designer: A. Manickavalli

Department of Mathematics			Class: II BCA					
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
III	GEC	23OUCAGEMA3	Numerical Methods	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

1. To Find the numerical solution for the nonlinear equations.
2. To introduce the various topics in Numerical methods.
3. To solve linear system of equations by various methods.
4. To know curve fitting by method of least square.
5. To know more about interpolation.

Course Content:

Unit – I: Theory of Equations: Introduction – Formation of Equations – Relation between Roots and Coefficients

Unit – II: Curve Fitting: Introduction – Linear Law – Method of Group Averages – Method of Moments.

Unit – III: Algebraic and Transcendental Equations: Bisection method – Regula Falsi Method (No derivative of Formula Required) – Newton Raphson Method.

Unit – IV: Simultaneous Equations: Back substitution – Gauss Elimination Method – Gauss Jordan Elimination Method – Calculation of Inverse of a Matrix (Problems Only)

Unit –V: Interpolation: Newton’s Interpolation Formulae – Central Difference Interpolation formulae-Lagrange’s Interpolation Formula (Problem Only)

Books for study:

Arumugam. S. and Thangapandi Isaac. A. Somasundaram, *Numerical Methods 2nd Edition*, Scitech Publications Pvt Ltd, Chennai,2009.

Chapters:

Unit I Chapter 1: 1.1 to 1.3

Unit II Chapter 2: 2.0 to 2.3

Unit III Chapter 3: 3.2 to 3.4

Unit IV Chapter 4: 4.1 to 4.5

Unit V Chapter 7: 7.0 to 7.3

Books for Reference:

1. Kanda Samy P., Thilagavathy K., Gunavathy K., *Numerical Methods*, Second Revised Edition, Sultan Chand & Company Ltd, 1999.
2. Singaravelu A., *Numerical Methods*, First Edition, Meenakshi Publications, 2001.
3. Venkataraman M.S., *Numerical Methods in Science and Engineering* – National Publishing Company, 2001. Hutchison, I. H. (2015) *A student guide to Numerical Methods*, Cambridge University Press, Cambridge.

Web Resources /E books:

1. https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.sciencedirect.com/topics/engineering/numericalmethod&ved=2ahUKEwj_jo_Oi1pT_AhVt-TgGHTzQAMoQFnoECE8QAQ&usg=AOvVaw1qijfBa5RDwLnTDDUU_KHBF
2. <https://youtu.be/sANUGXAGmcw>
3. https://youtu.be/jw4_1XLwBCQ

Pedagogy:

Chalk and Talk, Power point presentations, Group Discussions, Quiz, Assignment and Seminar.

Rationale for nature of Course:**Knowledge and Skill:**

Have a good introduction to the study of Numerical Integration Solutions.

Learn Numerical Methods.

Activities to be given:

We will be providing students with intellectual problems, theory application problems, group discussion and other practical works and also insist them to check the books for references and web resource

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K Levels)
CLO1	Calculate the Theory of Equations and Reciprocal Equations.	K1 to K3
CLO2	Obtain the solutions of the Curve Fitting, Method of Least Squares and Method of Moments.	K1 to K3
CLO3	Understand the concepts of Algebraic and Transcendental Equations.	K1 to K4
CLO4	Obtain the solution for the Simultaneous Equations.	K1 to K3
CLO5	Obtain the solution of Interpolation.	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented, Justifying the statement and deriving inferences

K4-Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	3	1	2	3
CLO2	3	3	3	1	2	3
CLO3	3	3	3	2	1	3
CLO4	3	3	3	1	2	3
CLO5	3	3	2	1	2	3

Lesson Plan:

Unit	Description	Hours	Mode
I	Theory of Equations Reciprocal Equations	12	Problem solving Lecture
II	Linear Law Method of Group Averages Method of moments Method of Least Squares	12	Lecture PPT
III	Iterative Method. Bisection Method Regula Falsi Method (No Derivation For Formula Required) Newton Raphson method	12	Problem solving
IV	Back Substitution Gauss Elimination Method Gauss Jordan Elimination Method Inverse of Matrix	12	Lecture, Problem solving
V	Newton's Interpolation Central Difference Interpolation Lagrange's interpolation Formula (Problems only)	12	Tutorial, Problem solving
Total		60 hours	

Course Designer:S.Parimala

Department of Mathematics			II B.Sc. COMPUTER SCIENCE					
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
IV	GEC	23OUCSGEMA4	Resource Management Techniques	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

1. To know about Linear Programming Problems.
2. Under the Mathematical tools that are needed to solve optimization problems.
3. To equip the students in solving real time problems.
4. To construct and solve a minimization problem.
5. To develop formulation skills in transportation model and finding solutions.

