

PEOs for the Institution-UG

PEO1. The graduates will apply appropriate theory and scientific knowledge to participate in activities that support humanity and economic development nationally and globally, developing as leaders in their fields of expertise.

PEO2. The graduates pursue lifelong learning and continuous improvement of the knowledge and skills with the highest professional and ethical standards.

PEOs for the UG Departments

Mathematics:

PEO3: The graduates will demonstrate the ability to utilize effectively the variety of teaching techniques and class room strategies and develop confidence to appear for competitive examinations and occupy higher levels of academic and administrative fields.

B.Sc. Mathematics (PO)

PO No.	Upon completion of the B.Sc. Degree Programme, the graduates will be able to:
PO - 1	equip students with hands on training through various courses to enhance entrepreneurship skills.
PO - 2	impart communicative skills and ethical values.
PO - 3	face challenging competitive examinations that offer rewarding careers in science and education.
PO - 4	apply the acquired scientific knowledge to face day to day needs and reflect upon green initiatives to build a sustainable environment.

B.Sc. Mathematics (PSO)

PSO No.	Upon completion of the B.Sc. Degree Programme, the graduates will be able to:	PO addressed
PSO - 1	acquire a strong foundation in various branches of mathematics to formulate real life problems into mathematical models	PO 4
PSO - 2	apply the mathematical knowledge and skills to develop problem solving skills cultivating logical thinking and face competitive examinations with confidence.	PO 3, 4
PSO - 3	develop entrepreneurial skills based on ethical values, become empowered and self dependent in society.	PO 1,2
PSO - 4	enhance numerical ability and address problems in interdisciplinary areas which would help in project and field works.	PO 1
PSO - 5	pursue scientific research and develop new findings with global impact using latest technologies.	PO 4

Semester : I Major Core I
 Name of the Course : Differential Calculus and Trigonometry
 Subject code : MC2011

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives:

1. To impart knowledge on applications of Differential Calculus and important concepts of Trigonometry.
2. To enhance problem solving skills.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Recall the idea of derivative, rules of differentiation and understand the concept of p-r equation.	PSO - 1	R
CO - 2	Learn the concepts of curvature, circle of curvature, evolute and apply the concepts to solve problems.	PSO - 2	U, Ap
CO - 3	Recognize the rules of identifying asymptotes and employ the same to different curves.	PSO - 3	Ap, U
CO - 4	Acquire the knowledge about hyperbolic functions and compare it with circular functions, trigonometric functions, inverse trigonometric functions and their properties.	PSO - 1	U, E
CO - 5	Categorize the methods of finding the sum of trigonometric series.	PSO - 8	An

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
I	Curvature					
	1.	Introduction and definition of pedal equation	2	Recall the idea of derivative, rules of differentiation and understand the concept of p-r equation	Lecture	Test
	2.	Problems related to p-r equations	6	Apply the concept of p-r equation in problems	Lecture with illustrations	Group Discussion
	3.	Introduction, definition and theorems based on of curvature	3	To understand the definition of curvature and learn the theorems	Lecture	Test
	4.	Radius of curvature in different forms	2	To understand the definitions of closed sets and limit points with examples and theorems	Lecture	Test
	5.	Problems related to Radius of curvature	2	To identify Hausdorff spaces and practice various theorems	Lecture with illustrations	Group discussion
II	Centre of curvature, Evolute					

	1.	Definition and problems based on centre of curvature of the curve	5	To understand the definition of centre of curvature of the curve	Lecture	Test
	2.	Definition and problems related to evolute of the curve	5	To understand the definition of evolute of the curve and practice problems	Lecture	Q&A
	3.	Definition and problems on circle of curvature	5	To practice various problems related to circle of curvature	Lecture	Formative Assessment Test
III	Asymptotes					
	1.	Definition and methods of finding asymptotes for the curve $y=f(x)$ and $f(x,y)=0$	3	To understand the methods of finding asymptotes	Lecture	Quiz
	2.	Working rule to find the inclined asymptotes	2	Recognize the rules of identifying asymptotes	Lecture with illustration	Test
	3.	Problems on linear asymptotes and intersection of curves	5	To apply the rules to different curves	Lecture with group discussion	Brain stoming
	4.	Problems based on inclined asymptotes	5	To apply the rules to different curves	Lecture	Assignment
IV	Hyperbolic functions, Logarithm of Complex numbers					
	1.	Introduction and definition of Hyperbolic functions	2	Acquire the knowledge about hyperbolic functions	Lecture with illustration	Quiz
	2.	Problems based on hyperbolic functions	4	To compare with circular functions,	Lecture	Q&A
	3.	Definitions and Problems based on inverse hyperbolic functions	4	Acquire the knowledge about inverse hyperbolic functions	Lecture	Slip Test
	4.	Separate into real and imaginary parts of hyperbolic and inverse hyperbolic functions	5	To distinguish various hyperbolic functions, trigonometric functions, inverse trigonometric functions	Lecture	Formative Assessment Test
V	Summation of Trigonometric Series					
	1.	Introduction and Illustrations based on method of difference	4	To analyze the methods of finding the sum of trigonometric series	Lecture with illustration	Quiz
	2.	Theorem and problems on sum of	7	To categorize problems on sum of sines and	Lecture	Test

		sines and cosines of n angles in A.P		cosines of n angles in A.P		
	3.	Introduction of C+iS method	1	To know C+iS method	Lecture	Slip Test
	4.	Problems related to C+iS method	3	To apply C+iS method to find the sum of trigonometric series	Lecture	Assignment

Course Instructor: Dr.K.Jeya Daisy
Course Instructor: Ms. V. Princy Kala

HoD: Dr. V. M. Arul Flower Mary
HoD(SF): Mrs. J. Anne Mary Leema

Semester : I Allied I
Name of the Course : Algebra and Calculus (for Physics and Chemistry)
Subject code : MA2011

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives:

