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 graduateswill be able to:
PO - 1	equip students with hands on training through various courses to enhance entrepreneurshipskills.
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 graduateswill 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 solvingskills 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   **HoD: Dr. V. M. Arul Flower Mary**
Course Instructor: Ms. V. Princy Kala   **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

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

	3.	triplicate and subtriplicate ratio	2	To learn about triplicate and subtriplicate ratio	Lecture through googlemeet	Online Assignment
		subduplicate ratio				
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   **HoD: Dr. V. M. Arul Flower Mary**
Course Instructor: Dr.J.C.Evelin   **HoD(SF): Mrs. J. Anne Mary Leema**

Semester   **: II**   **Major Core II**
Name of the Course   **: Classical Algebra and Integral Calculus**
Course Code   **: MC2021**

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

Objectives:
1. To give a sound knowledge in Classical Algebra.
2. To solve problems in applications of Integral Calculus.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	recall the fundamentals of algebraic equations and rules of integration.	PSO - 1	R
CO - 2	apply fundamental theorem of algebra in framing and solving equations	PSO - 5	U
CO - 3	choose appropriate method for transformation of equations	PSO - 2	Ap
CO - 4	develop the skill of evaluation of double and triple integrals over different regions	PSO - 3	Ap
CO - 5	identify Beta, Gamma functions and utilize them for the evaluation of definite integrals	PSO - 5	Ap,E
CO - 6	develop the Fourier Series expansion in any interval and apply the same for solving technical and physical problems	PSO - 4	Ap, An

B.Sc. MATHEMATICS

PROGRAMME OUTCOMES OF B.SC.

- ➤ Apply the broaden and in-depth knowledge of science and computing to analyse, think creatively and generate solutions to face the global challenges.

- ➤ Foster intellectual curiosity, critical thinking and logical reasoning.

- ➤ Adapt to different roles and responsibilities and develop leadership qualities in multicultural working environment by relating to diversity and ethical practices.

- ➤ Update the techniques and acquire skills to develop systems and methods to solve current problems.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSOs	Upon completion of B.Sc. Mathematics, the graduates will be able to :
PSO - 1	acquire a strong foundation in various branches of mathematics.
PSO - 2	develop problem solving skills cultivating logical thinking.
PSO - 3	solve problems involving numerical ability and also problems in interdisciplinary areas which would widen the scope of career prospects.
PSO - 4	apply the skills and knowledge gained through the study of mathematics to real life situations and face competitive examinations with confidence.
PSO - 5	pursue higher studies which in turn will offer them job opportunities in government and public sector undertakings, banks, central government institutes etc.

Semester   : III   **Major Core III**

Name of the course   : **Differential Equations and Vector Calculus**

Course Code   : **MC1731**

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

Course Outcomes

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-1	U
CO- 3	Explain the basic properties of Laplace Transform and inverse Laplace Transform	PSO-1	U
CO- 4	Use the Laplace transform in finding the solution of linear differential equations	PSO-2, PSO-3	Ap
CO- 5	Learn methods of forming and solving partial differential equations	PSO-1	U
CO- 6	Learn differentiation and integration of vector valued functions	PSO-1	U
CO- 7	Evaluate line and surface integrals using Green's theorem, Stoke's theorem and Gauss divergence theorem	PSO-4 PSO-5	Ap,E
CO- 8	Apply the concepts to solve problems in physical sciences and engineering	PSO-2	Ap

Teaching Plan

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

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment
I	**Linear Differential equations**					
	1	Introduction of Linear Differential equations with constant coefficients, Formation of auxillary equation and finding the complementary function, Finding the	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
	2	Finding the particular	3	Solve linear differential	Lecture	Short test on homogeneous