Course Content:

Unit- I: Linear programming Problem-Mathematical formulation of L.P.P-Slack and Surplus Variables-Solution of Linear programming problem

Unit- II: Graphical solution of L.P.P- Simplex Method-Computational procedure

Unit- III: Artificial variables Technique-Two Phase method -Big-M method

Unit- IV: Mathematical formulation of Transportation Problem -Methods for obtaining an initial feasible solution- Optimal solution of T.P -Unbalanced T.P.

Unit- V: Mathematical formulation of assignment Problem-Method for solving the assignment problem.

Books for study:

Arumugam. S. and Thangapandi Isaac. A., 2011, *Linear Programming*, New Gamma Publishing House (2004)

Chapters

Unit-I: Chapter 3: Section 3.1-3.3

Unit-II: Chapter 3: Section 3.4 & 3.5

Unit-III: Chapter 3: Section 3.6 & 3.7

Unit-IV: Chapter 4: Section 4.1

Unit-V: Chapter 5: Section 5.1 & 5.2

Books for Reference:

1. Kanthiswarup, P.K. Gupta and Man Mohan, “*Operations Research*”, Sultan Chand & Sons Educational Publishers(2011).
2. Gupta P.K., ManMohan, ” *Problems in Operations Research*”, Sultan Chand & Sons, Delhi, (2003).
3. Sharma J.K.,4th Edition., “*Operations Research Theory and Applications*”, Macmillan Publishers India Ltd.,(2010).

Web Resources /E books:

1. https://www.brainkart.com/article/Linear-programming-problem_37039/
2. <https://www.gatexplore.com/transportation-problem-study-notes/>
3. <https://youtu.be/MZ843Vvia0A>

Pedagogy:

Chalk and Talk, Power point presentations, Group Discussions, Quiz, Assignment and Seminar

Rationale for nature of Course:**Knowledge and Skill:**

To make students able to identify, formulate, analyze and solve problems.

Activities to be given:

We will be providing students with intellectual problems, theory application problems, group discussion and other practical works and also insist them to check the books for references and web resource.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K Levels)
CLO1	Understand the basic concepts of Linear Programming Problems	K1 to K3
CLO2	Solve the problems of Graphical Methods & Simplex Methods.	K1 to K3
CLO3	To know how to find the solution of LPP using Big-M method and Two - Phase method.	K1 to K4
CLO4	Formulation of the Transportation Problems	K1 to K3
CLO5	Construct the assignment problems for the given algorithms	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented, Justifying the statement and deriving inferences

K4-Examining, analysing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	1	1	2	3
CLO2	3	3	2	2	3	3
CLO3	3	2	2	2	3	3
CLO4	3	3	2	3	3	3
CLO5	3	3	3	3	3	3

1-Basic Level 2- Intermediate Level 3- Advanced Level

Lesson Plan:

Unit	Description	Hours	Mode
I	Mathematical formulation of LPP Canonical form Standard form Degenerate basic feasible solution Non- Degenerate basic feasible solution	12	Problem solving Lecture
II	Graphical Method Simplex Method	12	Chalk &Talk PPT ,Lecture
III	Big-M Method Two Phase Method	12	Chalk &Talk, Problem solving
IV	Transportation Problems	12	Lecture Problem solving, Chalk &Talk
V	Assignment Problems	12	Tutorial, Problem solving,Chalk &Talk
Total		60 hours	

Course Designer: N.Uma Maheswari

Department of Mathematics			II B.Sc. DATA SCIENCE AND ANALYTICS					
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
IV	GEC	23OUCSDGEMA4	Discrete Mathematics-II	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- To provide students with an overview of Discrete Mathematics
- To understand the Concept of Recurrence Relations
- To Construct the Truth Table of a Formula
- Apply the techniques of TF Statements
- To know about the Graph Theory

Course Content:

UNIT-I: Recurrence Relations

Introduction – Polynomials and their Evaluations – Recurrence Relations – Solution of Finite Order Homogeneous (linear) Relations (for all the theorem consider the statements without proofs)

UNIT –II: Solution of Non-Homogeneous Relations – Generating Functions (for all the theorem consider the statements without proofs)

UNIT –III: Logic: Introduction – TF Statements – Connectives – Atomic and Compound Statements – Well Formed (Statement) Formulae – Parsing Trees

UNIT–IV Logic: Truth Table of a formula – Tautology – Tautological Implications and Equivalence of Formulae

UNIT –V Graph Theory: Basic Concepts – Subgraph – isomorphism – Some Special Classes of Graphs – Shortest Path Problem.

Book for study:

‘Discrete Mathematics’ – M.Venkataraman, N.Sridharan and N.Chandrasekaran –The National Publishing Company, May 2009.

