

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS101	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	CLASSICAL ALGEBRA	Semester:	I
			Credits:	4

Course Objective

This course provides the learners a wide spectrum of basic mathematical concepts including summation of series, roots of an equation and matrices.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Apply the numerical methods for approximating the solution to problems of algebraic and transcendental equations.	K3
CO2	Apply the concepts of convergence and divergence of series using various tests like Cauchy's root test, D'Alembert's ratio test to solve problems.	K3
CO3	Solve problems related to Binomial, Exponential and Logarithmic series.	K4
CO4	Apply Newton's method of divisors and Horner's Method to analyze the nature of the roots.	K4
CO5	Diagonalize the matrix using Cayley-Hamilton theorem.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	M	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Convergency and Divergency of Series: Some general theorems concerning infinite series – Series of positive terms – Comparison tests – Cauchy’s condensation test – D’Alembert’s Ratio test – Cauchy’s Root test – Raabe’s test. Text Book 1: Chapter 2: Sections: 11-20.	15
Unit II	Binomial theorem: Application of Binomial theorem to summation of series. Exponential and logarithmic series: The Exponential theorem – Summation - The logarithmic series - Modification of the Logarithmic series - Series which can be summed up by the logarithmic series. Summation of series: Application of partial fractions. Text Book 1: Chapter 3: Section: 10. Chapter 4: Sections: 2.3, 3.1, 5- 7,9, 9.1 (No derivations). Chapter 5: Sections: 2.1, 3.1, 3.2.	15
Unit III	Theory of equations: Symmetric function of roots- Newton’s Theorem on the sum of powers of the roots – To increase or decrease the roots of a given equation by a given quantity – Form of the quotient and remainder when a polynomial is divided by a binomial – <i>Removal of terms (Self study).</i> Text Book 1: Chapter 6: Sections: 12, 14 17-19.	15
Unit IV	Theory of equations: Multiple roots – Strum’s theorem – Solutions of numerical equations – Newton’s method of divisors – Horner’s Method. Text Book 1: Chapter 6: Sections: 26, 27, 28.1-28.3, 29.4, 30.	15

Unit V	Fundamental Concepts: Nilpotent – Idempotent – Unitary – Orthogonal Matrices – Related Problems. Characteristic roots and Characteristic vectors: The Characteristic equation of transformation-Properties of the Eigen vectors - Cayley-Hamilton theorem (statement only)-Diagonalization of a Matrix. Text Book 2: Chapter 1. Text Book 2: Chapter 4.	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. Manicavachagompillay T. K, Natarajan T. and Ganapathy K. S, *Algebra Volume I*, S. Viswanathan Pvt. Ltd, First edition, 2010.
2. Kandasamy P. and Thilagavathi K, *Mathematics for B. Sc. Branch - I, Volume II*, First Edition, 2004.

Books for Reference:

1. Ray M. and Sharma H. S, *A text book of Higher Algebra*, S. Chand & Company, 1988
2. Thakur B. R, Sinha H. C, Agarwal B. L. and Johri V. B, *A text book of Algebra*, Ram Prasad & sons, 1970.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://www.youtube.com/watch?v=BydVprh9NgQ>
2. <https://youtu.be/a05NS7dpbNM>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS102	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	6	CALCULUS	Semester:	I
			Credits:	4

Course Objective

This paper enables the students to gain the ability to solve the problems related to multiple integrals, Beta and Gamma functions. It also provides the basic knowledge about Laplace transforms and use it to solve the differential equations.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the methods of solving ordinary differential equations.	K1
CO2	Solve the linear differential equations with constant and variable coefficients.	K3
CO3	Compute area and volume of the solids using multiple integrals	K3
CO4	Analyze and apply the concepts of Laplace Transform, inverse Laplace Transform to solve linear ordinary differential equations with constant coefficients.	K4
CO5	Expose differential equation as a powerful tool in solving problems in Physical and Social sciences.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	M	M	M	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Curvature – Radius of curvature – Envelops. Text Book 1: Chapter 10: Sections: 1, 2.1-2.3. Linear differential equations with constant coefficients: Differential equation of higher order- The operators D and D^{-1} – Particular integral - Special methods of finding particular integral - Linear equations with variable coefficients – To find the particular integral – Special method of evaluating the P.I. when X is of the form x^m. Text Book 3: Chapter 2: Sections: 1 - 4 & 8.	18
Unit II	Partial Differential Equations: Derivation of partial differential equations by elimination of arbitrary constants and by arbitrary functions - Standard types of first order equations Type III, (Type IV - Self-study) - Lagrange's equation Text Book 3: Chapter 4: Sections: 1 -2 & 5-6.	18
Unit III	Multiple Integrals: Definition of double integral - Evaluation of the double integral - Double integral in polar co-ordinates - Triple integrals – Applications of multiple integrals (problems only) Text Book 2: Chapter 5: Sections: 1 - 5.	18
Unit IV	Change of Variables: Jacobians - Two important results regarding Jacobians - Change of variable in the case of two variables - Change of variable in the case of three variables - Transformation from Cartesian to polar co-ordinates - Transformation from Cartesian to spherical polar co-ordinates. Beta and Gamma Functions: Definitions - Convergence of Gamma functions - Properties of Beta functions - Relation between Beta and Gamma functions - Examples - Applications of Gamma functions to multiple integrals. Text Book 2 : Chapter 6 Chapter 7: Sections 2 - 6.	18
Unit V	The Laplace Transforms: Definitions - Transform of $f(t)$, e^{at}, $\cos at$, $\sin at$ and t^n when n is an integer - Using Laplace transforms to evaluate integrals - Inverse Laplace transforms (Self study)- Finding the Laplace transforms of functions to get the inverse transforms of functions--Laplace transforms to solve ordinary differential equation with constant coefficients. Text Book 3: Chapter 5: Sections 1,2,4 - 8.	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. Narayanan S. and ManicavachagomPillay T.K, Calculus Volume – I, S. Viswanathan(Publishers and Printers), 2010.
2. Narayanan S. and ManicavachagomPillay T.K, Calculus Volume – II, S. Viswanathan(Publishers and Printers), 2010.
3. Narayanan S. and ManicavachagomPillay T. K, Calculus Volume – III, S. Viswanathan(Publishers and Printers), 2010.

Books for Reference:

1. Dass H. K., Advanced Engineering MathematicsS. Chand and Company Ltd, Sixteenth Edition, New Delhi, 2006.
2. Kandasamy P. and Thilagavathi K., Allied Mathematics (Volume-II), S. Chand and company Ltd, New Delhi, 2004.
3. Kandasamy P. and Thilagavathi K., Allied Mathematics (Volume-III), S. Chand and company Ltd, New Delhi, 2004

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <http://www.math.odu.edu/~jhj/Volume-2.PDF>
2. <https://nptel.ac.in/courses/111/105/111105122/>
3. <https://nptel.ac.in/courses/111/107/111107108/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S. SIVASANKAR  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name:Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS1A1	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	6	MATHEMATICAL STATISTICS- I	Semester:	I
			Credits:	5

Course Objectives

The aim of this course is to introduce the concept of discrete and continuous random variables, probability functions, expectations, moment generating functions and some discrete and continuous distributions and should have developed skills to apply them to various real life situations.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge level
CO1	Understand the concepts of random variables and probability distributions in two dimensional space.	K2
CO2	Compute expected value and variance of discrete and continuous random variables.	K3
CO3	Understand and analyze the discrete distributions such as Binomial and Poisson distributions.	K4
CO4	Analyze the continuous distributions such as normal, beta, gamma, exponential and rectangular distributions	K4
CO5	Use statistical tool effectively to analyze real life problems and to be an efficient statistician.	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Random Variables and Distribution Functions: Introduction- Two Dimensional or Joint Probability Mass Function - Two Dimensional Distribution function - Marginal Distribution functions - Joint Density function - Marginal Density Function - The conditional Distribution Function and Conditional Probability Density function - Simple problems. Chapter 5: Sections: 5.1,5.5, 5.5.1 - 5.5.5. Mathematical Expectation: Introduction - Mathematical Expectation or Expected value of Random variable – Expected value of function of a Random variable - Properties of Expectation. Chapter 6: Sections: 6.1-6.4.	18
Unit II	Mathematical Expectation: Properties of Variance - Covariance – Variance of a linear combination of Random variables - Moments of Bivariate Probability Distributions - Conditional Expectation and Conditional Variance - Simple problems. Chapter 6: Sections: 6.5, 6.6, 6.6.1, 6.8, 6.9. Moment Generating Functions: Moment Generating Functions - Properties of Moment Generating Functions – Uniqueness Theorem of Moment Generating Functions - Cumulants - <i>Properties of Cumulants (Self study)</i> - Simple problems. Chapter 7: Sections: 7.1, 7.1.2, 7.1.3, 7.2, 7.2.1.	18
Unit III	Moment Generating Functions: <i>Characteristic Function (Self study)</i> - Properties of Characteristics Function - Chebychev's inequality - Simple problems. Chapter 7: Sections: 7.3, 7.3.1, 7.5. Special Discrete Probability Distributions: Binomial distribution - Moments of Binomial Distribution - Recurrence Relation for the Moments of Binomial Distribution - Moment Generating function of Binomial Distribution - Additive property of Binomial Distribution- Simple problems. Poisson distribution - Moments of Poisson distribution - Recurrence relation of Moments of the Poisson distribution - Moment Generating function of Poisson Distribution - Characteristics Function of the Poisson distribution – Cumulants of the Poisson distribution- Additive or reproductive property of independent Poisson variates - Simple problems. Chapter 8: Sections: 8.4, 8.4.1, 8.4.2, 8.4.6, 8.4.7, 8.5, 8.5.2, 8.5.4-8.5.8	18
Unit IV	Special Continuous Probability Distributions: Normal distribution - Chief Characteristics of the Normal Distribution - M.G.F. of Normal distribution - C.G.F. of Normal distribution - Moments of Normal Distribution - A linear	18

	combination of independent normal varieties - Simple problems. Rectangular distribution - Moments of Rectangular distribution - MGF of Rectangular distribution - Characteristic function of Rectangular distribution - Mean Deviation about Mean -Simple problems. Chapter 9: Sections: 9.2, 9.2.2, 9.2.5, 9.2.6, 9.2.7, 9.2.8, 9.3-9.3.4.	
Unit V	Special Continuous Probability Distributions: Gamma Distribution - M.G.F. of Gamma distribution - C.G.F. of Gamma distribution - Additive property of Gamma Distribution - Beta distributions of first kind - Constants of Beta distributions of first kind - Beta distributions of second kind - Constants of Beta distributions of second kind - Exponential distribution - M.G.F. of Exponential distribution - Simple problems. Chapter 9: Sections: 9.5-9.5.3, 9.6, 9.6.1, 9.7, 9.7.1, 9.8, 9.8.1.	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Gupta S. C. and Kapoor V. K., *Fundamentals of Mathematical Statistics, Eleventh Edition* S.Chand& Sons, 2009.

Books for Reference:

1. Hogg R.V. and Craigh A. G., *Introduction to Mathematical Statistics*, Pearson Education publications, 2004.
2. Veerarajan T., *Fundamentals of Mathematical Statistics*, Yes Dee Publishing Pvt.Ltd, 2017.
3. Vital P. R., *Mathematical Statistics*, Margham publications, 2004.

Digital Demonstration using R

<http://www.r-tutor.com/elementary-statistics/numerical-measures/mean>

Finding mean

<http://www.r-tutor.com/elementary-statistics/numerical-measures/median>

Finding median

<http://www.r-tutor.com/elementary-statistics/probability-distributions/binomial-distribution>

Binomial distribution

<http://www.r-tutor.com/elementary-statistics/probability-distributions/poisson-distribution> @

Poisson distribution

<http://www.r-tutor.com/elementary-statistics/hypothesis-testing>

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Programme Code:	UCY	Programme Title :	B.Sc., Chemistry	
Course Code:	25UCY1A1	Title	Batch :	2025 - 2028
		MATHEMATICS FOR CHEMISTRY-I	Semester	I
Hrs/Week	6		Credits :	4

Course Objective

This course provides a platform to understand the fundamental concepts of Matrices, Theory of Equations, Summation of series and some Special functions.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge about different types of matrices and finding characteristic roots and vectors of a matrix.	K2
CO2	Analyze the relation between roots and coefficients of the polynomial equations.	K3
CO3	Know the concept of Binomial, Exponential, Logarithmic series and their application to summation of series.	K2
CO4	Apply the numerical methods for approximating the solution to problems of algebraic linear equations.	K4
CO5	Solve the problems related to Beta and Gamma functions.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	M	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Matrices: Symmetric and Skew Symmetric matrices - Hermitian and Skew - Hermitian matrices - Orthogonal and unitary matrices - Characteristic Equation of a matrix – Characteristic vectors of a matrix - Cayley-Hamilton's theorem (without proof) - Simple Problems. Text Book 1: Chapter 5 (Page No. 5.8 - 5.24 and 5.50 - 5.75)	18
Unit II	Theory of Equations: Fundamental theorem in the theory of Equations - Relation between the roots and co-efficient of an Equation - Imaginary and Irrational roots. Text Book 1: Chapter 6: Sections: 1- 4 (Page No. 6.1 - 6.26) Reciprocal Equation - Diminishing the roots of an Equation - Removal of term - Simple Problems. Text Book 1: Chapter 6 : Sections: 6, 9, 10 (Page No.6.30 - 6.37 and 6.49 - 6.56)	18
Unit III	Binomial Series: Summation of Binomial Series - Exponential series - Logarithmic series - Simple Problems. Text Book 1: Chapter 2: Sections: 3 (Page No. 2.4 - 2.21) Chapter 3 Sections: 1, 2 (Page No. 3.1 - 3.23) Chapter 4 (Page No. 4.1 - 4.21)	18
Unit IV	Solution of Simultaneous Linear Algebraic Equations – Direct Methods: Introduction - Gauss Elimination Method – Gauss Jordan Elimination Method - Inversion of a matrix using Gauss Elimination Method Text Book 2: Chapter 4: Sections: 4.1 – 4.3	18
Unit V	Beta, Gamma Functions - Simple Problems. Text Book 1: Chapter 30 (Page No.30.1 - 30.31)	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

1. Dr. Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.
2. Kandasamy P, Thilagavathy K and Gunavathi K, *Numerical Methods*, S. Chand company Ltd, 2012.

Books for Reference :

Frank Ayres, *Shaum's outline of theory and problem of matrices.*

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://www.youtube.com/watch?v=xyAuNHPsq-g>
2. <https://www.youtube.com/watch?v=JoyvDWZ0aMY>

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Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UPS	Programme Title:	B.Sc., Physics	
Course Code:	25UPS1A1	Title	Batch :	2025 - 2028
		MATHEMATICS FOR PHYSICS – I	Semester	I
Hrs/Week	6		Credits :	4

Course Objective

This course provides a platform to understand the fundamental concepts of Matrices, Theory of Equations, Summation of series and some Special functions.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge about different types of matrices and finding characteristic roots and vectors of a matrix.	K2
CO2	Analyze the relation between roots and coefficients of the polynomial equations.	K3
CO3	Know the concept of Binomial, Exponential, Logarithmic series and their application to summation of series.	K2
CO4	Apply the numerical methods for approximating the solution to problems of algebraic linear equations.	K4
CO5	Solve the problems related to Beta and Gamma functions.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	M	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Matrices: Symmetric and Skew Symmetric matrices - Hermitian and Skew - Hermitian matrices - Orthogonal and unitary matrices - Characteristic Equation of a matrix – Characteristic vectors of a matrix - Cayley-Hamilton's theorem (without proof) - Simple Problems. Text Book 1: Chapter 5 (Page No. 5.8 - 5.24 and 5.50 - 5.75)	18
Unit II	Theory of Equations: Fundamental theorem in the theory of Equations - Relation between the roots and co-efficient of an Equation - Imaginary and Irrational roots. Text Book 1: Chapter 6: Sections: 1- 4 (Page No. 6.1 - 6.26) Reciprocal Equation - Diminishing the roots of an Equation - Removal of term - Simple Problems. Text Book 1: Chapter 6 : Sections: 6, 9, 10 (Page No.6.30 - 6.37 and 6.49 - 6.56)	18
Unit III	Binomial Series: Summation of Binomial Series - Exponential series - Logarithmic series - Simple Problems. Text Book 1: Chapter 2: Sections: 3 (Page No. 2.4 - 2.21) Chapter 3 Sections: 1, 2 (Page No. 3.1 - 3.23) Chapter 4 (Page No. 4.1 - 4.21)	18
Unit IV	Solution of Simultaneous Linear Algebraic Equations – Direct Methods: Introduction - Gauss Elimination Method – Gauss Jordan Elimination Method - Inversion of a matrix using Gauss Elimination Method Text Book 2: Chapter 4: Sections: 4.1 – 4.3	18
Unit V	Beta, Gamma Functions - Simple Problems. Text Book 1: Chapter 30 (Page No.30.1 - 30.31)	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

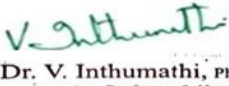
1. Dr. Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.
2. Kandasamy P, Thilagavathy K and Gunavathi K, *Numerical Methods*, S. Chand company Ltd, 2012.