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

		Partial differential equations by				constants, and arbitrary function.
	2	Methods of solving Partial differential equations, Standard form of Lagrange's equation, General solution	3	Learn methods of forming and solving partial differential equations	Lecture with PPT Illustration	
	3	Solving Lagrange's equation by method of grouping, Solving Lagrange's equation	4	Learn methods of forming and solving partial differential equations	Lecture with illustration	Quiz
	4	Solution of Lagrange's equation using grouping and suitable multipliers, Explanation of Charpit's method, Finding the solution of PDE	4	Learn methods of forming and solving partial differential equations	Lecture Discussion	Formative
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	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	4	Learn differentiation and integration of vector valued functions	Lecture with illustration	Formative Assessment-I Short test on Divergence, Curl , Solenoidal and irrotational vectors,
	3	Angle between two surfaces, Divergence of vectors and its properties, Curl	3	Learn differentiation and integration of vector valued functions	Lecture with illustration	
	4	Solenoidal and irrotational vectors, Harmonic vectors and Laplace's	4	Learn differentiation and integration of vector valued functions	Lecture with illustration	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	Lecture with Discussion	Formative Assessment-II
	3	Evaluation of surface integrals over a cube and parrelopiped, Evaluation of surface integrals over a sphere, cylinder and cone, Statement and verification of Green's theorem	4	Evaluate line and surface integrals using Green's theorem, Stoke's theorem and Gauss divergence theorem, Apply the concepts to solve	Lecture with illustration	Short test on Green's theorem& Stoke's 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	Short test on Gauss Divergence theorem Formative Assessment-III

Course Instructor (Aided): Dr.V.Sujin Flower   HOD(Aided) :Dr. V. M. Arul Flower Mary
Instructor(S.F): V. Mara Narghese   Course HOD(S.F) :Ms. Anne Mary Leema

Semester	: III			Major Core IV

Semester : III   **Major Core IV**
Name of the Course : Sequences and Series
Subject code : MC1732

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

Course Outcomes

CO	Upon completion of this course the students will be able to :	PSO	CL
CO- 1	Explain the primary concepts of sequences and series of real numbers	PSO-1	U
CO- 2	Define convergent and divergence of sequences and series	PSO-1	R
CO- 3	Distinguish between convergent and divergent of the sequences and series	PSO-1	U
CO- 4	Relate the behavior of monotonic and geometric sequences and series	PSO-2,PSO-3	Ap
CO- 5	Calculate the limit and peak point of sequences	PSO-4	An
CO- 6	Analyze the importance of Cauchy's general principle of convergence of sequences and series	PSO-4	An
CO- 7	Evaluate the convergence of series using different types of test.	PSO-4	E
CO- 8	Develop their skill in sequence and series to gain mastery in analysis.	PSO-4	An

Teaching Plan

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

Unit	Module	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
I		**Sequences**				
	1	Sequences- Definitions Range of Sequences, Limit of a 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	Divergent Sequence, Oscillating Sequence	3	To understand Divergent Sequence and Oscillating Sequence	Discussion with Illustration	Quiz and Test
II		**Algebra of limits**				

	1	Algebra of limits Theorems based on Algebra of limits, Problems based on Algebra of Limits.	2	To identify the limits And Algebra of limits	Lecture with PPT	Evaluation through discussions.
	2	Null sequence Behaviour of monotonic sequence Theorems based on Behaviour of monotonic sequence	2	To know about Behaviour of monotonic sequence	Lecture	Evaluation through appreciative inquiry
	3	Problems based on Behaviour of monotonic sequences Behaviour of Geometric Sequence	2	To identify Behaviour of monotonic sequences and Behaviour of Geometric Sequence	Lecture	Formative Assessment Test
	4	Theorems based on Behaviour of Geometric Sequence	3	Relate the behavior of monotonic and geometric sequences	Group Discussion	Slip Test
	5	Problems based on Behaviour of Geometric sequences	3	To Solve Problems based on Behaviour of Geometric sequences	Group Discussion	Home assignment.
III	**Subsequences**					
	1	Subsequences- Definition Theorems based on Subsequences	2	Explain the primary concepts of Subsequences	Lecture with PPT Illustration	Evaluation through
	2	Peak points Peak points- Examples Limit points	3	Calculate the limit and peak point of sequences	Lecture with Illustration	Evaluation through appreciative inquiry
	3	Cauchy sequences3 Definition Cauchy	3	To apply the principles of Cauchy sequences	Lecture	Formative Assessment Test
	4	Theorems based on Cauchy sequences Cauchy's General Principle of Convergence	3	To identify the Cauchy sequences principles and solve problems	Group Discussion	Slip Test
IV	**Series of Positive Terms**					
	1	Series- Definition& Examples Series- Examples	3	Explain the primary concepts of series of real numbers	Lecture with PPT Illustration	Evaluation through discussions.
	2	Theorems based on series Cauchy's General Principle of Convergence in series	3	To understand the theorems based on Cauchy's General	Lecture and group discussion	Evaluation through Assignment
	3	Comparison Test	3	To know about	Lecture with	Formative

