

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 the real 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

	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

Teaching Plan (2019-2020)

Semester - V

Name of the Course : Linear Algebra

Subject Code : MC1751

Number of hours per week	Number of credits	Total number of hours	Marks
6	5	90	100

Objectives:

(i) To introduce the algebraic system of Vector Spaces and the related study of various physical applications.

(ii) To equip students with the ideas of vector space, basis, inner product spaces, linear transformations to pursue their higher studies.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO- 1	Recall and define Groups ,Fields and their properties	PSO -1	R
CO- 2	Cite examples of vector spaces ,subspaces and linear transformations	PSO -1	U
CO- 3	Determine the concepts of linear independence, linear dependence , basis and dimension of vector spaces	PSO -1	U
CO- 4	Correlate rank and nullity ,Linear transformation and matrix of a Linear transformation	PSO-2	Ap
CO- 5	Examine whether a given space is an inner product space and the orthonormality of sets	PSO-3	Ap

Unit	Module	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/e valuation
I	Vector Spaces					
	1	Vector spaces - Definition and Examples	3	Understand the basic definitions and fundamental concepts of Vector spaces	Lecture with illustration	Slip Test
	2	Sub spaces -	4	Identify the difference between Vector spaces and subspaces	Lecture	Brain Storming
	3	Sub spaces –solved problems	4	Learn to solve the problems based on sub Spaces.	Lecture with Group Discussion	Assignment
	4	Linear	4	Understand the concept	Lecture with	Jigsaw

		Transformation		of Linear Transformation.	PPT	
II	Span of a set					
	1	Span of a Set	4	Understand the definitions and basic concepts of span of a set	Lecture	Slip Test
	2	Linear Independence	4	Identify the difference between Linear Independence and dependence.	Lecture with illustration	Assignment
	3	Basis	3	Understand the concept of Basis	Lecture with PPT	Formative Exam
	4	Dimension	4	Solve the problems based on Basis and dimension.	Lecture with video	Slip Test
III	Rank and Nullity					
	1	Rank and Nullity	3	Understand the concept of Rank and Nullity	Lecture	Quiz
	2	Matrix of a linear transformation	3	Determine the concepts of Matrix of a linear transformation	Lecture with illustration	Test
	3	Characteristic Equation	3	Solve the problems based on Characteristic Equation	Lecture with PPT	Slip Test
	4	Cayley –Hamilton theorem	3	Learn the theory of Cayley –Hamilton theorem	Blended Learning	Assignment
	5	Eigen Values and eigen vectors.	3	Solve the problems based on eigen Values and eigen vectors.	Lecture	Formative Exam
IV	Inner Product Spaces					
	1	Inner Product Spaces-Definition and Examples	5	Understand the definition and examples of Inner Product Spaces	Lecture with illustration	Quiz
	2	Orthogonality	5	To practice various problems on Orthogonality	Lecture , Blended Learning	Brain Storming
	3	Orthogonal Complement	5	Learn to find the Orthogonal Complement	Lecture	Assignment
V	Bilinear form					
	1	Bilinear forms	5	Understand the	Lecture	Quiz

				definition of Bilinear forms	with illustration	
	2	Quadratic forms	5	Distinguish between Bilinear forms and Quadratic forms	Lecture	Assignment
	3	Reduction of a quadratic form to the Diagonal form	5	To practice various Problems based on Reduction of a quadratic form to the Diagonal form	Lecture	Formative Exam

Course Instructor (Aided): Dr. L. Jesmalar

HoD(Aided): Dr. V.M. Arul Flower Mary

Course Instructor (S.F): Ms. R.N. Rajalekshmi

HoD(Aided): Ms. J. Anne Mary Leema

Name of the Course : Real Analysis

Subject code : MC1752

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, compactness and uniform convergence.
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	Understands 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-9	An
CO -4	Use the basic concepts in the development of real analysis results	PSO-1	C
CO- 5	Understand the concepts of countable and uncountable sets, metric space, connectedness, compactness of metric spaces	PSO-7	U

CO- 6	Develop the ability to reflect on problems that are quite significant in the field of real analysis	PSO-8	Ap
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Unit	Module	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/ evaluation
I	1	Introduction to real analysis. Definitions, examples and theorems on Countable and Uncountable Sets.	4	To determine countable and uncountable sets	Lecture with PPT	Quiz
	2	Metric spaces definitions, problems and theorems	5	To explain about metric spaces	Lecture, Group discussion	Test
	3	Bounded sets definitions and problems	2	To find out a set is bounded or unbounded	Lecture	Quiz
	4	Open ball, open sets definitions, examples, problems and theorems	3	To solve problems on open sets	Lecture with PPT	Assignment
	5	Equivalent metrics, Subspace	3	To analyse about equivalent metrics	Lecture	Test
II	1	Interior of a set definitions, examples, problems and theorems	3	To analyse about interior of a set	Lecture with group discussion	Assignment
	2	Closed sets, closure definitions, examples, problems and	4	To determine the closed sets and closure of the subsets	Lecture	Formative Assessment