Books for Reference :

Frank Ayres, *Shaum's outline of theory and problem of matrices.*

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1. <https://www.youtube.com/watch?v=xyAuNHPsq-g>
2. <https://www.youtube.com/watch?v=JoyvDWZ0aMY>

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Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS203	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES	Semester:	II
			Credits:	4

Course Objective

This paper enables the students to provide basic knowledge of trigonometry, vector calculus and Fourier series.

Course Outcomes (CO)

On successful completion of this course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic concepts of vector analysis, trigonometry, differentiation and integration.	K1
CO2	Apply the differential operator to solve vector differential equations.	K3
CO3	Solve the multiple integrals by applying Gauss divergence theorem, Stoke's theorem and Green's theorem.	K3
CO4	Compute the expansion of trigonometric function as multiple of θ and a series of powers of θ .	K3
CO5	Find Fourier series expansion for odd and even functions of a given period and can apply to solve problems in mathematical physics.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	M	M	H	M	M	H	H
CO2	H	M	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Expansions and Inverse circular functions: Expansions of $\cos^n \theta$ and $\sin^n \theta$ - Expansions of $\cos n\theta$ and $\sin n\theta$ - Power series for $\sin x$ and $\cos x$ – Trigonometric equations – Relations among inverse functions - Related problems Text Book 1: Chapter 4: Sections: 4.1-4.5.	15
Unit II	Circular and Hyperbolic Functions: Exponential function - Circular functions - hyperbolic functions - Relations between circular and hyperbolic functions- Related problems. Text Book 1: Chapter 6: Sections: 6.1 – 6.4.	15
Unit III	Fourier Series: Definition - Finding Fourier co-efficient for given periodic functions with period 2π and $2l$ - Even and odd functions - Half range series. Text Book 2: Chapter 6: Sections: 1 – 6.1.	15
Unit IV	Vector differentiation: Gradient, Curl and Divergence- Scalar and vector point functions - Level surface - Gradient of a scalar point function - Directional derivative of a scalar point function - Theorems (statement only) - Equations of tangent plane and normal line to a level surface (Self study) - Divergence and curl of a vector point function - Solenoidal vector - Irrotational vector - Vector identities. Text Book 3: Chapter 1.	15
Unit V	Vector integration: Line integral - Theorems on line integrals - Surface and Volume integrals - Gauss Divergence theorem - Stoke's theorem - Green's theorem in plane. (Statement only and relevant problems). Text Book 3: Chapter 2.	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. Duraipandian P., Laxmi Duraipandian and Jayamalaparamasivan, Trigonometry, Emerald Publishers, 1999.
2. Narayanan S., Manicavachagom Pillay T. K., Calculus Volume III, Viswanathan S (Publishers and Printers), 2010.
3. Vittal P. R. and Malini V., Vector Analysis, Margham Publication, 1997.

Books for Reference:

1. Gupta R., Vector Calculus, Firewall Media, 2005.
2. Narayanan S. and Manicavachagom pillay T. K., Trigonometry, Viswanathan S (Publishers and Printers), 2012.
3. Duraipandian P. and Udhayabaskaran S., Allied Mathematics, Vol 1, S. Chand, Reprint 2019.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://nptel.ac.in/courses/111/105/111105122/>
2. <http://www.math.odu.edu/~jh/Volume-2.PDF>
3. https://www.whitman.edu/mathematics/calculus_online/chapter16.html
4. <https://nptel.ac.in/courses/111/107/111107108/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS204	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	ANALYTICAL GEOMETRY	Semester:	II
			Credits:	4

Course Objective

This paper enables the student to gain fundamental ideas about co-ordinate geometry and gives clear knowledge about regular geometrical aspects and their properties in two and three dimensions.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the basic properties of circle, sphere, parabola and hyperbola and can able to gain a deep knowledge in it.	K1
CO2	Understand the ideas about the relation between polar and cartesian co-ordinates of geometric figures in solving simple problems.	K2
CO3	Compute the equations of a chord to a circle and common tangents to a circle.	K3
CO4	Solve problems relating to right circular cone, enveloping cone and general quadric cone.	K3
CO5	Apply in real life problems in physics, engineering and computer graphics.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	H	H	H
CO2	H	H	H	H	H	M	H	H	H
CO3	H	H	H	H	M	M	H	H	H
CO4	H	H	H	H	M	M	H	H	H
CO5	H	H	H	H	M	M	M	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Circle - <i>Common tangents to two circles (self study).</i> Text book 1: Chapter 4: Sections: 4.10 – 4.14. Parabola Text book 1: Chapter 6: Sections: 6.5-6.7. Ellipse Text book 1: Chapter 7: Sections: 7.6-7.8. Hyperbola - <i>Some properties of the asymptotes(self study).</i> Text book 1: Chapter 8: Sections: 8.4-8.6.	15
Unit II	Polar Equations Text book 1: Chapter 9: Sections: 9.1 – 9.15.	15
Unit III	Sphere Text book 2: Chapter 4: Sections: 4.1- 4.8.	15
Unit IV	Cone, Cylinder and Central quadrics Text book 2: Chapter 5: Sections: 5.1 – 5.7.	15
Unit V	Cone, Cylinder and Central quadrics Text book 2: Chapter 5: Sections: 5.8 – 5.13	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

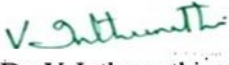
1. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I two dimensions*, S. Viswanathan printers & publishers Pvt. Ltd, 2018.
2. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I three dimensions*, S. Viswanathan printers & publishers, Pvt. Ltd, 2019.

Books for Reference:

1. Duraipandian P., Laxmi Duraipandian, Muhilan D, *Analytical Geometry 2 dimensional*, Emerald publishers, 2000.
2. Duraipandian P., Laxmi Duraipandian, Muhilan D, *Analytical Geometry 3 dimensional*, Emerald publishers, 2000.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://www.youtube.com/watch?v=TpTA-xW2oq4>
2. https://www.youtube.com/watch?v=cStx9_eWD5Y
3. <https://www.youtube.com/watch?v=a2mt2L0e06Y>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S. SIVASANKAR  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS2A2	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	6	MATHEMATICAL STATISTICS – II	Semester:	II
			Credits:	5

Course Objective

The objective of this paper is to introduce the concepts about correlation, regression, sample theory, sampling distributions and theory of estimation.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of regression line and the principles of least squares.	K2
CO2	Apply the concept of correlation and rank correlation in real life situations.	K3
CO3	Analyze the concepts of sampling techniques and procedure for testing of hypothesis for large samples.	K4
CO4	Apply chi square, t and F distributions for testing of attributes as well apply the Cramer Rao- inequality for estimation.	K3
CO5	Find good estimators for an unknown parameter using estimation theory	K3

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	H	H	H
CO2	H	H	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Correlation: Introduction – Meaning of correlation – Scatter diagram - Karl Pearson's coefficient of Correlation - Limits for Correlation Coefficient - Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution - Rank Correlation - Spearman's Rank Correlation Coefficient - problems only (no derivations). Chapter 10: Sections: 10.1, 10.2, 10.3, 10.4, 10.4.1, 10.5, 10.7, 10.7.1. Linear Regression: Introduction – Linear Regression - Regression Coefficients – Properties of Regression Coefficients- <i>Angle between two Lines of Regression (Self study)</i> – Simple Problems. Chapter 11: Sections: 11.1, 11.2, 11.2.1, 11.2.2, 11.2.3.	18
Unit II	Large Sample Theory: Introduction – Types of sampling – Purposive sampling –Random Sampling – simple sampling – Stratified sampling - Parameter and Statistic – Sampling Distribution of a Statistic - Standard Error - Tests of Significance - Null and alternative Hypothesis - Errors in sampling - Critical Region and Level of Significance - One-tailed and Two-tailed tests - Critical Values or Significant Values - Procedure for Testing of Hypothesis - Tests of Significance for Large Samples - Sampling of Attributes - Test of significance for Single Proportion - Test of significance for Difference of Proportions - Simple Problems. Chapter 14 : Sections: 14.1, 14.2, 14.2.1, 14.2.2, 14.2.3, 14.2.4, 14.3, 14.3.1, 14.3.2, 14.4, 14.4.1-14.4.5, 14.5, 14.6, 14.7, 14.7.1, 14.7.2.	18
Unit III	Large Sample Theory: Sampling of Variables - Test of significance for Single Mean – <i>Test of significance for Difference of Means (Self study)</i>- Simple Problems. Chapter: 14 : Sections: 14.8, 14.8.3, 14.8.4. Chi – square (χ^2) Distribution: Applications of Chi- square Distribution - Inferences about a Population Variance - Goodness of Fit Test - Test of Independence of Attributes-- Contingency Tables - Simple Problems. Chapter 15: Sections: 15.6, 15.6.1, 15.6.2, 15.6.3.	18
Unit IV	t, F and z Distributions: Applications of t-Distribution - t-test for Single Mean - t-test for Difference of Means - t-test for Testing the Significance of an Observed Sample Correlation Coefficient - Applications of F-Distribution - F-test for Equality of Two Population Variances - Simple Problems. Chapter 16: Sections: 16.3, 16.3.1, 16.3.2, 16.3.4, 16.6, 16.6.1.	18

Unit V	Theory of Estimation: Introduction - Characteristic of estimators – Unbiasedness – Consistency – Efficient estimators – Sufficiency – Cramer-Rao inequality – Simple problems – Methods of estimation – Method of maximum likelihood estimation – Properties of maximum Likelihood Estimators – Method of moments - Simple Problems. Chapter 17: Sections: 17.1, 17.2, 17.2.1, 17.2.2, 17.2.3, 17.2.4, 17.3, 17.6, 17.6.1, 17.6.3.	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Gupta S. C and Kapoor V. K., Fundamentals of Mathematical Statistics, Eleventh edition, S. Chand & Sons, New Delhi, 2009.

Books for Reference:

1. Hogg R. V and Craigh A. G., Introduction to Mathematical Statistics, Pearson Education publications, 2004.
2. Veerarajan T., Fundamentals of Mathematical Statistics, Yes Dee Publishing Pvt. Ltd., 2017.
3. Vital P. R., *Mathematical Statistics*, Margham publications, 2004.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. **Normal distribution**
<https://www.r-tutor.com/elementary-statistics/probability-distributions/normal-distribution>
2. **Chi-squared Distribution**
<https://www.r-tutor.com/elementary-statistics/probability-distributions/chi-squared-distribution>
3. **Student t Distribution**
<https://www.r-tutor.com/elementary-statistics/probability-distributions/student-t-distribution>
4. **F Distribution**
<https://www.r-tutor.com/elementary-statistics/probability-distributions/f-distribution>
5. <http://www.khanacademy.com>

6. <https://nptel.ac.in/courses/111/105/111105124/>
7. <https://nptel.ac.in/courses/111/105/111105090/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. M.MAHESWARI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UCY	Programme Title :	B.Sc.Chemistry	
Course Code:	25UCY2A2	Title	Batch :	2025 - 2028
		MATHEMATICS FOR CHEMISTRY-II	Semester	II
Hrs/Week	6		Credits :	4

Course Objective

This paper enables the students to acquire the ability in solving problems in hyperbolic functions, Laplace and Inverse Laplace transforms and vector calculus.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of circular functions and hyperbolic functions.	K2
CO2	Apply Laplace transform for solving differential equations.	K3
CO3	Apply the concepts of Gradient, Curl and Divergence in computing vector differentiation problems.	K3
CO4	Compute problems on line integral, surface integral and volume integral.	K4
CO5	Solve the multiple integrals by applying Gauss divergence theorem and Green's theorem.	K4

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	M	H	H
CO5	H	H	H	H	M	M	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Hyperbolic functions: Relations between circular and hyperbolic functions - Addition formula for hyperbolic functions - Problems. Chapter 14: Sections: 1-9 (Pg. No. : 14.31 to 14.37 and 14.40 to 14.55) Laplace Transform: Definition - Laplace transform of elementary function - Linear Property – Shifting Property - Change of scale property - Laplace transform of derivatives - Laplace transform of integrals - Multiplication by t - problems. Chapter 27: Sections: 1,2 (Pg. No. : 27.1 to 27.20)	18
Unit II	Inverse Laplace Transform: Inverse Laplace Transform of some functions-Properties of Inverse Laplace Transform-Problems-Solving Differential Equations using Laplace Transform-Problems. Chapter 27: Sections: 4, 5 (Pg. No. : 27.23 to 27.62)	18
Unit III	Vector Differentiation: Gradient, Curl and Divergence – Problems- Divergence and Curl of a Vector point function-Problems-Vector Identities-Problems. Chapter 28 (Pg. No.: 6 to 53)	18
Unit IV	Vector Integration: Line Integral - Surface Integral - Volume Integral - Simple Problems. Chapter 29 (Pg. No. : 59 to 88)	18
Unit V	Vector Integration: Gauss Divergence Theorem(without proof) -Green's theorem (without proof) - Simple Problems. Chapter 29 (Pg. No.: 94 to 107 and 129 to 141)	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

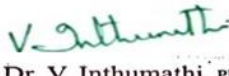
Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.

Books for Reference:

1. Murray R. Spiegel, *Shaum's outline of theory and problem of vector analysis*
2. Murray R. Spiegel, *Shaum's outline of theory and problem of Laplace Transform.*

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://www.youtube.com/watch?v=Pq-tUQzeSRw>
2. <https://www.youtube.com/watch?v=M0H1UJbn-V4>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UCY	Programme Title:	B.Sc.Chemistry	
Course Code:	25UCY2A3	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	Programming Lab for Chemistry using MATLAB	Semester:	II
			Credits:	2

Course Objective

This course ensures a practical knowledge for computing the sub matrices from the existing matrix and finding the derivative of polynomials.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Create a matrix using MATLAB	K3
CO2	Calculate eigen values and eigen vectors of the matrix using MATLAB.	K5
CO3	Solve a system of linear equations using MATLAB	K4
CO4	Calculate the first and second derivative of a polynomial using MATLAB	K5
CO5	Find the integral of a function using MATLAB	K3

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	M	M	H
CO2	H	H	H	H	M	H	H	M	H
CO3	H	H	H	H	M	H	H	M	H
CO4	H	H	H	H	M	H	H	M	H
CO5	H	H	H	H	M	H	H	M	H

H - HIGH; M - MEDIUM; L - LOW.

List of programs:

1. Program for creating a matrix 5×4
2. Program for finding the characteristic equation of the 3×3 matrix
3. Program to illustrate the row vector problem in a given matrix $\begin{bmatrix} 6 & 43 & 2 & 11 & 87 \\ 12 & 6 & 34 & 0 & 5 \\ 34 & 18 & 7 & 41 & 9 \end{bmatrix}$
4. Program to illustrate the column vector problem in a given matrix $\begin{bmatrix} 2 & 4 & 6 & 8 & 10 \\ 3 & 6 & 9 & 12 & 15 \\ 7 & 14 & 21 & 28 & 35 \end{bmatrix}$
5. Program to illustrate the creation of sub matrix from a given 4×7 matrix
6. Program to finding the eigen values of the 3×3 matrix
7. Program to check the matrix 3×3 is symmetric or skew symmetric

$$4x - 2y + 6z = 8$$
8. Program to solve the system of linear equations $2x + 8y + 2z = 4$

$$6x + 10y + 3z = 0$$
9. Program to create a 6×6 matrix in which the middle rows and the middle two columns are 1's and the rest are zeros.
10. The following were the daily maximum temperature (in °F) in Washington In during the month of April, 2002: 58 73 73 53 50 48 56 73 66 69 63 74 82 91 93 89 91 80 59 69 56 64 63 66 64 74 63 69, (data from the U.S. National Organic and Atmospheric Administrations). Use relational and logical operations determine the following:
 - A) The number of days the temperature was above 75°
 - B) The number of days the temperature was between 65° and 80°
 - C) The days of the month that the temperature was between 50° and 60°
11. A worker is paid according to his hourly wage up to 40 hours, and 50% more for overtime. Write a program in a script file that calculates the pay to a worker. The programs ask the user to enter the number of hours and the hourly wage. The program the displays the pay.
12. A vector is given by $V=[5,17,-3,8,0,-1,12,15,20,-6,6,4,-7,16]$. Write a program as a script file that doubles the elements that are positive and are divisible by 3 and/or 5, and raise to the power of 3 the elements that are negative but greater than -5.
13. For the polynomial $f(x) = x^5 - 12.1x^4 + 40.59x^3 - 17.015x^2 - 71.95x + 35.88$
 - a) Calculate $f(9)$
 - b) Calculate $f(x)$ for $0 \leq x \leq 10$
14. Create 3×3 matrix to demonstrate that matrix multiplication is not commutative.
15. Program to find the first and second derivative of

$$f(x) = x^5 - 12.1x^4 + 40.59x^3 - 17.015x^2 - 71.95x + 35.88$$
16. Program to find the first and second derivative of $f(x) = e^{3x+2}$ and find $\int_0^{\frac{\pi}{2}} \sin(2x) dx$
17. Program to find the inverse of a matrix.
18. Program to find the element by element operations.
19. Program in a script file that determines the real roots of a quadratic equation

$$ax^2 + bx + c = 0.$$
20. The maximum daily temperatures (in °F) for New York city and Anchorage Alaska during the month of January 2001 are given in the vectors below (data from the U.S. National Oceanic

Atmospheric Administration). TNY=[31 26 30 33 33 39 41 41 34 33 45 42 36 39 37 45 43 36 41 37 32 32 35 42 38 33 40 37 36 51 50]

TANC=[37 24 28 25 21 28 46 37 36 20 24 31 34 40 43 36 34 41 42 35 38 36 35 33 42 42 37 26 20 25 31]. Write a Program in a script file to answer the following:

- Calculate the average temperature for the month in each city.
- How many days was the temperature below the average in each city.
- How many days, and which dates in the month, was the temperature the same in both cities?
- How many days, and which dates in the month, was the temperature in both cities above freezing (above 32°F)

21. Program for divide the polynomial $15x^5 + 35x^4 - 37x^3 - 19x^2 + 41x - 15$ by polynomial $5x^3 - 4x + 3$

Text Book:

Amos Gilat, *MATLAB - An Introduction with Application*, John Wiley & Sons, Singapore, Third Edition, 2007.