		Alternative form of Comparison Test Theorems based on Comparison Test		Comparison Test Alternative form of Comparison Test Theorems	Illustration	Assessment Test
	4	Problems based on Harmonic Series Problems based on	3	To solve the Problems based on Harmonic Series Problems based on Comparison	Lecture with Illustration	Slip Test
V		**Test of Convergence of series**				
	1	Test of Convergence of series-Kummer's test Kummer's test Theorem Problems based on Kummer's test	3	Explain the Test of Convergence of series using Kummer's test	Lecture with PPT Illustration	Evaluation through discussions.
	2	D'Alembert's ratio Test Problems based on D'Alembert's ratio Test	3	To understand D'Alembert's ratio Test Problems based on D'Alembert's	Lecture with Illustration	Formative Assessment test
	3	Raabe's Test Problems based on Raabe's Test	3	To calculate Problems based on Raabe's Test	Lecture with Illustration	Slip Test
	4	Root Test Problems based on Root Test	2	To differentiate Raabe's Test and Root Test	Lecture with PPT Illustration	Home Assignment
	5	Cauchy's Condensation Test, Problems based on Cauchy's Condensation Test	1	To solve the Problems based on Cauchy's Condensation Test .	Lecture with Illustration	Quiz and Test

Course Instructor (Aided): Ms.J.C.Mahizha   HOD(Aided) :Dr. V. M. Arul Flower Mary Course
Instructor(S.F): Ms. S. Kavitha   HOD(S.F) :Ms. Anne Mary Leema

Semester	: III		**Allied III**
Name of the Course	: **Probability Theory and Distributions**		
Subject code	: **MA1731**		

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

Course Outcomes

CO	Upon completion of this course the students will be able to :	PSO	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-2,PSO-3		Ap
CO -6	Choose the suitable probability distribution corresponding to a given data			PSO-4,PSO-5		E
Co-7	Test the validity of a given data			PSO-4,PSO-5		E

Teaching Plan

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

Unit	Module	Topics	Lecture	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 variables, their types and related	Lecture with Illustration	Short Test
	2	Example and Theorems based on Events, Problems based on events	3	To recall the definition of probability and to apply the techniques to prove the properties of probability and related	Lecture with Illustration	Test
	3	Conditional probability, Problems based on	3	To recall the definition of probability and apply the techniques to prove the properties of probability and related	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	Lecture with Illustration	Formative Assessment Test
	5	Bayers theorem and Problems based on Bayers 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	Group Discussion	Quiz and Test

				requirement, and to understand the definition of random variables, their types and related concepts		
	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	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, Examples of Moment Generating Function, Problems based on Moment Generating	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 probability and	Lecture with PPT Illustration	Quiz and Test
	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	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	Lecture with Illustration	Test
	4	Theorem based on poission distribution, Problems based on poission distribution, Mode,mgf of poission 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,	Group Discussion	Short Test
	5	Theorems based on	3	To apply the techniques to	Lecture with	Test