		theorems				
	3	Limit point definitions, examples, problems and theorems, Dense sets definitions, examples, and theorems	3	To find the limit point	Lecture	Assignment
	4	Complete metric space definitions, examples, problems and theorems	5	To analyse about complete metric space	Lecture with group discussion	Test
	5	Cantor's intersection theorem, Baire's Category theorem	3	To explain the theorems	Lecture	Test
III	1	Continuity of functions definitions, examples, problems and theorems	4	To determine the continuity of a function	Lecture	Assignment
	2	Composition of continuous functions problems	3	To analyse about composition of continuous functions problems	Lecture	Assignment
	3	Homeomorphism examples	3	To learn to prove homeomorphism	Lecture with group discussion	Test
	4	Uniform continuity definitions, examples, problems and theorems	2	To determine the uniformly continuous functions	Lecture	Assignment
	5	Discontinuous functions definitions, examples, problems and theorems	5	To test the discontinuity of a function	Lecture with PPT	Test
IV	1	Connectedness	3	To learn to prove the	Lecture	Quiz

		definitions, examples, problems and theorems		connectedness of the subsets	with group discussion	
	2	Connected subsets of \mathbb{R} problems and theorems	3	To determine the connected subsets	Lecture	Formative Assessment
	3	Connectedness and continuity problems and theorems	3	To compare connectedness and continuity	Lecture with group discussion	Assignment
	4	Intermediate value theorem	1	To learn Intermediate value theorem	Lecture	Test
V	1	Compactness definitions, examples, and theorems	3	To explain the concept compactness	Lecture	Test
	2	Compact subsets of \mathbb{R} theorems	2	To learn to prove the theorems	Lecture	Test
	3	Equivalent characterisations for compactness problems and theorems	5	To learn to prove the theorems	Lecture	Formative Assessment
	4	Compactness and continuity	3	To compare compactness and continuity	Lecture	Test

Course Instructor (Aided): Dr.J. Befija Minnie
 Course Instructor (S.F): Ms. V. Mara Narghese

HoD(Aided): Dr. V.M. Arul Flower Mary
 HoD(Aided): Ms. J. Anne Mary Leema

Name of the Course : Graph Theory

Course code : MC1753

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

Objectives:

1. To introduce graphs, directed graphs and the concepts of connectedness and labeling.
2. To apply these concepts in research.

CO	Course Outcomes 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	Module	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
I	Graphs and Sub graphs					
	1	Graphs and Sub graphs - Definition and Examples - Degrees, Sub graphs, Isomorphism	4	Understand the basic definitions and fundamental concepts of graph theory	Lecture with illustration	Brainstorming
	2	Ramsey Numbers - Independent sets and coverings - Intersection graphs and line graphs	4	Identify the difference between Independent sets and coverings and understand the concept of Intersection graphs and line graphs	Lecture with PPT	Slip Test
	3	Matrices - Operations on graphs	4	Learn to form adjacency and incidence matrices of a graph and learn different types of operations on graphs	Lecture with Group Discussion	Assignment Method

	4	Degree Sequences - Graphic Sequences.	5	Understand the concept of Degree Sequences and Graphic Sequences.	Lecture with Video	Test
II	Connectedness					
	1	Connectedness - Walks, Trails and Paths	5	Understand the definitions and distinguish among walks, trails and paths	Blended learning	Brainstorming
	2	Connectedness and Components	5	Understand the definitions of cut point and bridge of a graph and analyse the connectedness of a graph	Lecture with PPT	Jigsaw
	3	Blocks -Connectivity	5	Understand the concept of blocks and learn to find the connectivity of different graphs	Lecture with PPT	Formative Exam
	4	Eulerian Graphs - Hamiltonian Graphs(excluding theorem 5.10)	5	Understand the concept of Eulerian graphs and Hamiltonian graphs	Lecture with illustration	Test
III	Trees					
	1	Trees - Characterisation of trees - Centre of a tree	5	Understand the concept of trees	Lecture with PPT	Quiz
	2	Matchings - Matchings in bipartite graphs.	5	Understand the concept of Matchings and to practice various Theorems	Blended learning	Test
IV	Planarity					
	1	Definition and properties	5	Cite examples of planar and non-planar graphs	Lecture with illustration	Quiz
	2	Colourability - Chromatic number and chromatic index	5	Learn to find the chromatic number of different graphs	Blended learning	Formative Exam
	3	The Five Colour Theorem - Chromatic polynomials	5	To practice various Theorems and learn to write the chromatic polynomial of different graphs	Lecture	Presentations
V	Directed Graphs					
	1	Directed Graphs - Definition and Basic Properties	4	Understand the definition of digraphs	Lecture with illustration	Quiz