Books for Reference:

- Etter D. M., Kuncicky D. C. and Moore H., Introduction to MATLAB 7, Prentice Hall, New Jersey, 2009.
- Palm W. J., Introduction to MATLAB 7 for Engineers, McGraw-Hill Education, New York, 2005.
- Prata R. P., Getting Started with MATLAB - A Quick Introduction for Scientist and Engineers, Oxford University Press, New Delhi, 2010.

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Ms A. GNANASOUNDARI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UPS	Programme Title :	B.Sc.Physics	
Course Code:	25UPS2A2	Title	Batch :	2025 - 2028
		MATHEMATICS FOR PHYSICS-II	Semester	II
Hrs/Week	6		Credits :	4

Course Objective

This paper enables the students to acquire the ability in solving problems in hyperbolic functions, Laplace and Inverse Laplace transforms and vector calculus.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of circular functions and hyperbolic functions.	K2
CO2	Apply Laplace transform for solving differential equations.	K3
CO3	Apply the concepts of Gradient, Curl and Divergence in computing vector differentiation problems.	K3
CO4	Compute problems on line integral, surface integral and volume integral.	K4
CO5	Solve the multiple integrals by applying Gauss divergence theorem and Green's theorem.	K4

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	M	H	H
CO5	H	H	H	H	M	M	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Hyperbolic functions: Relations between circular and hyperbolic functions - Addition formula for hyperbolic functions - Problems. Chapter 14: Sections: 1-9 (Pg. No. : 14.31 to 14.37 and 14.40 to 14.55) Laplace Transform: Definition - Laplace transform of elementary function - Linear Property – Shifting Property - Change of scale property - Laplace transform of derivatives - Laplace transform of integrals - Multiplication by t - problems. Chapter 27: Sections: 1,2 (Pg. No. : 27.1 to 27.20)	18
Unit II	Inverse Laplace Transform: Inverse Laplace Transform of some functions-Properties of Inverse Laplace Transform-Problems-Solving Differential Equations using Laplace Transform-Problems. Chapter 27: Sections: 4, 5 (Pg. No. : 27.23 to 27.62)	18
Unit III	Vector Differentiation: Gradient, Curl and Divergence – Problems- Divergence and Curl of a Vector point function-Problems-Vector Identities-Problems. Chapter 28 (Pg. No.: 6 to 53)	18
Unit IV	Vector Integration: Line Integral - Surface Integral - Volume Integral - Simple Problems. Chapter 29 (Pg. No. : 59 to 88)	18
Unit V	Vector Integration: Gauss Divergence Theorem(without proof) -Stoke's Theorem(without proof) -Green's theorem (without proof) - Simple Problems. Chapter 29 (Pg. No.: 94 to 141)	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.

Books for Reference:

1. Murray R. Spiegel, *Shaum's outline of theory and problem of vector analysis*.
2. Murray R. Spiegel, *Shaum's outline of theory and problem of Laplace transform*.

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2. <https://www.youtube.com/watch?v=M0H1UJbn-V4>

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Programme Code:	UPS	Programme Title:	B.Sc. Physics	
Course Code:	25UPS2A3	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	Programming Lab for Physics using MATLAB	Semester:	II
			Credits:	2

Course Objective

This course ensures a practical knowledge for computing the sub matrices from the existing matrix and finding the derivative of polynomials.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Create a matrix using MATLAB	K3
CO2	Calculate eigen values and eigen vectors of the matrix using MATLAB.	K5
CO3	Solve a system of linear equations using MATLAB	K4
CO4	Calculate the first and second derivative of a polynomial using MATLAB	K5
CO5	Find the integral of a function using MATLAB	K3

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	M	M	H
CO2	H	H	H	H	M	H	H	M	H
CO3	H	H	H	H	M	H	H	M	H
CO4	H	H	H	H	M	H	H	M	H
CO5	H	H	H	H	M	H	H	M	H

H - HIGH; M - MEDIUM; L - LOW.

List of programs:

1. Program for creating a matrix 5×4
2. Program for finding the characteristic equation of the 3×3 matrix
3. Program to illustrate the row vector problem in a given matrix $\begin{bmatrix} 6 & 43 & 2 & 11 & 87 \\ 12 & 6 & 34 & 0 & 5 \\ 34 & 18 & 7 & 41 & 9 \end{bmatrix}$
4. Program to illustrate the column vector problem in a given matrix $\begin{bmatrix} 2 & 4 & 6 & 8 & 10 \\ 3 & 6 & 9 & 12 & 15 \\ 7 & 14 & 21 & 28 & 35 \end{bmatrix}$
5. Program to illustrate the creation of sub matrix from a given 4×7 matrix
6. Program to finding the eigen values of the 3×3 matrix
7. Program to check the matrix 3×3 is symmetric or skew symmetric

$$4x - 2y + 6z = 8$$
8. Program to solve the system of linear equations $2x + 8y + 2z = 4$

$$6x + 10y + 3z = 0$$
9. Program to create a 6×6 matrix in which the middle rows and the middle two columns are 1's and the rest are zeros.
10. The following were the daily maximum temperature (in °F) in Washington In during the month of April, 2002: 58 73 73 53 50 48 56 73 66 69 63 74 82 91 93 89 91 80 59 69 56 64 63 66 64 74 63 69, (data from the U.S. National Organic and Atmospheric Administrations). Use relational and logical operations determine the following:
 D) The number of days the temperature was above 75°
 E) The number of days the temperature was between 65° and 80°
 F) The days of the month that the temperature was between 50° and 60°
11. A worker is paid according to his hourly wage up to 40 hours, and 50% more for overtime. Write a program in a script file that calculates the pay to a worker. The programs ask the user to enter the number of hours and the hourly wage. The program the displays the pay.
12. A vector is given by $V=[5,17,-3,8,0,-1,12,15,20,-6,6,4,-7,16]$. Write a program as a script file that doubles the elements that are positive and are divisible by 3 and/or 5, and raise to the power of 3 the elements that are negative but greater than -5.
13. For the polynomial $f(x) = x^5 - 12.1x^4 + 40.59x^3 - 17.015x^2 - 71.95x + 35.88$
 c) Calculate $f(9)$
 d) Calculate $f(x)$ for $0 \leq x \leq 10$
14. Create 3×3 matrix to demonstrate that matrix multiplication is not commutative.
15. Program to find the first and second derivative of

$$f(x) = x^5 - 12.1x^4 + 40.59x^3 - 17.015x^2 - 71.95x + 35.88$$
16. Program to find the first and second derivative of $f(x) = e^{3x+2}$ and find $\int_0^{\pi/2} \sin(2x) dx$
17. Program to find the inverse of a matrix.
18. Program to find the element by element operations.
19. Program in a script file that determines the real roots of a quadratic equation

$$ax^2 + bx + c = 0.$$
20. The maximum daily temperatures (in °F) for New York City and Anchorage Alaska during the month of January 2001 are given in the vectors below (data from the U.S. National Oceanic Atmospheric Administration). TNY=[31 26 30 33 33 39 41 41 34 33 45 42 36 39 37 45 43 36 41 37 32 32 35 42 38 33 40 37 36 51 50]

TANC=[37 24 28 25 21 28 46 37 36 20 24 31 34 40 43 36 34 41 42 35 38 36 35 33 42 42 37 26 20 25 31]. Write a Program in a script file to answer the following:

- Calculate the average temperature for the month in each city.
- How many days was the temperature below the average in each city.
- How many days, and which dates in the month, was the temperature the same in both cities?
- How many days, and which dates in the month, was the temperature in both cities above freezing (above 32°F)

21. Program for divide the polynomial $15x^5 + 35x^4 - 37x^3 - 19x^2 + 41x - 15$ by polynomial $5x^3 - 4x + 3$

Text Book:

Amos Gilat, *MATLAB - An Introduction with Application*, John Wiley & Sons, Singapore, Third Edition, 2007.

Books for Reference:

- Etter D. M., Kuncicky D. C. and Moore H., *Introduction to MATLAB 7*, Prentice Hall, New Jersey, 2009.
- Palm W. J., *Introduction to MATLAB 7 for Engineers*, McGraw-Hill Education, New York, 2005.
- Prata R. P., *Getting Started with MATLAB - A Quick Introduction for Scientist and Engineers*, Oxford University Press, New Delhi, 2010.

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS305	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	4	STATICS	Semester:	III
			Credits:	4

Course Objective

This course enables a deep knowledge about the concept of Forces, Moments, Friction, Gravity and resultant of more than one force acting on a surface. It also includes simple problems in each topic which develops the application skills of the students in solving them.

Course Outcomes(CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic concepts like friction, centre of gravity, moments.	K1
CO2	Apply the concepts of parallel forces and moments, use them to solve problems.	K3
CO3	Apply and solve the problems in coplanar forces, couples forces and resultant of more than one force acting on a surface.	K3
CO4	Analyse the concepts of friction and centre of gravity.	K4
CO5	Enrich the knowledge in this course to pursue higher degree and get employability.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	M	M	M	M	H	M
CO2	H	H	H	H	H	M	M	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	H	H	H	H	H	H	H	H	M
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Forces acting at a point - Simple problems. Chapter 2: Sections: 5-16.	12
Unit II	Parallel forces - <i>Moments (Self study)</i> - Simple problems. Chapter 3: Sections: 1 - 13.	12
Unit III	Couples - Simple problems Chapter 4: Sections: 1-10.	12
Unit IV	Equilibrium of three forces acting on a rigid body - <i>Coplanar forces (Self study)</i> - Simple Problems. Chapter 5: Sections: 1 - 6, Chapter 6: Sections: 1 - 9.	12
Unit V	Friction and Centre of gravity – Simple problems. Chapter 7: Sections: 1, 3-8, 10-12, Chapter 8: Sections : 1-6, 18.	12
	Total Contact Hrs.	60

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

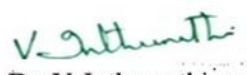
Venkataraman M. K, *Statics*, Sixth Edition, Agasthiar publications, 2007.

Books for Reference:

1. Dharmapadam A. V, *Statics*, S. Viswanathan printers and Publishers Pvt. Ltd, 1993.
2. Duraipandian P and Laxmi Duraipandian, *Mechanics*, Ram Nagar, New Delhi, S. Chand & Co. Pvt. Ltd, 1985.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

<https://nptel.ac.in/courses/112/106/112106180/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS306	Title	Batch:	2025 - 2028
		NUMERICAL TECHNIQUES	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	4		Credits:	3

Course Objective

This course helps the students to have an in-depth knowledge of various advanced methods in numerical analysis. The students to use numerical techniques to get numerical solutions of equations like transcendental and non-linear differential equations when ordinary analytical methods fail.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the need of numerical analysis techniques in the areas of approximation theory, and recall some basic concepts.	K1
CO2	Apply the numerical methods for approximating the solution to problems of algebraic and transcendental equations, simultaneous linear equations.	K3
CO3	Estimating the value of a function for any intermediate value of the independent variable using Newton Forward and Backward interpolation Formula as well compute the derivatives using Newton's forward and backward difference formula and Sterling's formula.	K3
CO4	Solve the ordinary and partial differential equations by using Numerical method techniques like Taylors method, Euler's method, RungeKutta method etc.	K4
CO5	Enrich the knowledge of numerical techniques and getting insight of algorithmic approach.	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	M	M	M	H	M
CO2	H	H	H	H	M	M	M	H	M
CO3	H	H	H	H	H	H	H	H	M
CO4	H	H	H	H	H	H	H	H	M
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	The solution of Numerical Algebraic and Transcendental Equations: Introduction - The Bisection method - The iteration method - The method of false position (RegulaFalsi Method) - Newton Raphson method. Text Book 1: Chapter 3: Sections: 1 - 5.	12
Unit II	Simultaneous Linear Algebraic Equations: Introduction – Gauss Elimination Method – Gauss Jordan Method – Computation of the inverse of a Matrix using Gauss’s Elimination Method. Chapter 4: Sections: 1 – 3. Simultaneous Linear Algebraic Equations: Iterative Methods - Gauss-Jacobi Method – Gauss-Seidal Method – <i>Comparison of Gauss elimination and Gauss-Seidal Iteration methods (Self study).</i> Chapter 4: Sections: 6, 7.	12
Unit III	Interpolation: Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values. Chapter 6: Sections: 1 - 5. Interpolation with unequal intervals: Divided differences-Properties of Divided Differences-Newton’s Interpolation Formula for unequal Intervals. Chapter 8: Sections: 1 - 3.	12
Unit IV	Numerical Differentiation: Introduction - Newton’s forward difference formula to compute the derivatives - Newton’s backward difference formula to compute the derivatives - Derivatives using Stirling’s formula. Chapter 9: Sections: 1 - 4. Numerical Integration: The Trapezoidal rule - Romberg’s method - Simpson’s one third rule - Practical applications of Simpson’s rule. (Problems only). Chapter 9: Sections: 8 -10 and 12.	12

Unit V	Numerical Solution of Ordinary Differential Equations: Solution by Taylor Series - Taylor Series method for higher order differential equations- Euler's method - Improved Euler's method - Modified Euler method - RungeKutta method - Second order RungeKutta Method - <i>Higher order RungeKutta methods (Self study).</i> Chapter 11: Sections: 6, 8, 10 - 15.	12
	Total Contact Hrs.	60

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Venkataraman M. K, *Numerical Methods in Science and Engineering*, The National Publishing Company, Madras, 2009.

Book for Reference:

Kandasamy P, Thilagavathy K and Gunavathi K, *Numerical Methods*, S. Chand company Ltd, 2012.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

<https://nptel.ac.in/courses/111/107/111107105/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. R. SANTHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS3N1	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	Non Major Elective I:QUANTITATIVE APTITUDE – I	Semester:	III
			Credits:	2

Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the necessary fundamentals to take up the course	K2
CO2	Solve simple problems related to percentage, profit & loss, ratio & proportion.	K3
CO3	Apply the concepts of probability, permutations and combinations in solving real life problems.	K3
CO4	Develop logical thinking, problem solving skills and time management.	K4
CO5	Clear competitive exams in banking, postal and railway services, IT, etc..	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	H	M	M	M	M	H
CO2	H	M	M	H	M	M	M	M	H
CO3	H	H	M	H	M	M	M	M	H
CO4	H	H	M	H	M	M	M	M	H
CO5	H	H	M	H	M	M	M	M	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Percentage: Introduction - Important facts and family - Concept of percentage - Simple problems. Chapter 10 Simplification: Introduction - BODMAS rule - Simple problems. Chapter 4	6
Unit II	Ratio and Proportion: Ratio - Proportion - Simple problems. Chapter 12:	6
Unit III	Profit and loss: Introduction - Cost price - Selling price - Profit and loss - Simple Problems. Chapter 11	6
Unit IV	Permutations and Combinations: Factorial Notation – Permutations – Combinations. Chapter 30	6
Unit V	Probability: Sample Space – Results on probability. Chapter 34	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Aggarwal R. S, *Quantitative Aptitude*, S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://youtu.be/2_XXuqkJFgs
2. https://youtu.be/g_Fahsgyn-Q

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS3N2	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	Non Major Elective I: ASTRONOMY- I	Semester:	III
			Credits:	2

Course Objective

This paper enables the learners to gain basic knowledge of the Solar System and the Milky Way.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of the Solar System.	K2
CO2	Become familiar with the Double & Multiple stars.	K2
CO3	Acquire the knowledge in the Milky Way.	K3
CO4	Know the various constellations.	K4
CO5	Analyze the concepts of Seasonal changes	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	M	H	M	M	M	M	M
CO2	M	M	M	M	M	M	M	M	M
CO3	M	M	M	H	M	M	M	M	M
CO4	M	M	M	H	M	M	M	M	M
CO5	M	M	M	H	M	M	M	M	M