1. To impart knowledge in concepts related to Algebra.
2. To solve problems in Physical Science.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Recall the fundamentals of algebraic equations, matrices and rules of integration	PSO - 1	R
CO - 2	Practice the formation of equations and compute symmetric functions of roots in terms of coefficients	PSO - 2	Ap
CO - 3	Revise the properties of eigen values of the matrices	PSO - 3	E
CO - 4	Learn Beta, Gamma functions and evaluate integrals using them	PSO - 4	E, U
CO - 5	Practice the expansion of Fourier series and utilize the same for higher studies	PSO - 5	Ap

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I	Theory of equations					
	1.	Basic definition about Polynomial and its roots. Fundamental Theorem of Algebra and related theorems without proof	3	To recall the fundamentals of algebraic equations, matrices and rules of integration	Lecture	Short Test
	2.	Formation of equations of lowest degree with	3	Practice the formation of	Lecture and group	Test

		rational coefficients and solving equations when one root and two roots given.		equations and to solve equations when one root and two roots given.	discussion		
	3.	Formation of equation of the lowest degree with rational coefficients whose roots are given	3	Practice the formation of equations and compute symmetric functions of roots in terms of coefficients whose roots are given	Lecture	Test	
	4.	Proving that the given equation has no imaginary roots and Relation between roots and coefficients	2	To Prove that the given equation has no imaginary roots and understand the relation between roots and coefficients	Lecture	Test	
	5.	Solving equations if their roots are in G.P, A.P	2	To Solve equations if their roots are in G.P, A.P.	Lecture	Test	
	6.	Solving equations and finding equal roots two pairs of equal roots, roots which are in some ratio.	2	To Solve equations and finding equal roots, two pairs of equal roots, roots which are in some ratio.	Lecture	Test	
II	Transformation of equations						
	1	Formation of equation whose roots are k times the roots of $f(x) = 0$.	3	To understand the transformation of equations and formation of equation whose roots are k times the roots of $f(x) = 0$.	Lecture and discussion	Test	
	2	Form the equation whose roots are negative of the roots of the given equation and whose roots are diminished by h	3	To identify the equation whose roots are negative of the roots of the given equation and whose roots are diminished by h	Lecture	Formative Assessment	
	3	Solve the equation whose roots are equal in magnitude but opposite in sign to the roots of $f(x) = 0$ and to increase the roots of $f(x) = 0$ by h	3	To identify the equation whose roots are equal in magnitude but opposite in sign to the roots of $f(x) = 0$ and to increase the roots of $f(x) = 0$ by h	Lecture	Test	

	4	Solving the given equation and find thereal root using Newton's method.	3	To calculate the given equation and find the real root using Newton's method.	Lecture	Test	
	5	Finding positive and negative roots of the equation using Newton's method.	3	To identify positive and negative roots of the equation using Newton's method.	Lecture and discussion	Test	
III	Matrices						
	1	Basic concepts of matrix addition, matrix multiplication and rank of a matrix and definitions	3	To understand the basic concepts in matrices	Lecture	Test	
	2	Test the consistency of the system of given homogenous equations and solving if it is consistent.	2	To solve homogenous equations if it is consistent.	Lecture and discussion	Test	
	3	Cayley Hamilton theorem and Solving problems based on Cayley Hamilton theorem	2	To understand Cayley Hamilton theorem solve problems based on it	Lecture	Test	
	4	Defining matrix polynomial, Characteristic matrix, Characteristic polynomial and Characteristic equation	2	To identify Characteristic matrix, Characteristic polynomial and Characteristic equation	Lecture	Test	
	5	Evaluating the sum and product of the eigen values of the matrix without actually finding the eigen values.	2	To evaluate the sum and product of the eigen values of the matrix without actually finding the eigen values	Lecture	Test	
	6	Evaluating Characteristic roots, eigen values and eigen vectors of the matrix.	2	To evaluate Characteristic roots, eigen values and eigen vectors of the matrix.	Lecture	Test	
	7	Evaluating the sum and product of the eigen values of the matrix without finding the roots of the characteristic equation.	1	To evaluate Characteristic roots, eigen values and eigen vectors of the matrix.	Lecture	Formative Assessment	
	8	Evaluating the	1	To evaluate	Lecture	Test	

		characteristic vectors corresponding to each characteristic root of the given matrix.		Characteristic roots, eigen values and eigen vectors of the matrix.		
IV	Beta and Gamma functions					
	1	Introduction to Beta, Gamma functions, its properties	4	To learn Beta, Gamma functions and its properties.	Lecture and discussion	Test
	2	Evaluation of integrals using Beta Functions	2	To evaluate integrals using Beta Functions	Lecture	Test
	3	Proving duplication formula.	3	To prove duplication formula.	Lecture	Test
	4	Problems based on Beta and Gamma functions.	3	To solve problems based on Beta and Gamma functions.	Lecture	Test
	5	Proving some results on Beta and Gamma functions.	3	To prove some results on Beta and Gamma functions.	Lecture	Test
V	Fourier Series Expansion					
	1	Fourier Series Expansion and Fourier coefficients	2	To understand Fourier Series Expansion and Fourier coefficients	Lecture	Test
	2	Explanation of Sine Series and Cosine Series and results based on them	2	To identify Sine Series and Cosine Series and results based on them	Lecture	Test
	3	Evaluate the Fourier Sine series and Fourier Cosine series for the given function.	3	To evaluate the Fourier Sine series and Fourier Cosine series for the given function.	Lecture	Test
	4	Evaluate the Half range Fourier Sine Series and Fourier Cosine Series for the given function.	3	To evaluate the Half range Fourier Sine Series and Fourier Cosine Series for the given function.	Lecture	Test
	5	Evaluate the Fourier series for the given function and deduce certain results.	3	To evaluate the Fourier series for the given function and deduce certain results.	Lecture	Test
	6	Evaluate the Fourier series for the given function in the intervals $(-\pi, \pi)$ and $(0, \pi)$	2	To evaluate the Fourier series for the given function in the intervals $(-\pi, \pi)$ and $(0, \pi)$	Lecture	Formative Assessment

Course Instructor: Dr.K.Jeya Daisy & Dr. Jancy Vini HoD: Dr. V. M. Arul Flower Mary
 HoD(SF): Mrs. J. Anne Mary Leema

Semester **I**
 Name of the Course : **Quantitative Aptitude – I(NME)**
 Course Code : **MNM201**

No. of hours per week	Credits	Total No. of hours	Marks
4	2	60	100

Objectives: 1. To develop the quantitative aptitude of the students.
 2. To solve problems required for various competitive examinations.