2	Paths and Connections - Eulerian Trail	4	Distinguish between strongly connected and weakly connected digraphs and understand the concept of Eulerian trails	Lecture with PPT	Test
3	Digraphs and Matrices - Tournaments	5	To practice various Theorems and understand the concept of Tournaments	Lecture with group discussion	Formative Exam

Course Instructor (Aided): Sr. S. Antin Mary

HoD(Aided): Dr. V.M. Arul Flower Mary

Course Instructor (S.F): Ms. J. Anne Mary Leema

HoD(Aided): Ms. J. Anne Mary Leema

Name of the Course: Numerical Methods

Course Code : MC1755

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

Objectives: 1. To study Numerical differentiation and Numerical integration using different formulae.

2. To develop various methods for solving applied scientific problems.

Course Outcome

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	understand the basic definitions and meaning of interpolation	PSO - 1	U
CO - 2	select appropriate numerical methods and apply the same to various types of problems	PSO - 1	U
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

Unit	Module	Topics	Lecture hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
I	Solutions of algebraic and transcendental equations					
	1	Iteration method and problems	3	To understand the non-linear algebraic equations - Iteration method	Lecture with Illustration	Evaluation through test
	2	More problems on Iteration method	2	To understand solving techniques of Iteration method	Lecture with Illustration	Quiz and Test
	3	Newton Raphson method and problems	3	To understand the non-linear algebraic equations - Newton Raphson method	Lecture with Illustration	Quiz through Quizizz
	4	More problems on Newton Raphson method	2	To solve problems using Newton Raphson method	Lecture with Illustration	Test
	5	Finite difference	3	To understand Finite difference	Lecture with PPT Illustration	Quiz and Test
	6	Difference operators	2	To understand Difference operators	Lecture with Illustration	Formative Assessment Test
II	Interpolation					
	1	Newton's Interpolation formulae	4	To understand Interpolation	Lecture with PPT Illustration	Test
	2	Lagrange's Interpolation	4	To understand Lagrange Interpolation	Lecture with	Quiz and Test

		formula			Illustration	
	3	Divided difference	3	To understand Divided difference	Lecture with Illustration	Evaluation through test
	4	Newton's divided difference formula	4	To solve the problems using Newton's divided difference formula	Lecture with PPT Illustration	Formative Assessment Test
III	Numerical differentiation					
	1	Derivatives using Newton's forward difference formula	4	To recall the basic concepts of Numerical differentiation	Lecture with Illustration	Evaluation through test
	2	Numerical differentiation using interpolation formulae for equal interval and problems	3	To solve the problems using Newton's forward difference formula	Lecture with PPT Illustration	Quiz through Quizizz
	3	Derivatives using Newton's backward difference formula.	4	To learn the derivation of Newton's backward difference formula	Lecture with Illustration	Quiz and Test
	4	More problems on Newton's backward	4	To solve the problems using Newton's backward	Lecture with PPT	Formative Assessment

		difference formula		difference formula	Illustration	Test
IV	Numerical integration					
1	Newton cote's - quadrature formula	4	To understand Newton cote's - quadrature formula	Lecture with Illustration	Test	
2	Numerical integration by Trapezoidal rule	3	To learn the derivation of Trapezoidal rule and to solve the problems using Trapezoidal rule	Lecture with PPT Illustration	Quiz through Quizizz	
3	Numerical integration by Simpson's (1/3) rd rule	2	To learn the derivation of Simpson's (1/3) rd rule and to solve the problems using Simpson's (1/3) rd rule	Lecture with Illustration	Formative Assessment Test	
4	Numerical integration by Simpson's (3/8) th rule	4	To learn the derivation of Simpson's (3/8) th rule and to solve the problems using Simpson's (3/8) th rule	Lecture with Illustration	Test	
V	Numerical solution of differential equation					
1	Solve the differential equation using Taylor's series method	4	To understand Taylor's series method	Lecture with Illustration	Test	
2	More problems on Taylor's series method	4	To solve the differential equation using Taylor's series method	Lecture with PPT Illustration	Quiz and Test	
3	Solve the differential	4	To understand Picard's method	Lecture with	Quiz through	

		equation using Picard's method.			Illustration	Quizizz
	4	More problems on Picard's method	3	To solve the differential equation using Picard's method	Lecture with Illustration	Test

Course Instructor (Aided): Ms. A. Jancy Vini

HoD(Aided): Dr. V.M. Arul Flower Mary

Course Instructor (S.F): Ms. D. Berla Jeyanthi

HoD(Aided): Ms. J. Anne Mary Leema