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	The Solar System: Introduction - The Sun - Mercury - Venus - Mars - Asteroids - Jupiter - Saturn - Uranus - Neptune. Chapter 16: Sections: 316 - 326.Pg.No : 455 – 467	6
Unit II	The Solar System: Comets - Meteors - Zodiacal light. Chapter 16 Sections: 327 - 329.Pg.No : 467 – 472	6
Unit III	Double And Multiple Stars: Introduction - Variables stars - Eclipsing Variables Cepheid variables - Long period variables - Irregular variables - Novae - Star clusters Nebulae - Constellations - Zodiacal Constellations. Chapter 17: Sections: 339 - 345.Pg.No : 481 -489	6
Unit IV	The Milky Way: Introduction - Seasonal changes in the night sky - The winter Constellations - The spring Constellations. Chapter 17: Sections: 346 - 347.Pg.No : 489 – 497	6
Unit V	Constellations: Introduction - The summer Constellations - The autumn Constellations. Chapter 17: Section: 347.Pg.No : 497 – 504	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Kumaravelu S and Susheela Kumaravelu, *Astronomy for degree classes*, 7th edition 1986.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://youtu.be/libKVRa01L8>
2. <https://youtu.be/pIFiCLhJmig>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. CHITRA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

VALUE ADDED COURSE-I

Programme Code:	UMS			Programme Title:	B. Sc. Mathematics	
Course Code:	25UMS3VA			Title	Batch:	2025-2028
Lecture Hrs./Week or Practical Hrs./Week	-	Tutorial Hrs./Sem	30	PYTHON TRAINING	Semester:	III
					Credits:	2*

Units	Content	Hrs.
Unit I	Basics of python programming Features Of Python – The Future Of Python-Writing And Executing First Python Program –Literal Constants: Numbers, Strings-Variables And Identifiers-Data Types: Assigning Or Initializing Values To Variables, Multiple Assignment, Multiple Statements On a Single Line.	5
Unit II	Decision Control Statements&Functions Basic Loop Structures/Iterative Statements:While loop, for Loop, Nested Loops-The Break Statement–The Continue Statement-The pass Statement-The Else Statement Used With Loops. Need for Functions-Function Declaration, Function Call-Function Parameters, Variable Scope and Lifetime: Local and Global Variables, Using the Global Statement.	8
Unit III	Functions&Modules More on Defining Functions: Required Arguments, Keyword Arguments, Default Arguments, Variable-Length Arguments, Lambda Functions or Anonymous Function. The from an Important Statement-Name of Module, Making Your own Modules-The dir() Function, The Python Module-Modules and Name Spaces-Packages in Python, Standard Library Modules-Globals(), Locals(), and Reload(), Function Redefinition.	7
Unit IV	Python Strings Concatenating,Appending, and Multiplying Strings-Strings or Immutable – String Formatting Operator-Built-in String Methods and Functions-Slice, Operations: Specifying Stride While Slicing Strings-ord() and chr()	5

	Functions in and not in operators, Comparing Strings–Iterating String-The String Module.	
Unit V	File Handling File Path-Types of Files: ASCII Text Files, Binary Files-Opening and Closing Files: The Open() Function, The File Object Attributes, The Close() Method Reading and Writing Files: Write() and Writelines() Methods, Append() Method, The Read() and Readlines() Methods, Opening Files using with Keyword, Splitting Words, Some Other Useful File Methods, File Positions, Renaming and Deleting Files.	5
	Total Contact Hrs.	30

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Profenaa Industrial Training Center	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS407	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	4	DYNAMICS	Semester:	IV
			Credits:	4

Course Objective

This course provides a thorough knowledge about the characteristics of Projectiles, Energies during impact and Collision. Each topic involves problems to solve which develops the application skills and thinking process of the students.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the notions of matter, velocity, acceleration , force, momentum , moment of inertia etc.,	K1
CO2	Understand the concept of projectile motion and solving some simple problems related to it.	K2
CO3	Calculate radial and transverse components of velocity and acceleration, areal velocity of central orbits, describe the differential equation and pedal equation of central orbits.	K3
CO4	Apply the concepts of composition of simple harmonic motion in two directions.	K3
CO5	Analyze the concept of impulse, impulsive forces, direct & oblique impact of elastic bodies under collision and solve simple problems.	K4

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	M	M	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Projectiles - Simple problems. Chapter 6 :Sections : 6.1 - 6.8, 6.12 -6.15	12
Unit II	Simple Harmonic Motion - Simple problems. Chapter 10: Sections: 10.1 - 10.7.	12
Unit III	Motion under the action of central forces - <i>Differential Equations of central orbits (Self study)</i> - Simple problems. Chapter 11: Sections: 11.1 - 11.9.	12
Unit IV	Impulsive forces - Simple problems. Chapter 7: Sections: 7.1 - 7.6.	12
Unit V	Collision of elastic bodies -. <i>Compression and Restitution (Self study)</i> - Simple problems. Chapter 8: Sections: 8.1 - 8.8.	12
	Total Contact Hrs.	60

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

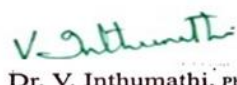
Venkataraman M. K, *Dynamics*, Thirteenth Edition, Agasthiar publications, 2009.

Books for Reference:

1. Dharmapadam A. V, *Dynamics*, S. Viswanathan Printers and Publishers Pvt. Ltd, Chennai, 1998.
2. ViswanathNaik K and Kasi M. S, *Dynamics*, Emerald Publishers, 1992.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://youtu.be/uM2HpLBVAkA>
2. <https://youtu.be/glsXr4SpOMQ>
3. <https://youtu.be/pZZt357pk-I>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name:Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS408	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	PROGRAMMING IN 'C'	Semester:	IV
			Credits:	3

Course Objective

C is a general- purpose structured programming language that is powerful, efficient and compact. The programming language C finds a wide variety of applications in the development of software. This course provides the students with all the fundamental concepts of the C language with some practical experience. Also helps the students to develop their programming skills and to build large programs.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the keywords, C-data types and variables.	K2
CO2	Apply the use of statements and looping structures.	K3
CO3	Analyze the concepts of user-defined functions, in-built functions and nesting of functions	K4
CO4	Acquire knowledge about use of multi-dimensional arrays & pointers.	K3
CO5	Sense the basic structure of C program and apply them to small projects.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	M	H	H	M	M	M
CO2	H	H	H	H	H	H	M	M	M
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Overview of C: History of C - Importance of C - Basic Structure of C Programs Constants ,Variables and Data Types: Introduction - Character set - C Tokens - Keywords and identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining symbolic constants Operators and Expressions: Introduction -Arithmetic operators - Relational operators - Logical operators - Assignment operators - increment and Decrement operators - conditional operators- Bitwise operators- Special operators - Arithmetic expressions - Evaluation of expressions - <i>Precedence of arithmetic operators (Self study)</i> - Type conversions in expressions - Operator precedence - Mathematical functions. Chapter 1: Sections : 1.1,1.2,1.8, Chapter 2: Sections : 2.1-2.8,2.10,2.11 Chapter 3: Sections : 3.1-3.12, 3.14-3.16	6
Unit II	Managing Input and Output Operations: Introduction - Reading a character - writing a character - Formatted input - Formatted output. Decision Making and Branching: Introduction - Decision making with if statement - Simple if statement - The If ... else statement - Nesting of if ... else statements - The else if ladder - The switch statement - The ?: operator - The Go to statement. Decision Making and Looping: Introduction - The while statement - The do statement - The for statement - Jumps in loops - Simple programs. Chapter 4: Sections: 4.1- 4.5, Chapter 5: Sections : 5.1-5.9 , Chapter 6: Sections :6.1-6.5.	6
Unit III	Arrays: Introduction - One dimensional arrays - Declarations of One dimensional arrays - Initializations of One dimensional arrays - Two dimensional arrays - Initializing Two dimensional arrays. Arrays and Strings: Introduction - Declaring and initializing string variables - Reading strings from terminal - Writing strings to screen - Arithmetic operations on characters - Putting strings together - comparison of two strings - String handling functions - <i>Table of strings (Self study)</i>. Chapter 7: Sections: 7.1 - 7.6 ,Chapter 8: Sections : 8.1 - 8.9.	6
Unit IV	User defined Functions: Introduction - Need for user defined functions - Multi-function Program - Elements of user defined functions - Definitions of functions - Return values and their types - Function Calls- Function Declaration - Category of Functions - No arguments and no return values - Arguments but no return values - Arguments with return values - No arguments but returns a value - Functions that return multiple values - Nesting of functions - Recursion. Chapter 9 :Sections : 9.1 - 9.16	6

Unit V	Pointers: Introduction - Understanding pointers - Accessing the address of a variable - Declaring pointer variables - Initialization of pointer variables - Accessing a variable through its pointer - Chain of Pointers - Pointer expressions - Pointer increments and scale factor - Pointers and arrays - Pointers and characters strings - Array of Pointers - Pointers as function arguments - Functions returning Pointers - Pointers to Functions . Chapter 11: Sections: 11.1-11.15.	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

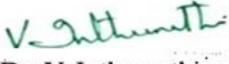
Balagurusamy E., *Programming in ANSI C*, 7th Edition, Tata McGraw Hill Publishing Company Ltd, 2017.

Books for Reference:

1. Kernighan B. W and Ritchie D. M, *The C programming language*, Prentice Hall, 1997.
2. Kochan S. G, *Programming in C*, Hyden, 1983.
3. Venugopal, K. R and Prasad S. R, *Programming with C*, Tata McGraw Hill Publishing company ltd, 1997.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. https://youtu.be/55l-aZ7_F24
2. <https://youtu.be/sY-s7O0FiYE>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S. SIVASANKAR  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS409	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	PROGRAMMING LAB IN 'C'	Semester:	IV
			Credits:	1

Course Objectives

The course is designed to provide a practical exposure to the students on 'C' language.

Course Outcomes (CO)

On completion of the course the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Write the programming code to understand the concepts of looping structure and conditional statements.	K3
CO2	Write the programming code for matrix operations to understand the array concepts	K3
CO3	Write the programming code using user-defined functions and nesting of functions	K3
CO4	Write the programming code using pointers	K4
CO5	Enrich the programming knowledge and debugging .	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	M	H	M	H	M	M	H
CO2	H	H	H	H	M	H	H	M	H
CO3	H	M	H	H	M	H	H	M	H
CO4	H	M	H	H	M	H	H	M	H
CO5	H	M	H	H	M	H	H	M	H

H - HIGH; M - MEDIUM; L - LOW.

List of Programs:

1. Program to convert the given temperature in Fahrenheit to Celsius.
2. Program to convert days into months and days.
3. Program to find the solution of quadratic equation.
4. Program for finding Fibonacci sequence.
5. Program to sort a list and find its median.
6. Program to sort a list in ascending / descending order.
7. Program to calculate mean and standard deviation of a given series of numbers.
8. Program for finding the addition of two matrices.
9. Program for finding the multiplication of two matrices.
10. Program to find the largest of two numbers using nested if else statements.
11. Program to sort a list of strings in alphabetical order.
12. Program to compute nCr value.
13. Program to check whether the number is prime or not.
14. Program to check whether the year is leap year or not.
15. Program to illustrate the use of pointers in one dimensional array.

Text Book:

Balagurusamy E, *Programming in ANSI C*, 7th Edition, Tata McGraw Hill Publishing Company Ltd, 2017.

Books for Reference:

1. Kernighan B. W and Ritchie D. M, *The C programming language*, Prentice Hall, 1997.
2. Kochan S. G, *Programming in C*, Hyden, 1983.
3. Venugopal, K. R and Prasad S. R, *Programming with C*, Tata McGraw Hill Publishing company Ltd, 1997.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://youtu.be/D53l7rRPIsS>
2. <https://youtu.be/s9fF8aSfQwg>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S.SIVASANKAR  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

ProgrammeCode:	UAP			ProgrammeTitle:	B.A., / B.Sc., / B. Com.,	
CourseCode:	25UAP4S1			Title	Batch:	2025 - 2028
				SEC II: Naan Mudhalvan: QUANTITATIVE APTITUDE	Semester:	IV
LectureHrs./Week or PracticalHrs./Week	2	Tutorial Hrs./Sem.	5		Credits:	2

Course Objective

- To enable the students to refine their mathematical, logical, and analytical skills.
- The student will be able to answer real-life simple problems by using HCF and LCM.
- The student is able to apply the correct sequence of operations to find out the value of a given mathematical expression.
- The student will be able to solve the problem involving square roots, cube roots, and average.
- To make them prepare for various public and private sector exams and placement drives.
- To understand the functions of tableau for data process and deploy dashboard.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To have fundamental knowledge of Mathematics about problems of numbers using Mathematical formulae.	K1
CO2	To understand the concepts of profit & loss related processing, simplification, etc.,	K2
CO3	To apply the formulae to real time problems on probability, Areas of surfaces and apply data visualization tool for any data set.	K3
CO4	To analyze the problems solving related to Age, Time and Distance and Time and Work etc. To examine their employability skills.	K4

CO5	Use their logical thinking and analytical abilities to evaluate puzzle and decision making related questions from company specific and other competitive tests / To critically evaluate numerous possibilities related to puzzles.	K5
	To develop their Competitive skills and improve the decision-making skills. To generate analytical reports and presentations using Data Interpretation.	K6

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	M	L	H	M	M	M	M	M	M
CO2	H	L	H	M	M	M	L	M	M	M	M	M
CO3	H	H	M	M	L	H	H	H	L	H	M	H
CO4	H	M	H	H	H	M	H	H	H	H	L	H
CO5	M	M	L	H	M	H	M	M	M	M	H	M

H-High; M-Medium; L-Low

Units	Content	Hrs
UnitI	Numbers-HCF And LCM of Numbers-Decimal Fractions- Comparison of Fractions - Simplification- Square Root and Cube Roots – Average.	6
UnitII	Time and Work - Time and Distance – Mixtures or Allegations - Problems on Numbers - Problems on Ages –Percentage - Profits and Loss.	6
Unit III	Ratio and Proportion - Time and Work - Time and Distance - Simple Interest - Compound Interest - Area-Volume and Surface Area.	6
UnitIV	Permutation and Combination - Probability, Height and Distances - Boats and Streams - Odd Man Out &Series.	6
UnitV	Interpretation: Tabulation, Bar Graphs, Pie Chart, Line Charts.	6
	Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

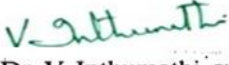
R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand & Company Ltd., New Delhi, 2018.

Reference Books

1. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson's Publications, New Delhi, 2nd Edition, 2013.
2. Praveen R.V., Quantitative Aptitude and Reasoning, PHI Learning Pvt. Ltd., New Delhi. 3rd Edition, 2016.
3. Rajesh Varma, Fast Track Objective Arithmetic, Arihant Publications India Limited, New Delhi, 2018.
4. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, McGraw Hill Education (India) Private Limited. 7th Edition, 2020.
5. Sarvesh K Verma, Quantitative Aptitude Quantum CAT, Arihant Publications India Limited, New Delhi; Twelve edition, 2022.

Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.,]

1. <https://www.javatpoint.com/aptitude/quantitative>
2. <https://www.toppr.com/guides/quantitative-aptitude/>
3. <https://www.tutorialspoint.com/quantitative Aptitude/index.htm>
4. <https://www.sscadda.com/quantitative-aptitude/>
5. <https://prepinsta.com/learn-aptitude/>
6. <https://www.indiabix.com/>
7. https://www.icai.org/post.html?post_id=17790
8. <https://tnpsc.news/tnpsc-study-materials>
9. <http://www.kalvisolai.com/p/kalvisolai-tnpsc-study-materials.html>
10. <https://byjus.com/free-ias-prep/tnpsc-study-material/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Mr. SRINIVASAN & Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

ProgrammeCode:	UAP			ProgrammeTitle:	B.A., / B.Sc., / B. Com.,	
CourseCode:	25UMS4S2			Title	Batch:	2025 - 2028
				SEC II: Naan Mudhalvan:	Semester:	IV
LectureHrs./Week or PracticalHrs./Week	2	Tutorial Hrs./Sem.	5	MATHEMATICS FOR COMPETITIVE EXAMINATIONS	Credits:	2

Course Objective

The primary objective of this course is to equip students with the necessary mathematical skills to solve problems commonly encountered in competitive examinations. This will involve understanding and applying concepts in averages, numbers, profit and loss, ratio and proportion, partnership, interest calculations, and series patterns.