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	apply BODMAS rule for simplification and determine missing numbers in a sequence	PSO - 1	R
CO - 2	express numbers in the base of a fraction of 100.	PSO - 2	U
CO - 3	employ the problems related to the division of profit and loss of a business.	PSO - 4	Ap
CO - 4	measure the relative magnitude of two quantities in an effective way.	PSO - 2	C
CO - 5	construct and develop mathematical solutions to simple real life problems.	PSO - 1	Ap
CO - 6	learn ratio and proportion and practice duplication and triplication of ratios	PSO - 4	U, Ap

Unit I

Simplification - BODMAS rule - Modulus of a real number - Virnaculum - Some real life problems, Missing numbers in the expression.

Unit II

Percentage - Concepts of Percentage – Results on Population - Results on Depreciation.

Unit III

Profit and Loss – Cost price – Selling Price – Profit or Gain – Loss – gain percentage - loss percentage.

Unit IV

Ratio and proportion – Fourth, third and mean proportionals – comparison of ratios, compound ratio – duplicate and subduplicate ratio- triplicate and subtriplicate ratio – variation.

Unit V

Partnership – Ratio of Division of Gains - Working and Sleeping partners – Chain Rule - Direct proportion – Indirect proportion.

Total contact hours: 60 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/ valuation
I		BODMAS rule				

	1.	Simplification of numbers, BODMAS rule, Examples based on BODMAS rule	2	To apply BODMAS rule for simplification	Lecture through googlemeet	Online Quiz
	2.	Modulus of a real number, Examples related to Modulus of a real number	2	To solve problems based on modulus of a real number	Lecture through googlemeet	Online test
	3.	Virnaculam (Bar), Illustrations based on Virnaculam, Missing numbers in the given expression	2	To learn about Virnaculam and to determine missing numbers in a sequence	Lecture through googlemeet	Online Assignment
II	Percentage					
	1.	Concepts of Percentage	2	To understand the basic concepts of percentage	Lecture through googlemeet	Online Assignment
	2.	Results on Population	2	To acquire detailed knowledge on results on population	Lecture through googlemeet	Online test
	3.	Results on Depreciation.	2	To solve the problems on depreciation.	Lecture through googlemeet	Formative Assessment online Test
III	Profit and Loss					
	1.	Cost price and Selling Price	2	To understand the concepts of cost price and selling price	Lecture through googlemeet	Online Quiz
	2.	Profit or Loss	2	To solve problems on profit or loss	Lecture through googlemeet	Online test
	3.	Gain percentage - loss percentage.	2	To learn techniques to solve problems involving gain percentage	Lecture through googlemeet	Online Assignment
IV	Ratio and proportion					
	1.	Fourth, third and mean proportionals	2	To understand about Fourth, third and mean proportionals	Lecture through googlemeet	Online Quiz and group discussion
	2.	comparison of ratios, compound ratio , duplicate and	2	To solve problems on ratios and compare them	Lecture through googlemeet	Online test

		subduplicate ratio				
	3.	triplicate and subtriplicate ratio	2	To learn about triplicate and subtriplicate ratio	Lecture through googlemeet	Online Assignment
V	Partnership					
	1.	Ratio of Division of Gains	2	To understand the basic concepts of partnersip	Lecture through googlemeet	Online Assignment
	2.	Working and Sleeping partners	2	To acquire skills to solve problems involving Working and Sleeping partners	Lecture through googlemeet	Online test
	3.	Chain Rule	2	To study about chain rule and to solve the problems related to chain rule	Lecture through googlemeet	Formative Assessment online Test

Course Instructor: Ms.T.Sheeba Helen
Course Instructor: Dr.J.C.Evelin

HoD: Dr. V. M. Arul Flower Mary
HoD(SF): Mrs. J. Anne Mary Leema

Name of the course : Differential Equations and Vector Calculus

Course Code : MC2031

No. of hours per week	Credits	Total No. of hours	Marks
6	4	90	100

Objectives:

1. To gain deeper knowledge in differential equations, differentiation and integration of vector functions.
2. To apply the concepts in higher mathematics and physical sciences.

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	distinguish linear, nonlinear, ordinary and partial differential equations	PSO - 4	An
CO - 2	solve linear differential equations with constant and variable coefficients	PSO - 5	U
CO - 3	explain the basic properties of Laplace Transforms and Inverse Laplace Transforms.	PSO - 1	U
CO - 4	use the Laplace transform to find the solution of linear differential equations	PSO - 2	Ap
CO - 5	learn methods of forming and solving partial differential equations	PSO - 3	U
CO - 6	learn differentiation and integration of vector valued functions	PSO - 4	U