		Mode,mgf of poission distribution, fitting of poission distribution and problems		prove the properties of probability and related distributions and to detect the different probability distributions which are widely used	Illustration	
IV	**Binomial Distribution**					
	1	Introduction Definition, Moments of binomial	3	To recall the definition of probability and set functions and to understand the definition of random variables, their types	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	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 probability and related	Group Discussion	Short Test
	4	Fitting of binomial distribution, examples, Problems based on fitting of binomial	3	To detect the different probability distributions which are widely used and to apply the techniques to prove the properties of probability and related	Lecture with Illustration	Test
V	**Normal Distribution**					
	1	Definition , m .g. f 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	Lecture with Illustration	Test
	2	Standard normal variate , mode, Median ,m.g.f about mean of normal distribution, Theorems based	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	3	To recall the definition of probability and set	Lecture with Illustration	Formative Assessment

		distribution, Area property of normal distribution, Problems based on area of normal distribution		functions and to understand the definition of random variables, their types and related concepts and to apply the techniques to prove the properties of probability and related distributions	**Major Core V**	Test
	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	Lecture with Illustration	Test

Course Instructor (Aided): Ms.Jancy Vini   HOD(Aided) :Dr. V. M. Arul Flower Mary Course
Instructor(S.F): Ms. V. Mara Narghese   HOD(S.F) :Ms. Anne Mary Leema

Semester : **IV**
Name of the Course : **Groups and Rings**
Subject code : **MC1741**
Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/ evaluation
I	**Groups.**					
	1.	Definition and examples on Groups	4	To understand the definition of groups	Lecture with Illustration	Evaluation through test
	2.	Definition and examples on Permutation Groups	3	To understand the definition permutation groups	Lecture	Q&A
	3.	Definition of cycle and theorem based on cycles	3	To understand the definition of cycle and theorem	Lecture with	Open Book Assignment
	4.	Theorems on even and odd permutations	2	To understand and apply this theorem in various problems	Lecture with Illustration	Quiz
	5.	Definition examples, theorems and problems of sub	3	To understand the definition and theorems of sub groups	Lecture with Illustration	Group Discussion
	6.	Theorems on cyclic groups and problems based on cyclic groups	2	To learn the concepts of cyclic groups	Lecture with Illustration	Q&A
II	**Order of an element and Normal Sub Groups**					
	1.	Definition and Theorems on order of an	2	To understand the definition and theorems on order of	Lecture with Illustration	Test
	2.	Problems on order of an element	2	To apply the concept of order of an element in problems	Lecture	Open book assignment

		3.	Definition of Cosets and problems on cosets	3	To understand the definition of cosets and problems	Lecture	Q&A
		4.	Lagrange's Theorem, Euler's Theorem, Fermats theorem	3	To learn Lagrange's Theorem, Euler's Theorem, Fermats	Lecture	Formative Assessment Test
		5.	Normal subgroups - Definition and Examples	2	To know the definition of Normal subgroups	Group Discussion	Q&A
		6.	Problems and theorems on Normal Subgroups	2	To apply the Normal subgroups concept in problems	Lecture with Illustration	Slip Test
III	Isomorphism						
		1.	Definition, theorems and Examples of Isomorphism	4	To understand the definition and theorems based on	Lecture with Illustration	Quiz