Course Outcomes

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

CO Number	CO Statement	KnowledgeLevel
CO1	calculate the average of a set of numbers with ease and accuracy.	K2
CO2	Solve real-world problems involving profit/loss and determine percentage gain or loss.	K3
CO3	have a clear understanding of applying ratios, proportions, and their applications in daily life.	K1
CO4	handle problems on simple and compound interest with ease.	K2
CO5	approach problems involving patterns in numbers or terms systematically and efficiently.	K2

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	L	M	H
CO2	H	H	H	H	M	H	L	M	H
CO3	H	H	H	H	M	H	L	M	H
CO4	H	H	H	H	M	H	L	M	H
CO5	H	H	H	H	M	H	L	M	H

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	Averages, Problems on Numbers. Section-I – Chapter 6 – Solved examples 1-15 only (Page No. 139- 141), Chapter 7 - Solved examples 1-15 only (Page No.161-163).	6
Unit II	Profit and Loss Section-I – Chapter 11 – Solved examples 1-29 only (Page No.251- 256).	6
Unit III	Ratio and Proportion, Partnership Section-I – Chapter 12 – Solved examples 1-7 only (Page No.294- 296), Chapter 13 (Page No.311- 325).	6
Unit IV	Simple Interest, Compound Interest Section-I – Chapter 21 – Solved examples 1-12 only (445-447), Chapter 22 – Solved examples 1-15 only (466-470).	6
Unit V	Odd Man Out and Series Section-I – Chapter 35 (Page No.649-657)	6
	Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

~~Seminar, Quiz, Assignments, Group Task.~~

Text Book

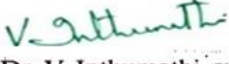
Dr. R. S. Aggarwal- Quantitative Aptitude for Competitive Examinations (Fully Solved) (Seventh Revised Edition), S. Chand & Company Pvt. Ltd

ReferenceBooks

Abhijit Guha - Quantitative Aptitude for All Competitive Examinations, McGraw Hill Education, Sixth edition.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://ncert.nic.in/ncerts/l/gemh108.pdf>
2. <https://ncert.nic.in/textbook/pdf/femh112.pdf?html>
3. <https://ncert.nic.in/ncerts/l/hemh108.pdf>

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS4N1	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	Non Major Elective II:QUANTITATIVE APTITUDE – II	Semester:	IV
			Credits:	2

Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the necessary fundamentals to take up the course	K2
CO2	Solve simple problems related to problems on ages , problems on trains and boats and streams.	K3
CO3	Apply the concepts of time and work, time and distance in solving real life problems.	K3
CO4	Develop logical thinking, problem solving skills and time management.	K4
CO5	Clear competitive exams in banking, Postal and railway services, IT, etc..	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	M	M	H	M	H	M	M	H
CO2	H	H	M	H	M	H	M	M	H
CO3	H	H	M	H	M	H	M	M	H
CO4	H	H	M	H	M	H	M	M	H
CO5	H	H	M	H	M	H	M	M	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Problems on ages: Problems on ages - Simple problems. Chapter 8.	6
Unit II	Time and work: Time and work - Simple problems. Chapter 15.	6
Unit III	Time and Distance : Time and Distance - Simple problems Chapter 17.	6
Unit IV	Problems on trains: Problems on trains with solved examples. Chapter 18	6
Unit V	Boats and Streams: Boats and Streams- Simple problems Chapter 19.	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Aggarwal R. S, *Quantitative Aptitude*, S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://youtu.be/KE7tQf9spPg>
2. <https://youtu.be/ufbDCFUn6PY>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S. SIVASANKAR  Signature	Name: Dr. V. INT HUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS4N2	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	Non Major Elective II: ASTRONOMY – II	Semester:	IV
			Credits:	2

Course Objective

This paper enables the learners to learn about the Moon and Ellipses.

Course Outcomes (CO)

After successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic knowledge of the Moon.	K2
CO2	Acquire the facts in Eclipses.	K2
CO3	Know the concept of planetary Phenomena.	K3
CO4	Find the application of Astronomical Instruments like sidereal clock and chronometer.	K4
CO5	Evaluate the Heliocentric motion of a planet	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	M	H	M	H	M	M	M
CO2	M	M	H	H	M	H	M	M	M
CO3	M	M	H	H	M	H	M	M	M
CO4	M	M	M	H	M	H	M	M	M
CO5	M	H	M	H	M	H	M	M	M

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	The Moon: Introduction - Sidereal month - Synodic month Elongation - Conjugation - Opposition - Quadratures Daily motion of the moon - Age of moon - Phase of moon. Chapter 12: Sections: 228 – 238	6
Unit II	The Moon: Moon exhibits the same side to the earth -Lunar Librations - summer and winter full moons path of the moon with respect to the sun - Perturbations of lunar orbit. Chapter 12: Sections: 241 – 245	6
Unit III	Eclipses: Introduction – Umbra and penumbra – Lunar eclipse – Solar eclipse – Length of earth’s shadow Chapter 13: Sections: 254 -257 and 264	6
Unit IV	Planetary Phenomena: Introduction – Bode’s law – Elongation – Conjugation, opposition and quadratures – Heliocentric motion of a planet. Chapter 14: Sections: 283,284 and 286 – 288	6
Unit V	Astronomical Instruments: Sidereal clock – Chronometer – Gnomon Sundial – The sextant. Chapter 15: Sections: 303-306 and 310	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

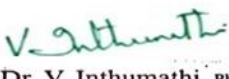
Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Kumaravelu S and SusheelaKumaravelu, *Astronomy for degree classes*, 7th edition 1986.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://youtu.be/6Vc9ZiJ0qgw>
2. <https://youtu.be/qdI-1p21Cio>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. CHITRA 	Name: Dr. V. INTUMATHI  Dr. V. Intumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.
Signature	Signature	Signature	Signature

VALUE ADDED COURSE-II

Programme Code:	UMS			Programme Title:	B. Sc. Mathematics	
Course Code:	25UMS4VA			Title	Batch:	2025-2028
Lecture Hrs./Week or Practical Hrs./Week	-	TutorialHrs./Sem.	30	ANDROID APP DEVELOPMENT	Semester:	IV
					Credits:	2*

Units	Content	Hrs.
Unit I	Android Framework and Android Studio: introduction- Android software Layers - Components of an Android Application – Pre-requisite of Android Application Development – Android Studio / Eclipse	5
Unit II	Android SDK Tools and Activity Class: Android Project Structure- Android Manifest File – Structure of Manifest File- Activity	8
Unit III	Fragment views and List View: Introduction – Fragments – Views – List views and List Activity	7
Unit IV	Intents and Intent Filters: Introduction – Native Android Action –Data Transfer – Intent to Call activities – Register and Intent Filter	5
Unit V	Android Layout and System views: Introduction – Views – Layouts – Customized Views. Android UI – Dialogs, Menus and Web view: Introduction – User Interaction – Dialogs – Toasts –Context Menu – Option Menu – Web View.	5
	Total Contact Hrs.	30

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Profenaa Industrial Training Center	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS510	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	6	MODERN ALGEBRA	Semester:	V
			Credits:	5

Course Objective

To promote a better understanding of algebra and provides an adequate foundation for further study in abstract algebra and its applications in various branches of Mathematics.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the algebraic structures such as sets, mappings, relations, groups, rings and field.	K2
CO2	Understand the properties of groups, subgroups and applying in simple proofs and solving problems.	K3
CO3	Apply the results from group theory to study the properties of rings and fields and to possess the ability to work within their algebraic structures.	K3
CO4	Understand and analyze the concepts of group homomorphism, isomorphism for groups, rings and Euclidian rings.	K4
CO5	Enrich the knowledge in algebra to pursue higher degree and choose a teaching career.	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	M	M	H	H
CO2	H	H	H	H	H	M	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Preliminary Notions: <i>Set Theory</i> (Self study)- <i>Mappings</i> (Self study). Group Theory: Definition of a Group - Some Examples of Groups - Some preliminary Lemmas – Subgroups – A Counting Principle. Chapter 1: In Section 1.1, Theorem 1.1.1 only In Section 1.2, Lemma 1.2.1 onwards Chapter 2: Sections: 2.1 - 2.5.	18
Unit II	Group Theory: Normal Subgroups and Quotient Groups - Homomorphisms. Chapter 2: Sections: 2.6, 2.7.	18
Unit III	Group Theory: Automorphisms - Cayley's Theorem - Permutation Groups – Another Counting Principle. Chapter 2: Sections: 2.8 - 2.11.	18
Unit IV	Ring Theory: Definition and Examples of Rings - Some Special Classes of Rings - Homomorphisms - Ideals and Quotient Rings. Chapter 3: Sections: 3.1 - 3.4.	18
Unit V	Ring Theory: More Ideals and Quotient Rings - The Field of Quotients of an Integral Domain - Euclidean Rings - A Particular Euclidean Ring. Chapter 3: Sections: 3.5 - 3.8	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Herstein, I. N, *Topics in Algebra*, Wiley India Pvt. Ltd., New Delhi, 2nd Edition, 2010.

Books for Reference:

1. Bhattacharya. P. B, Jain S. K, *A first course in group theory*, Wiley Eastern Pvt. Ltd, 1972.
2. Herstein I. N, *Abstract Algebra*, Prentice-Hall international, 1996.

3. Surjeetsingh, Qazizameeruddin, *Modern Algebra*, Vikas Publishing House Pvt. Ltd, Second Edition, 1975.
4. Santiago M.L, *Modern Algebra*, Tata McGraw Hill, 2003.
5. R. Balakrishnan and N. Ramabhadran, *A Text Book of Modern Algebra*, Vikas, New Delhi, 2000.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://nptel.ac.in/courses/111/106/111106137/>
2. <https://nptel.ac.in/courses/111/105/111105112/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S. SIVASANKAR  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS511	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	6	REAL ANALYSIS - I	Semester:	V
			Credits:	5

Course Objective

To enable the learner to get into basic concepts of Real Analysis and obtain a foundation for further study in analysis.

Course Outcomes (CO)

On successful completion of the course student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the fundamental properties of the real numbers which underpin the formal development of real analysis.	K2
CO2	Apply the concepts of closure and interior of sets, continuity, convergence to effectively communicate mathematics.	K3
CO3	Calculate the limits of various types of sequences, discuss the nature of continuity and analyze their properties.	K3
CO4	Analyze the applications of intersection theorem, covering theorems and Bolzano-Weierstrass theorem.	K4
CO5	Understand the structure of a metric space and deal with the notions of continuity, completeness and connectedness.	K2

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	M	M	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Unit -1 The Real and Complex number Systems: Introduction - The field axioms - The order axioms – Geometric representation of real numbers-Intervals - Integers - The unique factorization theorem for integers - Rational numbers - Irrational numbers - Upper bounds, maximum element, least upper bound - The completeness axiom - Some properties of the supremum - Properties of the integers deduced from the completeness axiom - The Archimedean property of the real number system- Absolute values and the triangle inequality - The Cauchy Schwarz inequality - Plus and minus infinity and the extended real number system R^* . Chapter 1: Sections: 1.1 - 1.20 (Except 1.15 - 1.17).	18
Unit II	Some Basic Notations of Set Theory: Ordered pairs - Cartesian product of two sets - Relations and functions - One to one functions and inverses - Composite functions - Sequences -Similar sets - Finite and infinite sets - Countable and uncountable sets - Unaccountability of the real number system - Set algebra - Countable collections of countable sets. Chapter 2: Sections: 2.3 - 2.15 (Except 2.6).	18
Unit III	Elements of Point Set Topology: Euclidean space R^n - Open balls and open sets in R^n - The structure of open sets in R^1 - Closed sets - Adherent points, Accumulation points - Closed sets and adherent points - The Bolzano-Weierstrass theorem - The Cantor intersection theorem - Lindelof covering theorem - The Heine-Borel covering theorem- Compactness in R^n . Chapter 3: Sections: 3.2 - 3.12.	18
Unit IV	Elements of Point Set Topology: Metric spaces - Point set topology in metric spaces - Compact subsets of a metric space - Boundary of a set. Limits and Continuity: Convergent sequences in a metric space - Cauchy sequences - Complete metric spaces - Limit of a function - Limits of vector valued functions. Chapter 3: Sections: 3.13 - 3.16, Chapter 4:Sections : 4.2 - 4.5, 4.7.	18
Unit V	Limits and Continuity: Continuous function - Continuity of composite functions - Continuity and inverse images of open or closed sets - Connectedness - Uniform continuity - Uniform continuity and compact sets - Discontinuities of real valued functions - Monotonic functions. Chapter 4: Sections: 4.8, 4.9, 4.12, 4.16, 4.19, 4.20, 4.22, 4.23.	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Tom M. Apostol, *Mathematical Analysis*, Addison Wesley, Second Edition 2002.

Books for Reference:

1. Ralph P. Boas, *A primer of Real function*, The mathematical Association of America, 1960.
2. Walter Rudin, *Principles of Mathematical Analysis*, Third Edition, McGraw Hill International Editions, 1976.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://nptel.ac.in/courses/111/106/111106053/>
2. <https://ocw.mit.edu/courses/mathematics/18-100c-real-analysis-fall-2012/>
3. <https://cosmolearning.org/courses/real-analysis-with-prof-sh-kulkarni/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S. KALEESWARI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS512	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	4	SEC: OPERATIONS RESEARCH	Semester:	V
			Credits:	3

Course Objective

The prime objective of this paper is to introduce certain OR techniques such as LPP, Transportation problems, Assignment problems, Sequencing and Replacing models to help the students to develop logical reasoning for applying mathematical tools to managerial and real life oriented problems.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Formulate real world problems as an LP model and explain the relationship between a linear program and its dual.	K2
CO2	Solve linear programming problems using appropriate techniques and interpret the results.	K3
CO3	Understand and solve replacement problems, build and solve specialized linear programming problems like transportation and assignment problems.	K3
CO4	Effectively communicate ideas, explain procedures, devise optimum allocations, interpret results and make firm decisions.	K4
CO5	Identify and develop operational research models from the verbal description of the real system in the areas of management science, industry, engineering fields and transportation.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Linear Programming Problem: Mathematical formulation: Introduction - Linear Programming Problem - Mathematical Formulation of the Problem – illustration on Mathematical formulation of LPP's. Chapter 2: Sections: 2.1 - 2.4 Linear Programming Problem: Graphical Solution and Extension: Introduction - Graphical Solution Method – Some exceptional cases - General Linear Programming Problem - Canonical and Standard Forms of L.P.P. Chapter 3: Sections: 3.1 - 3.5	12
Unit II	Linear Programming Problem: Simplex Method: Introduction - The Computational Procedure – Use of Artificial Variables- Degeneracy in Linear Programming - Applications of Simplex Method. Chapter 4: Sections: 4.1, 4.3 - 4.5. (Excluding Two-phase method in 4.4.)	12
Unit III	Duality in Linear Programming: Introduction – General Primal-Dual pair – Formulating a Dual problem - Primal-Dual pair in Matrix form- Duality Theorems – Duality and Simplex Method – Dual Simplex Method. Chapter 5: Sections: 5.1 – 5.4, 5.5, 5.7, 5.9	12
Unit IV	Transportation Problem: LP formulation of the Transportation Problem - Existence of Solution in TP - The Transportation Table - Loops in Transportation Tables - Finding an initial basic feasible solution - North West corner rule - Least cost Method - Vogel's approximation Method (Self Study) -Test for Optimality - Determining the Net evaluations (The uv method) - Transportation algorithm (MODI Method) - Some exceptional cases - Unbalanced Transportation Problem. Chapter 10: Sections: 10.2, 10.3, 10.5, 10.6, 10.9, 10.10, 10.13, 10.15.	12
Unit V	Assignment & Replacement Problem: Introduction - Mathematical Formulation of the Assignment Problem - Solution of Assignment Problem –Hungarian Assignment Method - Special cases in Assignment Problems– The Travelling Salesman problem. Chapter 11: Sections: 11.1- 11.3, 11.4, 11.7.	12
	Total Contact Hrs.	60

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

KantiSwarup, Gupta P. K and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi, 2014.

Books for Reference:

1. Phillips T, Ravindran A and Solberg J, Operations Research: Principles and Practice, John Willey & Sons, 1976.
2. Taha H. A, Operation Research - An introduction, Prentice Hall of India Pvt Ltd, New Delhi, 2006.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://youtu.be/Q31jKiEXxdc>
2. <https://youtu.be/BUGIhEecipE>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. J. JAYASUDHA  Signature	Name: Dr. V. INT HUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS513	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	COMPLEX ANALYSIS	Semester:	V
			Credits:	4

Course Objective

This course help the students to have an in depth knowledge of limits and continuity, analytic functions, uniform convergence, conformal mapping and Singularities.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental ideas of the functions of complex variables and complex integrals.	K2
CO2	Analyze the concepts of sequences and series of complex functions to generate Taylor series and Laurent series.	K3
CO3	Analyze integrals along a path in the complex plane by applying Cauchy integral formula and its various versions.	K3
CO4	Apply the concept of line integrals in fundamental theorems like Cauchy theorem for rectangle and Cauchy theorem for disc.	K3
CO5	Determine zeros and poles of simple functions, find the nature of the singularities and hence to calculate residues.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	H	H	H
CO2	H	H	H	H	M	M	H	H	H
CO3	H	H	H	H	M	M	H	H	H
CO4	H	H	H	H	M	M	H	H	H
CO5	H	H	H	H	M	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Introduction to the concept of analytic function: Limits and Continuity – Analytic functions - Polynomials - <i>Rational Functions. (Self study)</i> Chapter 1: Sections: 1.1 - 1.4.	15
Unit II	Elementary theory of power series: Sequences - Series - Uniform Convergence – PowerSeries - Abel’s Limit Theorem. Chapter 2: Sections: 2.1 - 2.5.	15
Unit III	The Exponential, Trigonometric Functions: <i>The Exponential –The Trigonometric Functions (Self study).</i> Conformality: Arcs and Closed Curves - Analytic Functions in Regions - Conformal Mapping. Chapter 2: Sections: 3.1 – 3.2. Chapter 3: Sections: 2.1 - 2.3.	15
Unit IV	Fundamental Theorems: Line Integrals – Line Integrals as Function of Arcs – Cauchy’s Theorem in a Rectangle - Cauchy’s Theorem in a Disk. Cauchy’s Integral Formula: The Index of a Point with respect to a Closed Curve -.The Integral Formula. Chapter 4 : Sections: 1.1, 1.3, 1.4 and 1.5. Chapter 4: Sections: 2.1- 2.2.	15
Unit V	Local Properties of Analytical functions: Removable Singularities, Taylor’s Theorem –Zeros and Poles - The Local Mapping – The Maximum Principle. Chapter 4 : Sections: 3.1- 3.4.	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Lars V. Ahlfors, Complex Analysis, MCGRAW HILL international Edition, (Indian Edition), 2013.