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment /Evaluation
I	Linear Differential equations					
	1	Introduction of Linear Differential equations with constant coefficients, Formation of auxillary equation and finding the complementary function, Finding the particular integral for e^{ax}	5	Distinguish linear , nonlinear, ordinary and partial differential equations, Solve linear differential equations with constant and variable coefficients	Lecture with illustration	Evaluation through: Short test on finding the particular integral Short test on homogeneous linear equations
	2	Finding the particular	3	Solve linear	Lecture	

		integral for $\cos ax$, $\sin ax$, Finding the particular integral for $e^{ax}f(x)$		differential equations with constant and variable coefficients	with PPT Illustration	Formative Assessment- I
	3	Finding the particular integral for $x^n f(x)$, Introduction of homogeneous linear equations, Conversion of homogeneous linear equations into linear differential equations with constant coefficients	3	Distinguish linear, nonlinear, ordinary and partial differential equations, Solve linear differential equations with constant and variable coefficients	Lecture with illustration	
	4	Solving homogeneous linear equations using the logarithmic substitution, Solving homogeneous linear equations using the new operator	3	Solve linear differential equations with constant and variable coefficients	Lecture with illustration	
II	Laplace Transform					
	1	Definition of Laplace Transform, Properties of Laplace Transform, Computation of Laplace Transform of standard functions	3	Explain the basic properties of Laplace Transform and inverse Laplace Transform	Lecture with PPT Illustration	Short test on Computation of Laplace Transform of standard functions
	2	Problems on Laplace Transform, Definition of Inverse Laplace Transform, Properties of Inverse Laplace Transform	5	Explain the basic properties of Laplace Transform and inverse Laplace Transform	Lecture with illustration	Assignment on the related problem
	3	Computation of Inverse Laplace Transform of	3	Explain the basic properties of Laplace Transform	Lecture with illustration	

		specific functions, Problems on Inverse Laplace Transform		and inverse Laplace Transform		Formative Assessment –II
	4	Solving Linear Differential equations using Laplace Transform, Solving simultaneous equations using Laplace Transform	4	Use the Laplace transform in finding the solution of linear differential equations	Lecture with illustration	
III	Partial Differential equations					
	1	Introduction of Partial differential equations, Formation of Partial differential equations by eliminating the unknown constants, Formation of Partial differential equations by eliminating the arbitrary functions	4	Learn methods of forming and solving partial differential equations	Lecture with illustration	Short test on formation of Partial differential equations by eliminating the unknown constants, and arbitrary function. Quiz Formative Assessment-III
	2	Methods of solving Partial differential equations, Standard form of Lagrange's equation, General solution of Lagrange's equation	3	Learn methods of forming and solving partial differential equations	Lecture with PPT Illustration	
	3	Solving	4	Learn methods of	Lecture	

		Lagrange's equation by method of grouping, Solving Lagrange's equation by method of multipliers		forming and solving partial differential equations	with illustration	
	4	Solution of Lagrange's equation using grouping and suitable multipliers, Explanation of Charpit's method, Finding the solution of PDE using Charpit's method	4	Learn methods of forming and solving partial differential equations	Lecture Discussion	
IV	Vector Differentiation					
	1	Revision of dot and cross product of vectors, Definition and theorems on differentiation of Vectors, Gradient of a scalar function and its properties	4	Learn differentiation and integration of vector valued functions	Lecture with PPT Illustration	Short test on gradient & differentiation of Vectors
	2	Problems based on Gradient, Equation of tangent plane and normal line for a single surface, Equation of tangent line and normal plane for the intersection of two surfaces	4	Learn differentiation and integration of vector valued functions	Lecture with illustration	Formative Assessment-I
	3	Angle between two surfaces, Divergence of	3	Learn differentiation and integration of	Lecture with illustration	

		vectors and its properties, Curl of vectors and its properties		vector valued functions		
	4	Solenoidal and irrotational vectors, Harmonic vectors and Laplace's equation, Problems based on divergence and curl	4	Learn differentiation and integration of vector valued functions	Lecture with illustration	Short test on Divergence, Curl, Solenoidal and irrotational vectors, Formative Assessment-II
V	Vector Integration					
	1	Definition of line integrals and work done by a force, Parametric equation of curves, Evaluation of line integrals over curves in a plane, Evaluation of line integrals over curves in a surface	4	Evaluate line and surface integrals using Green's theorem, Stoke's theorem and Gauss divergence theorem	Lecture with illustration	Short test on Evaluation of line integrals
	2	Computation of work done by a force, Projection of a surface over a plane, Definition of surface integrals, Evaluation of surface integrals over a plane	4	Evaluate line and surface integrals using Green's theorem, Stoke's theorem and Gauss divergence theorem, Apply the concepts to solve problems in physical sciences and engineering	Lecture with Discussion	Formative Assessment-II
	3	Evaluation of surface integrals over a cube and parallelepiped, Evaluation of surface integrals	4	Evaluate line and surface integrals using Green's theorem, Stoke's theorem and Gauss divergence	Lecture with illustration	Short test on Green's theorem & Stoke's theorem

		over a sphere, cylinder and cone, Statement and verification of Green's theorem		theorem, Apply the concepts to solve problems in physical sciences and engineering		Short test on Gauss Divergence theorem
	4	Statement and verification of Stoke's theorem, Statement and verification of Gauss Divergence theorem	4	Evaluate line and surface integrals using Green's theorem, Stoke's theorem and Gauss divergence theorem, Apply the concepts to solve problems in physical sciences and engineering	Lecture with illustration	Formative Assessment-III

Course Instructor: Dr. K. Jeya Daisy
Course Instructor: Dr.C.Jenila

HoD: Dr. V. M. Arul Flower Mary
HoD(SF): Mrs. J. Anne Mary Leema

Semester : III
 Name of the Course : Real Analysis I
 Course Code : MC2032

Major Core IV

No. of hours per week	Credits	Total No. of hours	Marks
5	4	75	100

Objectives:

1. To introduce the primary concepts of sequences and series of real numbers.
2. To develop problem solving skills.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO- 1	explain the primary concepts of sequences and series of real numbers	PSO - 1	U
CO- 2	define convergence and divergence of sequences and series	PSO - 1	R
CO- 3	distinguish between convergence and divergence of sequences and series	PSO - 2	U
CO- 4	relate the behavior of monotonic and geometric sequences and series	PSO - 5	Ap
CO- 5	calculate the limit and peak point of sequences	PSO - 3	An
CO- 6	analyze the importance of Cauchy's general principle of convergence of sequences and series	PSO - 4	An