	2.	Cayley's Theorem and Theorem on Automorphism and generators	3	To learn the Cayley's theorem and understand the concept of Automorphism and	Lecture	SipTest
	3.	Definition of Homomorphism	2	To learn the definition of Homomorphism and Examples	Lecture	Test
	4.	Fundamental Theorem of Homomorphism	3	To study the Fundamental Theorem	Lecture	Q&A
	5.	Problems on Kernel	3	To apply Kernel concept in problems	Group Discussion	Brain Storming
IV	**Rings**					
	1.	Definition, Elementary properties and examples of Rings	3	To learn the definition of rings	Lecture with	Quiz
	2.	Problems based on Isomorphism of Rings	3	To get the idea of Isomorphism of Rings	Lecture and group	Test
	3.	Types of Rings and Theorems	2	To identify the Types of Rings	Lecture with Illustration	Test
	4.	Examples of Skew fields and Theorems based on Skew fields	2	To apply Skew fields ideain problems	Lecture with	Formative Assessment Test
	5.	Definition and Theorems on integral Domains	1	To know aboutintegral Domains	Lecture with	Assignment
	6.	Characteristic of a Ring	1	To interpret the Characteristic of a Ring	Lecture with Illustration	Quiz and Test
V	**Sub Rings**					
	1.	Definition and Examples of Sub Rings	2	To get the knowledge of sub rings	Lecture with Illustration	Test
	2.	Problems and Theorems on Sub Rings	1	To develop the proof technique and solve problems.	Lecture with Illustration	Q&A
	3.	Definition, Theorems and Examples on ideals	3	To utilize the concept of ideals in examples	Lecture with	Open Book Assignment
	4.	Ordered integral Domains	3	To understand the Ordered integral	Lecture with Illustration	Assignment
	5.	Maximal and Prime Ideals	2	To know about Maximal and Prime Ideals	Lecture with Illustration	Quiz and Test
	6.	Homomorphism of Rings	2	To learn the definition of	Lecture	Assignment

					Homomorphism of Rings	with	
	7.	Unique factorization Domain	2		To understand and analyze about Unique factorization	Lecture with Illustration	Quiz and Test

Course Instructor(Aided): Dr. K. Jeya Daisy Flower Mary   HOD(Aided) :Dr. V. M. Arul

Course Instructor(S.F): Ms. R.N. Rajalekshmi   HOD(S.F) :Ms. J. Anne Mary Leema

Major Core VI

Semester   : **IV**
Name of the Course   : **Analytical Geometry - 3 Dimensions**
Subject code   : **MC1742**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/ evaluation
I		**Direction cosines of a line**				
	1.	Introduction and definition of distance between points and angle between two lines.	2	To understand the concept of distance between points and angle	Lecture	Test
	2.	Definition and problems related to Projection on a line, Direction cosines of a	3	To understand the projection on a line and direction cosines of a line	Lecture with illustrations	Group Discussion
	3.	Definition of direction ratios and projection of the line joining two points.	3	To analyze the equations of two skew lines in a simplified form	Lecture	Test
	4.	Definition and Theorems related to direction cosines of the line joining the	2	Acquire the knowledge about direction cosines of the line joining the	Lecture	Test
	5.	Definition and problems based on conditions for perpendicularity and parallelism.	2	To practice various problems related to conditions for	Lecture with group discussion	Group discussion
II		**The Plane**				
	1.	Definition and problems based on Equation of a plane in different forms,Intercept form	3	To understand the concepts Equation of a plane in different forms	Lecture	Test
	2.	Definition and problems related to Angle between the planes ,The ratio in which the plane	3	To understand the definition of the ratio in which the plane divides the line joining the points	Lecture	Q&A
	3.	Definition and problems on a plane	3	To practice various problems	Lecture	Formative Assessment

						Test
		of intersection of two given planes		plane through the line of intersection of two given planes		
	4.	Problems based on length of perpendicular , Planes bisecting the angle between two planes.	3	Acquire the knowledge about the planes bisecting the angle between	Lecture with illustrations	Test
III		**The Straight Line**				
	1.	Definition and methods of finding equation of a line in different forms	3	To understand the methods of finding equation of a line in	Lecture	Quiz
	2.	Problems based on the plane and the straight line	3	To compare the plane and the straight line	Lecture with	Test
	3.	Definition and problems Angle between the lines image of a line	3	To Know the concept of Angle between the lines	Lecture with group	Brain storming
	4.	Problems based on CoP planarity of two lines	3	Acquire the knowledge about Co-planarity of two	Lecture with ppt	Assignment
IV		**Shortest distance between two lines**				
	1.	Introduction and definition of Shortest distance between two lines	2	To understand the Shortest distance between two lines	Lecture with illustration	Quiz
	2.	Problems based on The equations of two skew lines in a simplified form	4	To analyze the equations of two skew lines in a simplified form	Lecture	Q&A
	3.	Definitions and Problems based on Intersection of three planes	3	Acquire the knowledge about Intersection of three	Lecture	Slip Test
	4.	Theorem and problems based on volume of a	3	To practice various problems related to volume	Lecture	Formative Assessment Test
V		**The Sphere**				
	1.	Introduction and Illustrations based on equation of the sphere in its general form	3	To Understand the sphere in its general form	Lecture with	Quiz
	2.	Theorem and problems on determination of the centre and radius of a sphere	2	To determine the centre and radius of a sphere	Lecture	Test
	3.	The length of the	2	To know The length of the	Lecture	Slip Test