Books for Reference:

1. Goyal & Gupta, *Functions of a Complex Variable* – Pragati's Edition, 2012.
2. Ponnusamy S., *Foundations of Complex Analysis* Narosa publishing house, Second Edition, 2009.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://nptel.ac.in/courses/111/107/111107056/>
2. <https://nptel.ac.in/courses/111/103/111103070/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. R. SANTHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS5E1	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	4	OOP with C++	Semester:	V
			Credits:	3

Course Objective

The aim of this course is to know all needed about C++ and object oriented programming and also to meet the global requirements in software industries.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of tokens, expressions and control structures.	K2
CO2	Understand and apply the concepts of functions, classes, objects.	K3
CO3	Analyze the concepts of single inheritance, multiple inheritance, call by function, call by reference of a function and polymorphism.	K4
CO4	Analyze the use of operator overloading and type conversions.	K4
CO5	Develop program codes effectively using OOPS.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	M	H	H	M	H	M	M	H
CO2	M	M	H	H	M	H	M	M	H
CO3	H	H	H	H	H	H	H	M	H
CO4	H	H	H	H	H	H	H	M	H
CO5	H	H	H	H	H	H	H	M	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Beginning with C++: What is C++? - Applications of C++ - A Simple C++ Program - More C++ Statements - An Example with Class - Structure of C++ Program. Tokens, Expressions and Control Structures: Introduction–<i>Tokens(Self study)</i> - Keywords - Identifiers and Constants - Basic Data Types - User-Defined Data Types - Storage Classes - Derived Data Types - Symbolic constants - Type Compatibility - Declaration of Variables - Dynamic Initialization of Variables - Reference Variables - Operators in C++ - Scope Resolution Operator - Member Dereferencing Operators - Memory Management Operators - Manipulators - Type Cast Operator - Expressions and Their Types - Special Assignment Expressions - Implicit Conversions - Operator Overloading - Operator Precedence - Control Structures. Chapter 2: Sections: 2.1-2.6. Chapter 3: Sections: 3.1- 3.25	12
Unit II	Functions in C++: Introduction - The Main Function - Function Prototyping - Call by Reference - Return by Reference - Inline Functions -Default Arguments - const Arguments - Recursion - Function Overloading - Friend and Virtual Functions - Math Library Functions. Classes and objects:Introduction - C Structures Revisited - Specifying a Class - Defining Member Functions - C++ Program with Class - Making an Outside Function Inline - Nesting of Member Functions - Private Member Functions - Arrays within a Class - Memory Allocation for Objects. Chapter 4: Sections: 4.1-4.12 Chapter 5: Sections: 5.1-5.10.	12
Unit III	Classes and objects:Static Data Members - Static Member Functions- Array of Objects - Object as Function Arguments - Friendly Functions - Returning Objects - const Member Function - Pointers to Members - Local Classes. Constructors and Destructors:Introduction - Constructors - Parameterized Constructors - Multiple Constructors in a Class - Constructors with Default Arguments - Dynamic Initialization of Objects - Copy Constructors - Dynamic Constructors - Constructing Two-Dimensional Arrays - const Objects - Destructors. Chapter 5: Sections: 5.11-5.19. Chapter 6: Sections: 6.1-6.11.	12

Unit IV	Operator overloading and Type conversions: Introduction - Defining Operator Overloading - Overloading Unary Operator - Overloading Binary Operators - Overloading Binary Operators Using Friends - Manipulation of Strings Using Operators - Some Other Operator Overloading Examples - Rules for Overloading Operators - Type Conversions. Inheritance: Extending Classes: Introduction - Defining Derived Classes - Single Inheritance - Making a Private Member Inheritable - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Base Classes - Abstract Classes - Constructors in Derived Classes - Member Classes: Nesting of Classes. Chapter 7: Sections: 7.1-7.9 Chapter 8: Sections: 8.1-8.12.	12
Unit V	Pointers, Virtual Functions and Polymorphisms: Introduction - <i>Pointers (Self study)</i> Pointers to Objects - this Pointer - Polymorphism - Pointers to Derived Classes - Virtual Functions - Pure Virtual Functions. Chapter 9: Sections: 9.1-9.8.	12
	Total Contact Hrs.	60

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Balagurusamy E, *Object Oriented Programming with C++*, Tata McGraw Hill Publishing Company, Seventh Edition, New Delhi, 2018.

Books for Reference:

1. Bjarne Stroustrup, *The C++ Programming language*, Addison Wesley, 1991.
2. Herbert Schildt Osborne, *Teach You C++*, McGraw Hill Publishing Company, 1994.
3. Robert Lafore, *Object Oriented Programming in turbo C++*, Waite group, 1992.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]1. <https://youtu.be/xoL6WvCARJY>2. https://youtu.be/m_MQYyJpIjg

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Ms. A. GNANASOUNDARI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS5E2	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	4	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	Semester:	V
			Credits:	3

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic logical searches, learning algorithms and improve decision making systems.	K1
CO2	Summarize the idea about knowledge representation and reasoning	K2
CO3	Illustrate new knowledge with probabilistic reasoning solutions	K3
CO4	Analyze Decision making system and its different process	K4
CO5	Evaluate the learning skills with many observations and machine learning algorithms	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	M	H	H
CO5	H	H	H	H	M	M	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	INTRODUCTION: The Introduction of AI - The History of AI - Intelligent agents – Agents based system. PROBLEM SOLVING: State Space models – Searching for solution – Uniformed/ Blind search – Informed/Heuristic search - A* search - Hill - climbing search - Meta Heuristic: Genetic Algorithm - Adversary based search: Minimax- Expect I max- Alpha Beta pruning - Constraint satisfaction problem - Backtracking search.	12
Unit II	KNOWLEDGE REPRESENTATION AND REASONING: Knowledge representation - Logics - bivalent logic - inference - Fuzzy logic: membership - Fuzzy rules and reasoning - Fuzzy inference	12
Unit III	UNCERTAIN KNOWLEDGE AND PROBABILISTIC REASONING: Uncertainty - Probabilistic reasoning - Semantics of Bayesian network - Exact inference in Bayesian network- Approximate inference in Bayesian network -Probabilistic reasoning overtime Inference in temporal models - HiddenMarkov Models Dynamic BayesianNetworks	12
Unit IV	DECISION-MAKING: Basics of utility theory, Utility functions - Sequential decision problems - Markov decision process - Value iteration - Policyiteration - Decisions in Multi agent system: Multi agent decision theory - Group decision making	12
Unit V	Machine learning: Introduction- Probability distributions: Binary variables, Multinomial variables. Neural networks feed forward network function-Error propagation. Kernel methods-radial bias function networks .Graphical models- Bayesian networks-Discrete variables, linear Gaussian model. Mixture models andEM-K means clustering-.Combining models-Boosting Algorithm.	12
	Total Contact Hrs.	60

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, Pearson Education, 2014.

2. David Pool and Alan Mackworth, *Artificial Intelligence: Foundations of Computational agents*, Cambridge University Press, 2017.
3. Christopher M.Bishop, *Pattern Recognition and Machine Learning*, Springer, 2013.

Books for Reference:

1. C. S. Krishnamoorthy, S.. Rajeev, *Artificial Intelligence and Expert Systems for Engineers*, CRC Press, 1996.
2. Nils J. Nilsson, *The Quest for Artificial Intelligence: A History of Ideas and achievements*, Cambridge University press, 2010.
3. Alpaydin Ethem, *Introduction to Machine Learning*, Massachusetts Institute of Technology Press, 2009.

Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.,]

1. <https://youtu.be/yaL5ZMvRRqE>

2. <https://youtu.be/ukzFI9rgwfU>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Ms. A. GNANASOUNDARI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS5E3	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	Programming Lab in OOP with C++	Semester:	V
			Credits:	1

Course Objective

This course is designed to provide a practical knowledge to the students on C++.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Develop the OOPS program to understand the concepts of multi dimensional arrays.	K3
CO2	Develop the program to understand the concepts of constructors, destructors and overloading constructors.	K4
CO3	Develop the program for single and multilevel inheritance.	K4
CO4	Develop the program for understanding the concepts of pointer object and polymorphism.	K4
CO5	Competent in developing the programming code and debugging.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	H	H	M	M	M	M	H
CO2	H	M	H	H	M	M	M	M	H
CO3	H	M	H	H	M	H	M	M	H
CO4	H	M	H	H	M	H	M	M	H
CO5	H	M	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

List of programs:

1. Program to illustrate the use of array of objects
2. Program to illustrate the use of objects as arguments
3. Program to swap private data of classes using friend function
4. Program to illustrate overloaded constructors
5. Program to illustrate overloading + operators
6. Program to explain hybrid inheritance
7. Program to illustrate multilevel inheritance
8. Program to illustrate the use of initialization lists in the base and derived constructors
9. Program to illustrate the use of pointers to objects
10. Program to illustrate runtime polymorphism

Difference between C and C++ programs:

11. Program to find the Mean and variance
12. Program to find the largest of two numbers using nesting of member functions
13. Program to illustrate matrix multiplication
14. Program for finding Fibonacci sequence
15. Program to check whether the number is prime or not.

Text Book:

Balagurusamy E, *Object Oriented Programming with C++*, Tata McGraw Hill Publishing Company, Seventh Edition, New Delhi, 2018.

Books for Reference:

1. Bjarne Stroustrup, *The C++ Programming language*, Addison Wesley, 1991.
2. Herbert Schildt Osborne, *Teach You C++*, McGraw Hill Publishing Company, 1994.
3. Robert Lafore, *Object Oriented Programming in turbo C++*, Waite group, 1992.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://youtu.be/xoL6WvCARJY>
2. https://youtu.be/m_MQYyJpIjg

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Ms. A. GNANASOUNDARI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS5S1	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	SEC III: IIK: Introduction to Vedic Mathematics	Semester:	V
			Credits:	1

Course Objective

The Learning Objectives of the course are:

- Discuss the rich heritage of mathematical temper of Ancient India
- Enhance computation skills in students through Vedic Mathematics
- Develop logical and analytical thinking
- Promote joyful learning of mathematics

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	develop the understanding of objectives and features of Vedic Sutras to do Arithmetic calculations.	K1
CO2	calculate easily the square and square root of numbers and algebraic terms.	K2
CO3	find cubes of numbers and cube roots of numbers using Vedic formulas.	K2
CO4	understand the concept of division by using straight division method, Nikhilam method and Paravarthiya method.	K3
CO5	develop the ability to find Simple and Compound interest Profit and Loss.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	M	H	M	H	L	M	M
CO2	H	M	M	H	L	H	L	M	M
CO3	H	M	M	H	L	H	L	M	M
CO4	H	M	M	H	L	H	L	M	M
CO5	H	M	M	H	L	H	L	M	M

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Introduction to Vedic Mathematics – 16 Vedic Sutras – Beejank and Vedic Check – Vinculam numbers – Multiplication by Nikhilam method 1, Nikhilam method 2, UrdhvaThiryagbhyam method (Vertically & Crosswise method)	6
Unit II	Squaring of numbers – Square root of numbers – Square and Square root of algebraic terms	6
Unit III	Cubes of numbers – Cube root of numbers	6
Unit IV	Division by Nikhilam method, Paravarthiya method, Straight Division method	6
Unit V	Arithmetic – Ratio – Rule of 3 – Percentage – profit & loss – simple & compound interest	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Chandrasahas Halai, Vedic Mathematics Inside Out, The Write Place, Mumbai, 2018.

Books for Reference:

1. Rajesh Kumar Thakur, Advanced Vedic Mathematics, Rupa Publications India Pvt. Ltd, New Delhi.
2. Atrul Gupta, The Power of Vedic Maths, 2nd Edition, Jaico Publishing House, Mumbai.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. [Bing Videos](#)

2. [Bing Videos](#)

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS5S2	Title	Batch:	2025 - 2028
		SEC III: IIK:	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	2	History of Indian Mathematics (From Vedic period to Modern Era)	Credits:	1

Course Objective

1. Understand the Ancient Beginnings of Mathematics.
2. Grasp the Classical Period Contributions.
3. Realize the Vedic Period and Modern Developments.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	understand the foundational contributions of ancient India during the Vedic period, including the concept of zero, arithmetic operations, and basic geometry.	K1
CO2	explore the classical period advancements and their influence on algebra, Trigonometry and Astronomy.	K1
CO3	analyze the medieval era's contributions, including the works of Mathematicians like BhaskarAcharya and his pioneering concept in calculus and continuous functions.	K1
CO4	expand and integrate ideas like zero, arithmetic, and geometry from the Vedic period to Modern Era.	K1
CO5	know about Indian mathematicians like Ramanujan made groundbreaking discoveries, and India continues to play a key role in the global mathematical community.	K1

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	L	M	M	M	L	M	L
CO2	H	M	L	M	M	M	L	M	L
CO3	H	M	L	L	M	M	L	L	L
CO4	H	M	M	L	L	M	L	M	L
CO5	H	M	M	M	L	M	L	L	L

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Introduction of Mathematics -Evolution of Vedic Mathematics - Features of Vedic Mathematics - Importance of Vedic Mathematics - Sutras - Sub sutras.	6
Unit II	Baudhayana-Apastamba-yajnavalkya-panini-Aryabhatavarahamihira- Brahmagupta-Bhaskara- MahaviraSridharacharya- Bhaskara-II-Madhava of SangamagramaNilakanthasomayaji-Jyeshtadeva-Parameshvara-Ramanujan.	6
Unit III	Birth of Zero - Mathematics in Vedas- A Generalized Approach for finding the Nth order roots of Numbers.	6
Unit IV	A Greedy Algorithm Hidden in Sulbasutra- Sankaras Geometrical Approach to CitrabhanusEkavimsatiPrasnottara.	6
Unit V	Vedic Mathematics in Modern Era - Vedic Mathematics in Computer: A survey -Vedic Mathematics- The cosmic software for implementation of fast Algorithms - Analysis of digital signal processing Algorithms based on Vedic Mathematics - Role of Vedic Mathematics in driving optimal solutions for Real Life Problems.	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Proceedings of the National Workshop on Ancient Indian Mathematics with special reference to Vedic Mathematics and Astronomy.Rashtriya Sanskrit Vidyapeetha 2011.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. [NPTEL :: Mathematics - Mathematics in India - From Vedic Period to Modern Times](#)
2. [Bing Videos](#)

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name:Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS5AL	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	-	ALC I (OPTIONAL):	Semester:	V
		ADVANCED OPERATIONS RESEARCH - I	Credits:	3*

Course Objective

The course aims to introduce some OR techniques like Integer programming, Goal programming, dynamic programming etc. to build capabilities in students for analyzing different business situations involving limited resources and obtained logical solutions.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recall Linear programming techniques, understand and apply advanced techniques in linear programming and duality to real life problems	K2 & K3
CO2	Understand and solve variety of problems such as replacement problems, transportation problem etc.	K2 & K3
CO3	Sketch the theoretical workings of Integer programming, Goal programming, Dynamic programming problems and their solution procedures.	K3
CO4	Analyze any real system and formulate Mathematical models.	K4
CO5	Make effective decisions under various business situations by applying appropriate optimization techniques.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	M	M	H	H
CO2	H	M	H	H	H	H	M	H	H
CO3	H	H	H	H	M	M	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content
Unit I	Duality in Linear Programming: Economic Interpretation of Duality - Dual Simplex method. LPP - Advanced Techniques: Introduction - Revised Simplex Method - Bounded Variables. Chapter 5: Sections: 5.8, 5.9. Chapter 9: Sections: 9.1, 9.2 and 9.4.
Unit II	Integer Programming: Introduction - Pure And Mixed Integer Programming Problems - Gomory's All-IPP Method - Construction of Gomory's constraint Fractional Cut Method - All Integer LPP, Fractional Cut Method - Mixed Integer LPP - Branch and Bound Method. Chapter 7: Sections: 7.1 - 7.7.
Unit III	Goal Programming: Introduction - Categorization of Goal Programming -Formulation of Linear Goal Programming Problem – Graphical Goal Attainment Method – Simplex Method for Goal Programming Problem. Chapter 8: Sections: 8.1 - 8.5.
Unit IV	Dynamic Programming: Introduction - The Recursive Equation Approach - Characteristics of Dynamic Programming - Dynamic Programming Algorithm. Chapter 13: Sections: 13.1 - 13.4.
Unit V	Replacement problem and System Reliability: Replacement of Equipment that fails suddenly - Recruitment and Promotion problem. Transportation Problem: Stepping Stone Solution Method - Time Minimization Transportation Problem - Transshipment Problems. Chapter 18: 18.3 and 18.4. Chapter 10: 10.14, 10.16 and 10.17.