Total contact hours: 75 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
I	Preliminaries					
	1	Preliminaries – Mathematical Induction	3	Explain the primary concepts of the Mathematical Induction.	Lecture with Illustration	Evaluation through appreciative inquiry
	2	Finite and Infinite Sets.	3	To distinguish between finite and infinite set.	Lecture with PPT	Evaluation through quizzes and discussions.
	3	Theorems based on the Real Numbers and the algebraic and order	3	To understand the theorems based on the Real Numbers and the	Lecture with Illustration	Slip Test

		properties of \mathbb{R} .		algebraic and order properties of \mathbb{R} .		
	4	Absolute value and the real line.	3	To understand Absolute value and the real line.	Discussion with Illustration	Quiz and Test
II	The real numbers					
	1	The Real Numbers-The completeness property of \mathbb{R} .	3	To know about The completeness property of \mathbb{R} .	Lecture with PPT	Evaluation through discussions.
	2	Applications of the supremum property.	3	To know about Applications of the supremum property.	Lecture	Evaluation through appreciative inquiry
	3	Intervals.	3	To identify Intervals.	Lecture	Formative Assessment Test
III	Sequences					
	1	Sequences- Definitions Range of Sequences, Limit of a Sequence, Bounded Sequence.	3	Explain the primary concepts of sequences and series of real numbers	Lecture with Illustration	Evaluation through appreciative inquiry
	2	Theorems based on bounded Sequence, Problems based on bounded Sequence, Monotonic Sequence.	3	To distinguish between bounded and monotonic sequences	Lecture with PPT	Evaluation through quizzes and discussions.
	3	Theorems based on Monotonic Sequence Convergent Sequence Theorems based on Convergent Sequence	3	To understand the theorems based on Convergent Sequence and Divergent Sequence	Lecture with Illustration	Slip Test
	4	Behavior of monotonic sequence.	3	To understand Behavior of monotonic sequence.	Discussion with Illustration	Quiz and Test
IV	Subsequences					
	1	Subsequences- Definition Theorems based on Subsequences Subsequences- Examples	2	Explain the primary concepts of Subsequences	Lecture with PPT Illustration	Evaluation through discussions.
	2	Peak points	3	Calculate the limit and	Lecture	Evaluation

		Peak points-Examples Limit points Limit points-Examples		peak point of sequences	with Illustration	through appreciative inquiry
	3	Cauchy sequences- Definition Cauchy sequences- examples	3	To apply the principles of Cauchy sequences	Lecture	Formative Assessment Test
	4	Theorems based on The upper and lower limits of a sequence.	3	To identify the upper and lower limits of a sequence.	Group Discussion	Slip Test
V	Series of positive terms					
	1	Series-Definition& Examples Series, Infinite series- Examples	3	Explain the primary concepts of series of real numbers	Lecture with PPT Illustration	Evaluation through discussions.
	2	Theorems and problems based on Comparison Test.	3	To understand the Theorems and problems based on Comparison Test.	Lecture and group discussion	Evaluation through Assignment
	3	Problems based on Kummer's Test, D'Alembert's Ratio Test, De Morgan and Bertrand's Test and Gauss Test.	3	To solve the Problems based on Kummer's Test, D'Alembert's Ratio Test, De Morgan and Bertrand's Test and Gauss Test.	Lecture with Illustration	Formative Assessment Test
	4	Problems based on Root Test and Condensation Test.	3	To solve the Problems based on Root Test and Condensation Test.	Lecture with Illustration	Slip Test
	5	Problems based on Integral Test.	2	To solve the Problems based on Integral Test.	Lecture with Illustration	Quiz and Test

Course Instructor: Dr. Angel Jebitha
Course Instructor: Dr.S.Kavitha

HoD:Dr. V. M. Arul Flower Mary
HoD(SF): Mrs. J. Anne Mary Leema

SEMESTER

III

Name of the Course : Probability Theory and Distributions (Allied)

Course Code : MA2031

No. of hours per week	Credit	Total No. of hours	Marks
5	5	75	100

Objectives: 1. To impart knowledge on the basic concepts of Probability theory and Probability distributions.

2. To apply the theory in real life situations.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	recall the definition of probability and set functions	PSO - 1	R
CO - 2	differentiate between probability and conditional probability and compute according to the requirement	PSO - 4	An
CO - 3	understand the definition of random variables, their types and related concepts	PSO - 1	U
CO - 4	detect the different probability distributions which are widely used	PSO - 4	An
CO - 5	apply the techniques to prove the properties of probability and related distributions	PSO - 5	Ap
CO - 6	choose the suitable probability distribution corresponding to a given data	PSO - 5	E

Total contact hours: 75 (Including lectures, assignments and tests)

Unit	Sections	Topics	Lecture hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
I	Probability					
	1	Probability, Experiment, sample space	2	To recall the definition of probability and set functions and understand the definition of random	Lecture with Illustration	Short Test

				variables, their types and related concepts		
	2	Example and Theorems based on Events, Problems based on events and sample space	3	To recall the definition of probability and to apply the techniques to prove the properties of probability and related distributions	Lecture with Illustration	Test
	3	Conditional probability, Problems based on Conditional probability	3	To recall the definition of probability and apply the techniques to prove the properties of probability and related distributions	Lecture with PPT Illustration	Quiz and Test
	4	Properties – Independent events, Theorems based on independent events, Problems based on independent events.	3	To detect the different probability distributions which are widely used and to recall the definition of probability and apply the techniques to prove the properties of probability and related distributions	Lecture with Illustration	Formative Assessment Test
	5	Baye's theorem and Problems based on Baye's theorem	2	To understand the definition of random variables, their types and related concepts	Lecture with Illustration	Test
II	Random variables					