		tangent from the point to the sphere		tangent from the point to the sphere		
	4.	Problems related to Section of sphere by a plane	3	To practice various problems related to Section of sphere by a plane	Lecture	Assignment
	5.	Definition of Intersection of two spheres and tangent plane.	2	Acquire the knowledge about Intersection of two spheres and tangent plane.	Lecture with	Formative Assessment Test

Course Instructor(Aided)::Dr.L.Jesmalar   HOD(Aided):Dr. V. M. Arul Flower Mary
Course Course Instructor(S.F): Ms. V.G. Michael Florence   HOD(S.F) :Ms. J.Anne Mary Leema

Semester   : **IV**   **Allied**
Name of the   : **Applied**
Course Subject   **Statistics :**
code   **MA1741**

Unit	Modules	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
I		**Correlation**				
	1	Definitions and examples of correlation, Properties of correlation coefficient, Problems based on correlation	5	To Recall the definitions of correlation, Properties of correlation coefficient	Lecture	Quiz
	2	Definition of Rank correlation and proving Spearman's formula, Calculating Rank	3	To analyze Rank correlation and to solve the problems.	Lecture	Assignment
	3	Definition and results based on regression, Problems on regression	2	To solve the problems on regression	Lecture	Test
	4	Equation of regression lines	1	Apply regression lines in real life problems	Lecture with group discussion	Test
	5	Angle between the regression lines.	1	To Learn the Angle between the regression lines.	Lecture	Assignment
II		**Test of significance**				
	1	Introduction on test of significance, Sampling and its types, Definition on Sampling distribution and examples, Standard error for some sampling distributions	3	To solve problems related to test of significance	Lecture with group discussion	Test
	2	Testing of hypothesis and	3	To testing of hypothesis	Lecture	Quiz

		errors in testing of hypothesis, critical values for different levels of significance, Procedure for testing of				
	3	Explanation and Problems of test of significance for single proportions	3	To solve problems related to single	Lecture	Formative Assessment
	4	Probable limits , Test of significance for difference of proportions	2	To solve problems related to Probable limits	Lecture	Test
	5	Problems on test of significance for difference of proportions	1	To solve problems related to difference	Lecture with group	Test
III	**Test of significance for means**					
	1	Test of significance for single mean if the standard deviation is known, Problems based on confidence limits for population mean, Problems based on test of significance of means.	4	To Learn some methods to solve the Problems based on confidence limits for population mean and Problems based on test of significance	Lecture	Test
	2	Problems based on test of significance for difference of sample means, Test of significance for single standard deviation	2	To Learn some methods to solve the problems of test of significance for difference of sample means and single	Lecture	Test
	3	Test of significance for equality of standard deviations of a normal population.	2	To learn normal population	Lecture	Test
	4	Problems based on test of significance for standard deviation	2	To test the significance for standard deviation	Lecture	Test
	5	Problems based on test of significance for correlation coefficient	3	To test the significance for correlation	Lecture	Test
IV	**Test of significance for small samples**					
	1	Distinguish large and small samples, Test of significance based on t-distribution, Test for the difference between the mean of a sample and that of a	3	To test the significance based on t-distribution, and the difference between the mean of a sample and that of	Lecture with group	Quiz
	2	Test for the difference between	2	To solve problems	Lecture	Assignment