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

KantiSwarup, Gupta P.K. & Man Mohan, Operations Research (2014), Sultan Chand & Sons, New Delhi.

Books for Reference :

1. Philips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.
2. Taha H. A, *Operation Research - An introduction*, Prentice Hall of India Pvt. Ltd, New Delhi, 2006.
3. P. K Gupta &D. S Hira, *Operations Research*, S. Chand and company Ltd, New Delhi, 2014.
4. S. DharaniVenkatakrishnan, *Operations Research principles problems*, Keerthi Publishing house Pvt. Ltd.,1994.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://www.youtube.com/watch?v=xGkpXkAnWU&list=PLjc8ejfjgTf0LaDEHgLB3gCHZYcNtsoX&index=30>
2. <https://www.youtube.com/watch?v=h0bdo06qNVw&list=PLjc8ejfjgTf0LaDEHgLB3gCHZYcNtsoX&index=33>
3. <https://www.youtube.com/watch?v=H58TPQNr2kM&list=PLjc8ejfjgTf0LaDEHgLB3gCHZYcNtsoX&index=34>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. J. JAYASUDHA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name:Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS614	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	6	LINEAR ALGEBRA	Semester:	VI
			Credits:	5

Course Objective

To enable the students to study how to solve system of linear algebraic equations, basic concepts of an algebraic structure namely vector space and its properties of linear transformations on vector spaces and their relation between matrices.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Solve systems of linear equations and to reduce the augmented matrix to echelon form or to row reduced echelon form.	K3
CO2	Understand the basic ideas of vector spaces and the concepts of span, linear independence, basis, dimension and to apply these concepts to vector spaces and subspaces.	K2
CO3	Find row space, column space, null space, rank and nullity of a matrix and to understand the relationship of these concepts to associated systems of linear equations.	K3
CO4	Apply the principles of matrix algebra to linear transformations and analyze the competence with the basic ideas in Vector spaces, Dual spaces and linear transformation.	K4
CO5	Enrich the knowledge in Linear Algebra to pursue higher degree in Mathematics and other discipline, as well to get employability in education field and IT sectors.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	M	M	H	H
CO2	H	H	H	H	M	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Linear Equations: Fields - Systems of Linear Equations - Matrices and Elementary Row Operations- Row Reduced Echelon Matrices - <i>Matrix Multiplication (Self study)</i> – Invertible Matrices. Chapter 1: Sections: 1.1 - 1.6.	18
Unit II	Vector Spaces: Vector Spaces - Subspaces - Bases and Dimension - Coordinates - <i>Summary of Row Equivalence (Self study)</i> . Chapter 2: Sections: 2.1 - 2.5.	18
Unit III	Linear Transformations: Linear transformations - The Algebra of Linear Transformations - Isomorphism. Chapter 3: Sections: 3.1 - 3.3.	18
Unit IV	Linear Transformation: Representation of Transformations by Matrices - Linear Functionals. Chapter 3: Sections: 3.4, 3.5.	18
Unit V	Linear Transformation: The Double Dual - The Transpose of a Linear Transformation. Chapter 3: Sections: 3.6, 3.7.	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Kenneth Hoffman and Ray Kunze, *Linear Algebra*, Second Edition, PHI Learning Pvt. Ltd, New Delhi, 2013.

Books for Reference:

1. Herstein I. N, *Topics in algebra*, Vikas Publishing House Pvt. Ltd, 1981.
2. Kumaresan S, *Linear Algebra*, Prentice Hall of India, 2001.
3. Seymour Lipschutz and Marc Lipson, *Linear Algebra*, Tata McGraw Hill, 3rd Edition, 2001.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://nptel.ac.in/courses/111/105/111105112/>
2. <https://nptel.ac.in/courses/111/106/111106051/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S. SIVASANKAR  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS615	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	6	REAL ANALYSIS – II	Semester:	VI
			Credits:	4

Course Objective

To equip the students for study in Real analysis by introducing further some of advanced topics in Real Analysis.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and use abstract mathematical concepts of derivatives and functions of bounded variation.	K2
CO2	Apply the properties of monotonic functions and continuous functions of bounded variation in the context of real analysis.	K3
CO3	Apply the ideas of total variation and step into the theory of Riemann Stieltjes Integral.	K3
CO4	Analyze the Riemann Integral and Riemann-Stieltjes integral in detail and write complete, correct and coherent proofs.	K4
CO5	Enhance higher order learning and demonstrate how abstract ideas in real analysis can be applied to practical problems.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Derivatives: Introduction - Definition of derivative – Derivatives and continuity - Algebra of Derivatives – The chain rule – One sided Derivatives and infinite derivatives - Functions with nonzero derivative – Zero derivatives and local extrema - Rolle's theorem - The Mean Value Theorem for derivatives – Intermediate value theorem for derivatives - Taylor's formula with remainder. Chapter 5 :Sections: 5.1 - 5.12.	18
Unit II	Functions of Bounded Variations: Introduction - Properties of monotonic functions - Functions of bounded variations - Total variations - Additive property of total variation - Total variation on $[a, x]$ as a function of x - Functions of bounded variation expressed as the difference of increasing functions - Continuous functions of bounded variation. Chapter 6 :Sections: 6.1 - 6.8.	18
Unit III	The Riemann-Stieltjes Integral: Introduction - Notation - The definition of Riemann-Stieltjes Integral - Linear properties - Integration by parts - Change of variable in Riemann-Stieltjes integral - Reduction to a Riemann integral - Step functions as integrators - Reduction of a Riemann-Stieltjes integral to a finite sum - Euler's summation formula. Chapter 7 :Sections: 7.1 - 7.10	18
Unit IV	The Riemann-Stieltjes Integral: Monotonically increasing integrators - Upper and lower integrals - Additive and linearity properties of upper and lower integrals - Riemann's condition - Comparison theorems - Integrators of bounded variation - Sufficient conditions for existence of Riemann-Stieltjes integrals - Necessary conditions for existence of Riemann-Stieltjes integrals. Chapter 7 :Sections: 7.11 - 7.17.	18
Unit V	The Riemann-Stieltjes Integral: Mean Value Theorems for Riemann-Stieltjes Integrals - The integral as a function of the interval - Second fundamental theorem of integral calculus - Change of variable in a Riemann integral - Second Mean-Value Theorem for Riemann integrals. Chapter 7 :Sections: 7.18 - 7.22.	18
	Total Contact Hrs.	90

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:Tom M. Apostol, *Mathematical Analysis*, Narosa Publishing House, Second Edition 2002.**Books for Reference:**

1. Goldberg R. R, *Methods of Real Analysis*, Oxford and IBH Publishing Co., 1973.
2. Soma Sundaram D, Choudhary B, *A first course in Mathematical Analysis*, Narosa Publishing House, 1996.
3. Walter Rudin, *Principles of Mathematical Analysis*, McGraw Hill Inc, Third Edition, 1976.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://ocw.mit.edu/courses/mathematics/18-100c-real-analysis-fall-2012/>
2. <https://cosmolearning.org/courses/real-analysis-with-prof-sh-kulkarni/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. S. KALEESWARI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS616	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	RESOURCE MANAGEMENT TECHNIQUE	Semester:	VI
			Credits:	4

Course Objective

The prime objective of this paper is to introduce certain OR techniques such as game theory, sequencing and networking models to help the students to develop logical reasoning for applying mathematical tools to managerial and other life oriented problems.

Course Outcomes (CO)

On successful completion of the course student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall and apply linear programming techniques to develop and solve simple models of Game theory.	K2
CO2	Determine the optimal sequence of allocation of jobs to machines in a production line by minimizing the idle time.	K3
CO3	Comprehend several queuing system models and extend the same to practical situations, develop network models and analyze a project with deterministic and probabilistic activity times.	K4
CO4	Identify the importance of stocks, need for holding stocks and determine the optimum order quantity based on the available constraints.	K4
CO5	Make constructive decisions and use the resources (labor, capital, materials, machinery) more effectively by analyzing & applying the techniques of operations research to problems in engineering, industry, management or any business environment.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	M	H	H	H
CO2	H	H	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Games and strategies: Two person zero sum games - Some basic terms - The Maximin - Minimax principle - Games without Saddle points - Mixed strategies - Graphical Solution of $2 \times n$ and $m \times 2$ games – Dominance Property. Chapter 17: Sections: 17.1 - 17.7.	15
Unit II	Sequencing problems: Problem of Sequencing - Basic terms used in Sequencing - Processing n jobs through 2 machines - <i>Processing n jobs through k-machines (Self study)</i> processing 2 jobs through k-machines. Chapter 12: Sections: 12.1 - 12.6.	15
Unit III	Queuing Theory: Introduction- Queuing System - Elements of a Queuing System - Operating characteristics of a Queuing system - Classification of Queuing Models – Definition of Transient and Steady States - Poisson Queuing System Model I : (M/M/ 1): (∞/FIFO) Model III : (M/M/ 1): (N/FIFO) Model V : (M/M/ C): (∞/FIFO) Model VI : (M/M/ C): (N/FIFO)(Self study) - Simple Problems. Chapter 21: Sections: 21.1 - 21.4, 21.7, 21.8, 21.9.	15
Unit IV	Inventory control: Introduction - Types of inventories - Reasons for carrying inventories- The inventory decisions - Costs associated with inventories - Factors affecting inventory control - The concept of EOQ - Deterministic inventory problems with no shortages. Case (i) The fundamental Problem of EOQ Case (ii) Problem of EOQ with finite replenishment (Production). Deterministic inventory Problems with shortages Case (i) Problem of EOQ with instantaneous Production and variable order cycle Case (ii) Problem of EOQ with instantaneous Production and Fixed order cycle. Case (iii) Problem of EOQ with finite replenishment (Production). Problem of EOQ with price breaks Case (i) Problem of EOQ with one price break Case (ii) Problem of EOQ with more than one price break. Chapter 19: Sections: 19.1 - 19.4, 19.6, 19.7, 19.9-19.12.	15

Unit V	Network scheduling by PERT/CPM: Network: Basic compounds - Logical Sequencing - Rules of Network constructions – Concurrent Activities- <i>Critical Path Method (CPM) (Self study)</i> - Probability considerations in PERT - Distinction between PERT & CPM - Simple Problems. Chapter 25: Sections: 25.1 - 25.8.	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

KantiSwarup, Gupta P.K. & Man Mohan, Operations Research (2014), Sultan Chand & Sons, New Delhi.

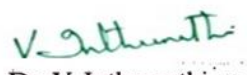
Books for Reference:

1. Philips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.
2. Taha H. A, *Operation Research - An introduction*, Prentice Hall of India Pvt. Ltd, New Delhi, 2006.
3. P. K Gupta &D. S Hira, Operations Research, S. Chand and company Ltd, New Delhi, 2014.
4. S. DharaniVenkatakrishnan, Operations Research principles problems, Keerthi Publishing house Pvt. Ltd.,1994.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://www.youtube.com/watch?v=xGkpXkAnWU&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX&index=30>

2. <https://www.youtube.com/watch?v=h0bdo06qNVw&list=PLjc8ejfpgTf0LaDEHgLB3gCHZYcNtsoX&index=33>
3. <https://www.youtube.com/watch?v=H58TPQNr2kM&list=PLjc8ejfpgTf0LaDEHgLB3gCHZYcNtsoX&index=34>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. J. JAYASUDHA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS6E4	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	THEORY OF NUMBERS	Semester:	VI
			Credits:	5

Course Objective

This course exposes the elementary basic theory of numbers and several famous functions, related theorems and some unsolved problems about primes to the students in order to enable them to deeper their understanding of the subject.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of divisibility, congruence, greatest common divisor and prime-factorization.	K2
CO2	Apply the properties of multiplicative functions such as the Euler phi-function and quadratic residues to solve the problems of number theory.	K3
CO3	Demonstrate the concepts of linear congruence and polynomial congruence using Fermat's Theorem and Wilson's Theorem.	K3
CO4	Analyze and solve linear Diophantine equations, congruences of various types and evaluate the unsolved problems about primes.	K4
CO5	Clear competitive exams in banking, insurance, TNPSC and UPSC.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	H	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Basic Representation: Principles of Mathematical Induction - The Basis Representation Theorem. The Fundamental Theorem of Arithmetic: Euclid's Division Lemma - Divisibility - The Linear Diophantine Equation. Chapter 1: Sections: 1.1 -1. 2. Chapter 2: Sections: 2.1 -2. 3.	15
Unit II	Combinational and Computational Number Theory: Permutations and Combinations - Fermat's Little Theorem (Statement only) - Wilson's Theorem (Statement only) – Generating Functions. Fundamentals of Congruence's: <i>Basic Properties of Congruence's (Self study).</i> Chapter 3: Sections: 3.1 - 3.4. Chapter 4: Sections: 4.1.	15
Unit III	Solving Congruences: Linear Congruences - The Theorems of Fermat and Wilson Revisited - The Chinese Remainder Theorem - <i>Polynomial Congruences (Self study).</i> Chapter 5: Sections: 5.1-5.4.	15
Unit IV	Arithmetic Functions: Combinatorial Study of $\Phi(n)$ - Formulae For $d(n)$ and $\sigma(n)$ - Multiplicative Arithmetic Functions - The Mobius Inversion Formula. Chapter 6: Sections: 6.1-6.4.	15
Unit V	Primitive Roots: Primitive Roots Modulo P. Prime Numbers: Elementary Properties of $\pi(x)$ - Tchebyshev's Theorem - Some Unsolved Problems About Primes. Chapter 7: Sections: 7.2. Chapter 8: Sections: 8.1-8.3.	12
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

George E. Andrews, *Number Theory*, HPS (India), 1992.

Books for Reference:

1. David M. Burten, *Elementary Number Theory*, McGraw- Hill edition, 2010.
2. Kumaravelu et al., *Elements of Number Theory*, Nagerkovil, SKV, 2002.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://nptel.ac.in/courses/111/101/111101137/>
2. <https://nptel.ac.in/courses/111/103/111103020/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. CHITRA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name:Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS6E5	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	FUZZY SET THEORY	Semester:	VI
			Credits:	5

Course Objective

To enable the learners to obtain basic knowledge in fuzzy set theory.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the concepts of crisp sets and fuzzy sets.	K2
CO2	Understand the types and concept of fuzzy sets.	K2
CO3	Analyze the difference between crisp sets and fuzzy sets.	K4
CO4	Understand the concepts of operations on fuzzy sets.	K2
CO5	Apply the concept of fuzzy sets in research and real life problems.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	H	M	H	H	H	M	H	H
CO2	M	H	H	M	H	M	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	M	H	M	M	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	From Classical(crisp) sets to fuzzy sets: A Ground Paradigm shift-Introduction-Crisp sets: An overview.	15
Unit II	Fuzzy sets: Basic types-Basic concepts-Characteristic and significance of the paradigm shift.	15
Unit III	Fuzzy sets versus Crisp sets: Additional properties of α -cuts-Representations of Fuzzy sets-Extension Principle for Fuzzy sets.	15
Unit IV	Operations on Fuzzy sets: Types of operations-Fuzzy complements-Fuzzy intersections: t-Norms.	15
Unit V	Fuzzy Unions: t-Conorms-Combinations of operations-Aggregation operations.	15
Total Contact Hrs.		75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

George J. Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic(Theory and Applications),
Prentice Hall of India Private Limited, New Delhi, 2000.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://nptel.ac.in/courses/111/107/111107103/>
2. <https://nptel.ac.in/courses/111/104/111104025/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. CHITRA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS6E6	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS	Semester:	VI
			Credits:	5

Course Objective

1. To understand and familiarize the methods of solving Ordinary and Partial Differential Equations.
2. To comprehending the role of differential equations in modelling and solving scientific problems.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	determine solutions of homogeneous equations, non-homogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations.	K2
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.	K2
CO3	find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters.	K4
CO4	form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations.	K2
CO5	explain standard forms and Solve Differential equations using Charpit's method.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	H	H	H	H	M	M	H	M
CO2	M	H	H	H	H	M	H	H	M
CO3	H	H	H	H	H	H	H	H	M
CO4	H	H	H	H	H	H	H	H	M
CO5	M	H	H	H	H	M	M	H	M

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Ordinary Differential Equations: Variable separable - Homogeneous Equations - Non-Homogeneous Equations of first degree in two variables - Linear Equations - Bernoulli's Equation-Exact differential equations. Chapter 2: Sections 1 to 6	15
Unit II	Equation of first order but 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. Chapter 4: Sections 1,2 ,3 and Chapter 5: 1 to 4	15
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. Chapter 6 and Chapter 8: Sections 1 to 4	15
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. Chapter 12: 1,2,3, and 4	15
Unit V	Special methods – Standard forms- Charpit's Method- Simple Applications. Chapter 12: 5 and 6	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

1. Narayanan S and Manicavachagam Pillay T.K. Differential equations and its application, 2006, S. Viswananthan Printers Pvt. Ltd.
2. G.F. Simmons, Differential equations with applications and historical notes, 2ndEd, Tata McGraw Hill Publications, 1991.