	1	Random variables, Distribution function, Discrete, continuous-random variable	3	To recall the definition of probability and set functions, to differentiate between probability and conditional probability and compute according to the requirement, and to understand the definition of random variables, their types and related concepts	Group Discussion	Quiz and Test
	2	Problems based on discrete random variable	2	To recall the definition of probability and set functions	Lecture with Illustration	Test
	3	Problems based on continuous-random variable	2	To detect the different probability distributions which are widely used	Lecture with Illustration	Test
	4	Mathematical expectation	2	Test the validity of a given data	Group Discussion	Quiz and Test
III	Moment Generating Function					
	1	Moment Generating Function, Related examples, Problems based on Moment Generating Function, Properties of Moment Generating Function	3	Recall the definition of probability and set functions, understand the definition of random variables, their types and related concepts and to apply the techniques to prove the properties of	Lecture with PPT Illustration	Quiz and Test

				probability and related distributions		
	2	Cumulant generating function, properties and Problems based on Cumulant generating Function	3	To recall the definition of probability and set functions and to apply the techniques to prove the properties of probability and related distributions	Group Discussion	Short Test
	3	Characteristic function, properties, Problems based on Characteristic function and Poisson distribution	3	To recall the definition of probability and set functions, to detect the different probability distributions which are widely used and to apply the techniques to prove the properties of probability and related distributions	Lecture with Illustration	Test
	4	Theorems based on Poisson distribution, Problems based on Poisson distribution, Mode, Moment Generating Function of Poisson distribution	3	To recall the definition of probability and set functions and to apply the techniques to prove the properties of probability and related distributions and to understand the definition of random variables, their	Group Discussion	Short Test

				types and related concepts		
	5	Theorems based on Mode, Moment Generating Function of Poisson distribution, fitting of Poisson distribution and problems based on this	3	To apply the techniques to prove the properties of probability and related distributions and to detect the different probability distributions which are widely used	Lecture with Illustration	Test
IV	Binomial Distribution					
	1	Introduction- Definition, Moments of binomial Distribution	3	To recall the definition of probability and set functions and to understand the definition of random variables, their types and related concepts	Group Discussion	Short Test
	2	Central moments, Theorems based on Central moments	3	To understand the definition of random variables, their types and related concepts and recall the definition of probability and set functions and to	Lecture with Illustration	Test
	3	Mode of binomial distribution, Problems based on Mode of binomial distribution	3	To recall the definition of probability and set functions and to apply the techniques to prove the properties of	Group Discussion	Short Test

				probability and related distributions		
	4	Fitting of binomial distribution, examples, Problems based on fitting of binomial distribution	3	To detect the different probability distributions which are widely used and to apply the techniques to prove the properties of probability and related distributions	Lecture with Illustration	Test
V	Normal Distribution					
	1	Definition, Moment Generating Function about origin of normal distribution, Mean and variance	3	To recall the definition of probability and set functions and to apply the techniques to prove the properties of probability and related distributions	Lecture with Illustration	Test
	2	Standard normal variate, mode, Median, Moment Generating Function about mean of normal distribution, Theorems based on mean of normal distribution	3	To recall the definition of probability and set functions and to understand the definition of random variables, their types and related concepts	Lecture with Illustration	Quiz and Test
	3	Problems based on mean of normal distribution, Area property	3	To recall the definition of probability and set functions and to understand	Lecture with Illustration	Formative Assessment Test

		of normal distribution, Problems based on area of normal distribution		the definition of random variables, their types and related concepts and to apply the techniques to prove the properties of probability and related distributions		
	4	Quartile deviation for the normal distribution, fitting of normal distribution, Problems based on Fitting of normal distribution	3	To recall the definition of probability and to detect the different probability distributions which are widely used and to apply the techniques to prove the properties of probability and related distributions	Lecture with Illustration	Test

Course Instructor: Sr. S. AntinMary
Course Instructor: Ms. V. Princy Kala

HoD: Dr. V. M. Arul Flower Mary
HoD(SF): Mrs. J. Anne Mary Leema

CourseCode : MC2052

No. of hours per week	Credit	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To introduce Metric Spaces and the concepts of completeness, continuity, connectedness and compactness

2. To use these concepts in higher studies.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	understand the concepts of completeness, continuity and discontinuity of metric spaces	PSO - 1	U
CO - 2	apply the metric space theorems to real life situations	PSO - 4	Ap
CO - 3	distinguish between continuous functions and uniform continuous functions	PSO - 5	An
CO - 4	use basic concepts in the development of real analysis results	PSO - 1	C
CO - 5	Understand the concepts of metric space, connectedness and compactness of metric spaces	PSO - 3	U
CO- 6	Develop the ability to reflect on problems that are quite significant in the field of analysis	PSO -2	Ap

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
I	1	Metric Space, definition and examples	3	Explain the primary concepts of Metric Space	Lecture with Illustration	Evaluation through appreciative inquiry

	2	Bounded sets, Open ball, Open sets	3	To understand the concepts Bounded sets, Open ball and Open sets	Lecture with PPT	Evaluation through quizzes and discussions.
	3	Subspace, Interior of a set, Closed sets	3	To understand about Subspace, Interior of a set and Closed sets	Lecture with Illustration	Slip Test
	4	Closure, Limit point, Dense sets.	3	To understand about Closure, Limit point and Dense sets	Discussion with Illustration	Quiz and Test
II	1	Complete metric space	3	To know about complete Metric space	Lecture with PPT	Evaluation through discussions.
	2	Cantor's intersection theorem - Baire's Category theorem	3	To know about Cantor's intersection theorem and Baire's Category theorem	Lecture	Evaluation through appreciative inquiry
	3	Contraction mapping- Definition and examples- Contraction mapping theorem	3	To learn the concept Contraction mapping	Lecture	Formative Assessment Test
III	1	Continuity of functions	3	To explain the concept Continuity of functions	Lecture with Illustration	Evaluation through appreciative inquiry
	2	Composition of continuous functions, Equivalent conditions for continuity	4	To study the concepts Composition of continuous functions	Lecture with PPT	Evaluation through quizzes and discussions
	3	Homeomorphism, Uniform continuity	3	To understand the concepts Homeomorphism and Uniform continuity	Lecture with Illustration	Slip Test
	4	Discontinuous functions on \mathbb{R}	3	To understand the concept Discontinuous functions	Discussion with Illustration	Quiz and Test
IV	1	Connectedness, Definition and examples	3	To study about Connectedness	Lecture with PPT Illustration	Evaluation through discussions
	2	Connected subsets of \mathbb{R}	3	To learn the concept Connected subsets	Lecture with Illustration	Evaluation through appreciative inquiry
	3	Connectedness and	3	To understand the	Lecture	Formative