Chapters:

Chapter 5: Section:5.1 to 5.4

Chapter 5: Section:5.5 & 5.6

Chapter 9: Section:9.1 to 9.5

Chapter 9: Section: 9.6 to 9.8

Chapter 11: Section:11.1 & 11.5

Books for Reference:

1. T. Veera Rajan , *Discrete Mathematics with Graph theory & Combinatorics*, First Edition, Tata McGraw -Hill Publications Company Ltd.
2. J. P. Tremblay & R.Manohar,*Discrete Mathematical structure with application to Computer Science*,McGraw Hill Book Company, New York
3. S.Arumugam & S.Ramachandran, *Invitation to Graph theory*, SCITECH PUBLICATIONS(INDIA)PVT.LTD,New Delhi

Web Resources /E books

1. https://youtube.com/shorts/V0N60gs_sfE?feature=share
2. <http://www2.cs.uh.edu/~arjun/courses/ds/DiscMaths4Compdf>.

Pedagogy:

Chalk and Talk, PPT, group discussion & Quiz Rationale
for nature of Course:

Rationale for nature of Course:**Knowledge and Skill:**

Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.

Activities to be given:

We will be providing students with intellectual problems, theory application problems, group discussion and other practical works and also insist them to refer web resource and e – books.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy(Up to K Levels)
CLO1	Understand the basic concepts of Recurrence Relations	K1 to K3
CLO2	Understand the basic concepts of Generating Functions	K1 to K3
CLO3	Understand the concept of TF Statements and Wellformed formulas.	K1 to K4
CLO4	Construct the Truth Table for the given Proposition, interpret tautology and equivalences	K1 to K3
CLO5	Analyze the concepts of Graph Theory	K1 to K4

- K1- Remembering and recalling facts with specific answers
- K2- Basic understanding of facts and stating main ideas with general answers
- K3- Application oriented, Justifying the statement and deriving inferences
- K4-Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	3	3	3	-
CLO2	3	2	3	3	3	-
CLO3	3	2	3	3	3	-
CLO4	3	2	3	3	3	-
CLO5	3	2	3	3	3	-

1-Basic Level 2- Intermediate Level 3- Advanced Level

Lesson Plan:

Unit	Description	Hours	Mode
I	Recurrence Relations Introduction – Polynomials and their Evaluations – Recurrence Relations – Solution of Finite Order Homogeneous (linear) Relations (for all the theorem consider the statements without proofs)	12	PPT, Chalk and Talk.
II	Solution of Non-Homogeneous Relations – Generating Functions (for all the theorem consider the statements without proofs)	12	PPT, Chalk and Talk, Assignment sand Group discussion
III	Logic: Introduction – TF Statements – Connectives – Atomic and Compound Statements – Well Formed (Statement) Formulae – Parsing Trees	12	PPT, Chalk and Talk, Assignment s
IV	Logic: Truth Table of a formula – Tautology – Tautological Implications and Equivalence of Formulae	12	PPT, Chalk and Talk, Assignment s
V	Graph Theory: Basic Concepts – Subgraph – isomorphism – Some Special Classes of Graphs – Shortest Path Problem.	12	Assignment, Seminar and Group discussion
Total		60 hours	

Course Designer: A. Manickavalli

Department of Mathematics			Class: II BCA					
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CI A	SE	Total
IV	GEC	23OUCAGEMA4	Resource Management Techniques	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented

Course Objectives:

- To know about Linear Programming Problems.
- Under the Mathematical tools that are needed to solve optimization problems.
- To equip the students in solving real time problems.
- To construct and solve a minimization problem.
- To develop formulation skills in transportation model and finding solutions.

Course Content:**Unit- I:**

Linear programming Problem-Mathematical formulation of L.P.P-Slack and Surplus Variables
Solution of Linear programming problem

Unit- II:

Graphical solution of L.P.P- Simplex Method-Computational procedure

Unit- III:

Artificial variables Technique-Two Phase method -Big-M method

Unit- IV:

Mathematical formulation of Transportation Problem -Methods for obtaining an initial feasible solution- Optimal solution of T.P -Unbalanced T.P.

Unit- V:

Mathematical formulation of assignment Problem-Method for solving the assignment problem.

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Chapters:

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1-Basic Level 2- Intermediate Level 3- Advanced Level

Lesson Plan:

UNIT	Description	Hours	Mode
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II	Graphical Method, Simplex Method	12	PPT, Chalk & Talk
III	Big-M Method Two Phase Method	12	Problem solving, Chalk & Talk
IV	Transportation Problems	12	Lecture Problem solving, Chalk & Talk
V	Assignment Problems	12	Tutorial, Problem solving, Chalk & Talk
Total		60 hours	

Course Designer: S.Parimala