Reference Books

1. D.A. Murray, Introductory course in Differential Equations, Orient and Longman
2. H.T. H.Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi, 1985.
3. Sundrapandian, V. Ordinary and Partial Differential Equations, Tata McGraw Hill Education Pvt.Ltd. New Delhi, 2013

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

<https://nptel.ac.in>

Course Designed by	Verified by HOD	Checked by	Approved by
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Name: Dr. V. CHITRA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS6E7	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	DISCRETE MATHEMATICS	Semester:	VI
			Credits:	4

Course Objective

In this course a set of topics that are of genuine use in computer science and elsewhere are identified and combined together in a logically coherent fashion, to enable the students to get a good training in these topics which will inevitably lead the students in the direction of clear thinking, sound reasoning and a proper attitude towards the applications of Mathematics in computer science and other related fields.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic definitions of logic, lattice theory, graph theory and automata theory.	K2
CO2	Acquire knowledge about discrete structures which include sets, relations, functions, graphs and recurrence relations.	K3
CO3	Analyze how lattices and Boolean algebra are used as tools and mathematical models in the study of networks.	K4
CO4	Apply logically valid forms of arguments to avoid logical errors and to construct mathematical arguments using logical connectives and quantifiers.	K4
CO5	Apply the concepts to the field of computer science, information technology, cryptography and software engineering.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	M	H	H
CO2	H	H	H	M	H	H	M	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Recurrence Relations and Generating functions: Recurrence - An Introduction - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite order Homogeneous (linear) Relations - Solution of Non-Homogeneous Relations - Generating Functions - <i>Some Common Recurrence Relations(self Study)</i> . Text Book 1: Chapter 5: Sections: 1 - 7.	15
Unit II	Logic: Tautology - Tautological Implications and Equivalence of Formulae - Replacement Process - Functionally Complete Sets of Connectives and Duality Law - Normal Forms - Principle Normal Forms. Text Book 1: Chapter 9: Sections: 7 - 12.	15
Unit III	Lattices and Boolean Algebra: Lattices - Some Properties of Lattices - New Lattices - Modular and Distributive Lattices - Boolean Algebras Text Book 1: Chapter 10: Sections: 1 - 5.	15
Unit IV	Graph Theory: Introduction - Basic Terminology - Paths, Cycles and Connectivity - Subgraphs - Types of Graphs - Isomorphic Graphs - Homeomorphic Graphs - Eulerian and Hamiltonian Graphs. Text Book 2: Chapter 9: Sections: 9.1 - 9.7 and 9.9.	15
Unit V	Language , Grammar and Automata: Introduction - Language - The Set Theory of Strings - Languages - Regular Expressions and Regular Languages - Grammar - Finite-State Machine - Finite State Automata. Text Book 2: Chapter 15: Sections: 15.1 - 15.7.	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. Venkataraman M. K, Sridharan N and Chandrasekaran N, *Discrete Mathematics*, The National Publishing Company, 2000.
2. Sharma J. K, *Discrete Mathematics*, Macmillan Publishers India Ltd, 2011.

Books for Reference:

1. Ralph P. Grimaldi, *Discrete and Combinatorial Mathematics - An applied introduction*, Third Edition, Addison Wesley Publishing Company, 1994.
2. Tremblay J. P and Manohar R, *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw Hill, 2001.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://nptel.ac.in/courses/111/106/111106086/>
2. <https://nptel.ac.in/courses/111/107/111107058/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. CHITRA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS6E8	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	GRAPH THEORY	Semester:	VI
			Credits:	4

Course Objective

Graph theory is a major area of Combinatorics. In this Course we introduce the learners to some basic topics in graph theory.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic concepts and definitions of graphs along with types and their examples.	K1
CO2	Demonstrate the concepts of connectivity and line connectivity.	K3
CO3	Compare the features of Eulerian graphs and Hamiltonian graphs.	K4
CO4	Apply the concept of directed graphs to solve network flow problems.	K3
CO5	Relate the graph theory to the real world problems.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	H	H	H
CO2	H	M	H	M	H	H	M	H	H
CO3	H	M	M	M	M	H	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H – HIGH; M – MEDIUM; L – LOW.

Units	Contents	Hrs.
Unit-I	Graphs: Varieties of graphs - Walks and connectedness - Degrees - Operation on Graphs. Matrices: The adjacency matrix - The incidence Matrix.	15
Unit-II	Blocks: Cut points - bridges - and blocks - Block graphs and cut point graphs. Trees: Characterization of trees - Centers and centroids.	15
Unit-III	Connectivity: Connectivity and line-connectivity. Traversibility: Euclerian graphs.	15
Unit-IV	Traversibility: Hamiltonian graphs. Factorization: 1-factorization - 2-factorization.	15
Unit-V	Planarity: Plane and planar graphs - Outer planar graphs.	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Frank Haray. (2001). *Graph Theory*. Narosha Publishing.

Books for Reference:

1. Balakrishnan, R. and Ranganathan. K. (2000). *A Text Book on Graph Theory*. New York: Springer Verlag.
2. Gould, R. (1988). *Graph Theory*, California: The Benjamin/ Cummings Publishing Company, Inc.
3. Hartsfield, N. and Ringel, G. (1990) *Pearls in Graph Theory*, Academic Press.
4. Bondy, J.A. and Murty U.S.R. (1976) *Graph Theory with Applications*, Macmillan Company.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://youtu.be/1h2BoCtobXw>
2. <https://youtu.be/R9R9hhue614>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. CHITRA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS6E9	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	5	MATHEMATICS IN FINANCE	Semester:	VI
			Credits:	4

Course Objective

The objective of this paper is to introduce the concepts of financial statement analysis which help the students to develop their financial skills.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	recollect the concept of ratio analysis.	K1
CO2	get the idea of liquidity ratio and capital structure ratio.	K2
CO3	implement the concepts of return on investments.	K4
CO4	analyze the basic concept of financial statement analysis.	K5
CO5	evaluate investment projects using traditional techniques and discounted cash flow methods like NPV and IRR, helping them make informed financial decisions.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	M	H	M	H	H	M	M	H
CO2	M	H	H	H	M	H	M	M	H
CO3	M	H	H	H	H	H	M	M	H
CO4	M	H	H	H	M	H	M	M	H
CO5	M	M	H	H	H	H	M	M	H

H – HIGH; M – MEDIUM; L – LOW.

Units	Contents	Hrs.
Unit-I	Financial statement Analysis: Ratio Analysis: Meaning and Objectives of financial statement analysis – Ratio analysis – Types of ratios – Liquidity ratios.	15
Unit-II	Leverage/Capital structure ratios – Profitability ratios – Profitability ratios related to sales – Profitability ratios related to investments – Return on Investments (ROI).	15
Unit-III	Activity ratios – Importance of ratio analysis – Meaning of Capital budgeting – Rationale of Capital Expenditure.	15
Unit-IV	Kinds of Capital budgeting decisions – Data Requirement – Identifying relevant cash flows - Cash outflow estimates – Cash inflow estimates.	15
Unit-V	Capital budgeting: Methods of Appraisal: Traditional Techniques – Discounted cash flow or time adjusted techniques – NPV and IRR methods.	15
	Total Contact Hrs.	75

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

M. Y. Khan and P. K. Jain, Financial Management, Tata McGraw Hill Publishing Company Ltd, New Delhi, 1990.

Books for Reference:

1. AswathDamodaran, Corporate Finance – Theory and Practice, John Wiley and Sons, Inc.
2. Prasanna Chandra, Managing Investments, Tata McGraw Hill Publishing Company Ltd, New Delhi, 1998.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. [Bing Videos](#)
2. [Bing Videos](#)

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. CHITRA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS6P1	Title	Batch:	2025- 2028
Lecture Hrs./Week or Practical Hrs./Week	-	PROJECT	Semester:	VI
			Credits:	2

Components of the Project may be included the following

Review No.	Activity
I	Problem Identification and Related Literature collection
II	Analyzing or solving problems by applying different methodology
III	Giving conclusion

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A. Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS5E3	Title	Batch:	2025 - 2028
		SEC IV: Naan Mudhalvan: STATISTICS WITH EXCEL	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	2		Credits:	2

Course Objective

To learn and acquire the knowledge of Statistics using Excel Programming

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	compute Mean and Median using Excel.	K1
CO2	compute Mode, Midrange, Weighted Mean using Excel.	K1
CO3	create Time-Series Graphs, Dot plots, Stem plots, Bar Charts, Pie Charts using Excel.	K2
CO4	find Normal distribution, common distribution shapes, Correlation Coefficient and plot graphs using Excel.	K2
CO5	handle distribution of data and analyses the characteristics of data using Excel.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	H	L	H	L	M	H
CO2	H	H	M	H	L	H	L	M	H
CO3	M	H	M	H	L	H	L	L	M
CO4	M	H	H	H	M	M	M	M	H
CO5	M	M	H	H	H	H	M	M	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Distribution of data- Characteristics of data- Frequency distribution- Procedure for Constructing a Frequency Distribution Using Excel to Construct a Frequency Distribution-Relative Frequency Distribution-Cumulative Frequency Distribution. Chapter 2 (Page No. 58 - 70)	6
Unit II	Histograms-Relative Frequency Histogram-Normal Distribution- Common Distribution Shapes-Skewness-Using XLSTAT for Histograms-Graphs-Using Excel to Construct a Scatterplot Correlation Coefficient. Chapter 2 (Page No. 70 - 81)	6
Unit III	Time-Series Graph-Dot Plots-Using XLSTAT for Stem Plots-Bar Graphs-Using Excel to Create Bar Graphs-Pareto Charts-Pie Charts-Using Excel to Create Pie Charts-Frequency Polygon -Using Excel to Create Frequency Polygons. Chapter 2 (Page No. 81 - 98)	6
Unit IV	Descriptive statistics – Measures of Central tendency – Mean -Using Excel to Calculate the Mean-Median-Using Excel to Find the Median. Chapter 3 (Page No. 110 - 114)	6
Unit V	Mode-Using Excel to Find the Mode-Midrange-Using Excel to Calculate the Midrange-Weighted Mean-Using Excel for Descriptive Statistics. Chapter 3 (Page No. 114 - 125)	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

Mario F. Triola, “Elementary Statistics Using Excel”, Fifth Edition, Pearson New International Edition, 2014.

Books for Reference:

1. E. Balagurusamy, “Computer Oriented Statistical and Numerical Methods”, Macmillan Publishers India Limited, 2000.
2. V. K. Rohatgi, A. M. E. Saleh, “An introduction to probability and statistics”, John Wiley & Sons, 2015.
3. B. Held, B. Moriarty & T. Richardson, “Microsoft Excel Functions and Formulas”, Stylus Publishing, LLC, 2019.
4. N. J. Salkind, “Excel statistics: A quick guide”, Sage Publications, 2015.
5. J. Schmuller, “Statistical analysis with Excel for dummies”, John Wiley & Sons, 2013.

Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.,]

1. <https://nptel.ac.in>

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Name: Dr. J. JAYASUDHA  Signature	Name: Dr. V. INTHUMATHI  Dr. V. Inthumathi, Ph.D., Associate Professor & Head Department of Mathematics N.G.M College, Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001. Signature	Name: Mr. K. SRINIVASAN  K. SRINIVASAN, M.C.A Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature

Programme Code:	UMS	Programme Title:	B.Sc. Mathematics	
Course Code:	25UMS6S2	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	2	SEC IV: Naan Mudhalvan: Statistical Data Analysis using R- Programming	Semester:	VI
			Credits:	2

Course Objective

To teach students how to use R for data analysis, including data visualization, descriptive statistics, hypothesis testing, and predictive analytics techniques like regression and time series models.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	apply R programming and understand different data sets.	K3
CO2	apply R Programme and construct graphs and charts	K3
CO3	analyze the data and know descriptive statistics by using R Programming	K4
CO4	apply R Programming to test the hypothesis of the study	K3
CO5	predict the data and take decisions through R programming.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	M	H	H	M	H	M	M	H
CO2	M	M	H	H	M	H	M	M	H
CO3	M	M	H	H	H	H	M	M	H
CO4	M	M	H	H	H	H	M	M	H
CO5	M	M	H	H	M	H	M	M	H

H – HIGH; M – MEDIUM; L – LOW.

Units	Contents	Hrs.
Unit-I	Introduction to R programming: What is R? - Installing R and R Studio – R Studio Overview - Working in the Console - Arithmetic Operators - Logical Operations - Using Functions - Getting Help in R and Quitting R Studio Installing and loading packages. Data structures, variables, and data types in R: Creating Variables - Numeric, Character and Logical Data - Vectors - Data Frames - Factors -Sorting Numeric, Character, and Factor Vectors - Special Values.	6
Unit-II	Data Visualization using R: Scatter Plots - Box Plots - Scatter Plots and Boxand-Whisker Plots Together -Customize plot axes, labels, add legends, and add colours.	6
Unit-III	Descriptive statistics in R: Measures of central tendency - Measures of variability - Skewness and kurtosis - Summary functions, describe functions, and descriptive statistics by group.	6
Unit-IV	Testing of Hypothesis using R: T-test, Paired Test, correlation, Chi Square test, Analysis of Variance and Correlation	6
Unit-V	Predictive Analytics: linear Regression model, Non-Linear Least Square, multiple regression analysis, Logistic Regression, Panel Regression Analysis, ARCH Model, GARCH models, VIF model	6
	Total Contact Hrs.	30

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

1. Crawley, M. J. (2006), "Statistics - An introduction using R", John Wiley, London 32.
2. Purohit, S.G.; Gore, S.D. and Deshmukh, S.R. (2015), "Statistics using R", second edition. Narosa Publishing House, New Delhi.
3. Shahababa B. (2011) , "Biostatistics with R", Springer, New York.
4. Braun & Murdoch (2007), "A first course in statistical programming with R", Cambridge University Press, New Delhi.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://cran.r-project.org/doc/contrib/Owen-TheRGuide.pdf>
2. <https://sphweb.bumc.bu.edu/otlt/MPH-Modules/BS/R/R-Manual/R-Manual2.html>
3. <https://smac-group.github.io/ds/>
4. [Predictive Analysis in R Programming - GeeksforGeeks](#)

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Programme Code:	UMS	Programme Title:	Mathematics	
Course Code:	25UMS6AL	Title	Batch:	2025 - 2028
Lecture Hrs./Week or Practical Hrs./Week	-	ALC II (OPTIONAL); ADVANCED OPERATIONS RESEARCH - II	Semester:	VI
			Credits:	3*

Course Objective

The course aims to expose non-linear programming and simulation. Further it helps the student to understand different computational algorithms used in solving non-linear programming problems. The course also enables to schedule projects and build mathematical models to study the real world system.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand non-linear programming problems and familiarize different solving procedures	K2& K3
CO2	Formulate and solve non-linear programming problems using appropriate techniques and interpret the results.	K3
CO3	Simulate Various real life probabilistic situations using methods like Monte Carlo simulation	K4
CO4	Analyze the resources efficiently under various constraints and estimate the probability of completing a project on time.	K4
CO5	Develop critical and analytical skills that enable to apply optimization techniques constructively to any business environment and draw wise decisions.	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	M	M	H	H
CO2	H	H	H	H	M	H	M	H	H
CO3	H	M	H	H	H	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content
Unit I	Non-linear Programming: Introduction - Formulating a Non-linear Programming Problem (NLPP) - General Non-linear Programming Problem - Constrained Optimization with Equality Constraints - Constrained Optimization with Inequality Constraints. Chapter 27: Sections: 27.1- 27.5.
Unit II	Non-linear Programming - Methods: Introduction - Quadratic Programming - Wolfe's Modified Simplex Method - Beale's Method. Chapter 28: Sections: 28.1, 28.4 – 28.6.
Unit III	Simulation: Introduction - Why simulation? - Process of simulation - Simulation models - Event-type simulation - Generation of random numbers - Monte-Carlo Simulation. Chapter 22: Sections: 22.1 - 22.7.
Unit IV	Simulation: Simulation of inventory problems - Simulation of a Queueing System - Simulation of Job Sequencing. Chapter 22: Sections: 22.8, 22.9 and 22.12.
Unit V	Resource Analysis in Network scheduling: Introduction - Project cost - Time-cost Optimization Algorithm. Chapter 26: Sections: 26.1 - 26.3.

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

KantiSwarup, Gupta P.K., *Operations Research*, Sultan Chand & Sons, New Delhi - 2014.

Reference Books:

1. Philips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.
2. Taha H. A, *Operation Research - An introduction*, Prentice Hall of India Pvt. Ltd, New Delhi, 2006.
3. P. K Gupta & D. S Hira, *Operations Research*, S. Chand and company Ltd, New Delhi, 2014.
4. S. Dharani Venkatakrishnan, *Operations Research principles problems*, Keerthi Publishing house Pvt. Ltd, 1994.

Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.,]

1. <https://www.youtube.com/watch?v=xGkpXkAnWU&list=PLjc8ejfjgTf0LaDEHgLB3gCHZYcNtsoX&index=30>
2. <https://www.youtube.com/watch?v=h0bdo06qNVw&list=PLjc8ejfjgTf0LaDEHgLB3gCHZYcNtsoX&index=33>
3. <https://www.youtube.com/watch?v=H58TPQNr2kM&list=PLjc8ejfjgTf0LaDEHgLB3gCHZYcNtsoX&index=34>

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