		continuity		relation between Connectedness and Continuity		Assessment Test
	4	Intermediate value theorem	2	To study about the Intermediate value theorem	Group Discussion	Slip Test
V	1	Compactness, Compact space	3	Explain the primary concepts of Compactness	Lecture with PPT Illustration	Evaluation through discussions.
	2	Compact subsets of R	3	To understand the concept Compact subsets of R.	Lecture and group discussion	Evaluation through Assignment
	3	Equivalent Characterization for Compactness	3	To study about Equivalent Characterization for Compactness	Lecture with Illustration	Formative Assessment Test
	4	Compactness and continuity	4	To understand the relation between Compactness and Continuity	Lecture with Illustration	Slip Test

Course Instructor: Dr. J.Befija Minnie
Course Instructor S.F: Ms. Monisha

HoD:Dr. T.Sheeba Helen
HoD:Dr. S.Kavitha

Name of the Course : Graph Theory

Subject code : MC2055

No. of hours per week	Credits	Total No. of hours	Marks
5	4	75	100

Objectives:

1. To introduce graphs and the concepts of connectedness, matchings, planarity and domination.
2. To apply these concepts in research.

Course Outcome

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	understand the basic definitions to write the proofs of simple theorems	PSO - 1	U
CO - 2	employ the definitions to write the proofs of simple theorems	PSO - 2	Ap
CO - 3	relate real life situations with mathematical graphs	PSO - 3	Ap

CO - 4	develop the ability to solve problems in graph theory	PSO - 4	An
CO - 5	analyze real life problems using graph theory both quantitatively and qualitatively	PSO - 4	An

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
I	Pictorial Representation – Isomorphism and degrees - cycles in a graph - connected graphs - cut vertices and cut edges					
	1.	Trail and Path- Examples, Cycles in graphs – definitions and theorems, Theorems on limit points and examples, Theorems on connected graph	3	To apply the results in real life cycle	Lecture with Illustration	Evaluation through test
	2.	Theorems on cycles in graph, complement graphs – definition and theorems, Digraph	3	To distinguish the theorems and their application	Lecture with Illustration	Slip test
	3.	Definitions and Theorems on cut vertices and cut edges	3	To identify the cut vertices and edges	Lecture with Examples	Brain Storming and Test
	4.	Trivial and non-Trivial Graphs – definitions and theorems	3	To construct the graphs	Discussion with Illustration	Quiz and Test
II	Eulerian graphs - Fleury's algorithm - Hamiltonian graphs - Weighted graphs - Chinese Post-man Problem -Travelling Sales-man Problem Bipartite graphs - Trees.					
	1.	Eulerian Graphs-definitions and theorems, Theorems related to Eulerian trail using digraph	3	To identify the Closed walk.	Lecture with PPT	Test
	2.	Fleury's Algorithm to construct a closed Eulerian trail	2	To construct a Eulerian Trail	Lecture with illustration	Test
	3.	Hamiltonian Graphs – definitions and theorems,	2	To identify the difference in cycle and path	Lecture	Assessment Test

		Hamiltonian cycle and path				
	4.	Problem based on weighted graphs - Chinese Post-man Problem - Travelling Salesman Problem Bipartite graphs	3	To construct a road map.	Group Discussion	Test
	5.	Bipartite graphs- Definition and Theorems, Theorems on trees.	2	To calculate a unique path.	Lecture with illustration	Test
III	Planar graphs - Euler formula - Platonic solids - Dual of a plane graph - Characterization of planar graphs - Colourings - Vertex colouring - Edge colouring - An algorithm for vertex colouring.					
	1.	Definition and examples related to planar graphs, Euler's formula for planar graphs and related corollary	3	To understand the concept in Eulerian and planar graph	Lecture with PPT Illustration	Quiz
	2.	Definition and theorems related to Platonic solids, Dual of a plane graph, Definition and theorem related to characterization of planar graph	3	To apply the ancient concerned with polyhedra.	Lecture with Illustration	Test
	3.	Definition and theorems on colouring, Theorem related to maximum colourings of a graph, triangle free graph in colouring	4	To identify alternating colours to the graphs	Lecture with examples	Assignment
	4.	Definition and theorems related to edge colouring, An algorithm for vertex colouring of a graph	2	To identify the colouring and solve the problems	Group Discussion	Formative Assessment Test
IV	Directed Graphs - Connectivity in digraphs - Strong orientation of graphs – Eulerian digraphs -					

	Tournament.					
	1.	Introduction, Definitions related to directed graph	3	To understand the concept about directed graph	Lecture with PPT Illustration	Brain Storming
	2.	Strongly connected graph – definition and theorems	3	To understand the concept of strong, unilateral, weakly connected graph.	Lecture and group discussion	Test
	3.	Definition and Theorems related to Strong orientation of graphs	2	To understand about orientation graph.	Lecture with Illustration	Quiz and Test
	4.	Eulerian Digraph- definition and theorems, Tournaments	4	To understand the in degree and out degree to solve the problems.	Lecture with Illustration	Test
V	Dominating Sets, Relationship between independent sets and dominating sets, Irredundant sets, Upper Bounds and Lower Bounds for the Domination Number .					
	1.	Introduction and definition related to Dominating Sets with theorems,	2	To understand solve real life problems in dominating Sets	Lecture with PPT Illustration	Test
	2.	Definition and theorems relate to Independent Sets and Irredundant sets	3	To understand relate to independent and irredundant sets and problems related to it.	Lecture with Illustration	Assessment test
	3.	Definition Examples and theorems related to Bounds-Upper Bound	4	To understand the isolated vertices in graphs	Lecture with PPT Illustration	Slip test
	4.	Theorems related	3	To understand the concept	Lecture with PPT	Quiz

		to Lower Bounds		about Domination and connected graph.	Illustration	
--	--	-----------------	--	---------------------------------------	--------------	--

Course Instructor (Aided): Sr. S. Antin Mary
Course Instructor (S.F): Dr. G. Jovit Vinish Melma

HoD(Aided): Dr. T. Sheeba Helen
HoD(S.F) : Dr. S. Kavitha

Semester V
Major Core IX- Computer Oriented Numerical Methods
Course Code: MC2053

No. of hours per week	Credits	Total No. of hours	Marks
6	4	90	100

Objectives:

1. To provide suitable and effective numerical methods, for computing approximate numerical values of certain raw data.
2. To lay foundation of programming techniques to solve mathematical problems.

Course Outcomes

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	understand the elementary programming language and its structure	PSO - 4	U
CO - 2	develop computer programmes for the solution of various numerical problems	PSO - 5	C
CO - 3	apply numerical methods to obtain approximate solutions to mathematical problems	PSO - 3	Ap
CO - 4	employ different methods of constructing a polynomial using various methods	PSO - 2	A
CO - 5	compare the rate of convergence of different numerical formula	PSO - 4	An
CO - 6	distinguish the advantages and disadvantages of various numerical methods	PSO - 4	An

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
I	Basis structure of C programs					
	1	Basis structure of C programs, C Tokens and Keywords	3	To understand the structure of a C program and identify C Tokens and Keywords	Lecture with Illustration	Evaluation through Brainstorming
	2	Identifiers, Constants, Variables and Data Types, Operations and Expressions		To identify Identifiers, Constants, Variables and Data Types, Operations and Expressions	Lecture with Illustration	Slip Test
	3	Arithmetic Operators, Relational Operators,	3	To understand the syntax of various operators and apply	Lecture with illustration	Evaluation through role play

		Logical Operators, Assignment Operators, Increment and Decrement Operators		in programmes		
	4	Conditional Operators, Bitwise Operators and Special Operators	3	To understand the syntax of various operators and apply in programmes	Lecture with Illustration	Open book test
	5	Managing Input and Output Operations Formatted Input and Formatted Output	3	To understand the Input and Output Operations	Flipped class	Quiz and Test
II	Decision making and Branching					
	1	Decision making and Branching and Decision making with IF statement	3	To differentiated decision making and branching	Blended class	Evaluation through Assignment
	2	Simple IF statement The IF.... Else statements and Nesting of IF... Else statements.	3	To understand Simple IF statement The IF.... Else statements and Nesting of IF... Else statements.	Lecture with Illustration	Evaluation through appreciative inquiry
	3	The GOTO statement, Decision making and Looping	3	To express GOTO statement in programmes	Lecture with Small programmes	Slip test
	4	The WHILE Statement and The DO Statement	3	To express WHILE Statement and DO Statement in programmes	Lecture with Small programmes	Formative Assessment Test
	5	The FOR Statement.	3	To express GOTO statement in programmes	Lecture with Small programmes	Formative Assessment Test
III	Solutions of algebraic and transcendental equations					
	1	Solutions of algebraic and transcendental equations. Iteration method and Newton Raphson method	3	To understand the solutions of algebraic and transcendental equations and to solve problems for the same	Lecture with Illustration	Evaluation through open seminar
	2	programs in C for Newton Raphson method	3	To construct the programs in C for Newton Raphson method	Laboratoy method	Evaluation through the output of the program
	3	Interpolation - Newton's Interpolation formulae	3	To understand interpolation and to solve problems using Newton's Interpolation formulae	Lecture with Illustration	Slip Test
	4	programs in C for Newton's Forward Interpolation and Backward Interpolation fomula	3	To construct programs in C for Newton's Forward Interpolation and Backward Interpolation fomula	Laboratoy method	Evaluation through the output of the program
	5	Lagrange's	3	To solve problems using	Lecture with	Evaluation

		Interpolation formula		Lagrange's Interpolation formula	Illustration	through open seminar
IV	Numerical differentiation and integration					
	1	Numerical differentiation, derivatives using Newton's forward difference	3	To understand Numerical differentiation and to solve problems using Newton's forward difference	Lecture with PPT Illustration	Evaluation through discussions.
	2	Newton's backward difference formula	3	To obtain approximate solutions for problems using Newton's backward difference formula	Flipped Class	Evaluation through appreciative inquiry
	3	Numerical integration, Newton cote's quadrature formula	3	To understand Numerical integration and to develop Newton cote's quadrature formula	Lecture with Illustration	Formative Assessment Test
	4	Trapezoidal rule	3	To obtain approximate solutions for problems using Trapezoidal rule	Problem Solving	Slip Test
	5	Programs in C for Trapezoidal rule	3	To develop programs in C for Trapezoidal rule	Laboratoy method	Evaluation through the output of the program
V	Numerical integration					
	1	Simpson's $(1/3)^{rd}$ rule	3	To find approximate solutions for problems using Simpson's $(1/3)^{rd}$ rule	Problem Solving	Evaluation through exercise problem solving
	2	Programs in C for Simpson's one - third rule	3	To develop programs in C for Simpson's one - third rule	Laboratoy method	Evaluation through the output of the program
	3	Simpson's $(3/8)^{th}$ rule	3	To find approximate solutions for problems using Simpson's $(3/8)^{th}$ rule	Flipped class	Formative Assessment Test
	4	Numerical solution of differential equation	3	To understand numerical solution of differential equation	Blended class	Slip Test

	5	Taylor's series method and Picard's method.	3	To differentiate Taylor's series method and Picard's method and solve problems	Problem Solving	Formative Assessment Test
--	---	---	---	--	-----------------	---------------------------

Course Instructor: Dr. S.Sujitha
Course Instructor: Ms. Princykala

HoD:Dr. T.Sheeba Helen
HoD(SF): Dr.S.Kavitha