		the means of two samples, Confidence limits for population mean		related Confidence limits		
	3	Problems based on confidence limits for population mean, Test of significance based on F-test	2	To learn the test of significance based on Fs test	Lecture	Assignment
	4	Problems on test of significance based on F-test.	2	To solve problems on test of significance based on F-test.	Lecture	Formative Assessment
	5	Test of significance of an observed sample correlation, Problems on test of significance of an observed sample correlation.	2	To solve problems related to observed sample correlation.	Lecture	Assignment
V		**Test based on χ^2-distribution**				
	1	Introduction on test based on χ^2, distribution- χ^2 − test for population	3	To Solve the problems related to χ^2 − test for population	Lecture	Quiz
	2	χ^2 − test to test the goodness of fit	2	To test the goodness of fit for χ^2 − test.	Lecture	Test
	3	Result on χ^2 − test to test the goodness of fit.	2	To learn the Result on χ^2 − test to test the goodness of fit.	Lecture	Formative Assessment
	4	Fit a Poisson distribution for the given data and to test the goodness of fit.	3	To analyze a Poisson distribution.	Lecture	Test
	5	Theorem based on the test for independence of attributes, Yate's Correction.	2	To solve the Problems based on independence of attributes.	Lecture	Assignment

Course Instructor(Aided): A. Jancy Vini Course Instructor(S.F): Dr. C. Jenila

HOD(Aided) :Dr. V. M. Arul Flower Mary
HOD(S.F) :Ms. J. Anne Mary Leema

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	**Ector 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

| | 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

Unit	Module	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/ evaluation
		Develop the ability to reflect on problems that are quite significant in the field of real analysis			PSO-8	Ap

CO- 6 Develop the ability to reflect on problems that are quite significant in the field of real analysis — PSO-8 — Ap

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 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 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 HoD(Aided): Dr. V.M. Arul Flower Mary
Course Instructor (S.F): Ms. V. Mara Narghese 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 usingTrapezoidal 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	Sole 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	Sole the differential	4	To understand Picard'smethod	Lecture with	Quiz through

					Illustration	Quizizz
	4	More problems on Picard'smethod	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 Jeyanthy   HoD(Aided): Ms. J. Anne

Mary Leema

Teaching Plan (2019-2020)
Semester - VI

Name oftheCourse : Complex Analysis
Subjectcode   : MC1761

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

Objectives

1. To introduce the basic concepts of differentiation and integration of complex functions.
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 geometric representation of complex numbers	PSO- 1	U
CO- 2	use differentiation rules to compute derivatives and express complex-differentiable functions as power series	PSO- 4	E
CO- 3	compute line integrals by using Cauchy's integral theorem and formula	PSO-3	E
CO -4	identify the isolated singularities of a function and determine whether they are removable, poles or essential	PSO-1	U
CO- 5	evaluate definite integrals by using residues theorem	PSO-8	E

Unit	Module	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/ evaluation
I	1	Complex numbers – conjugation and modulus	5	To prove $\mathbb{C}$ is a field and some inequalities	Lecture	Assignment
	2	Geometrical representation of complex numbers and n^{th} roots of complex numbers	5	To find magnitude, argument and n^{th} roots of complex numbers	Lecture, Group discussion	Test
	3	Circles and straight lines – general equations and problems	4	To obtain necessary and sufficient condition for the concept inverse points and reflection points	Lecture	Quiz
	4	Regions in the complex plane - definitions and examples	2	To identify regions in $\mathbb{C}$	Lecture with PPT	Assignment
	5	The extended complex plane - definition and problems	2	To determine the point on the sphere that represents the complex plane	Lecture	Test
II	1	Differentiability – definitions and theorems	3	To analyse basic properties of differentiability	Lecture	Assignment
	2	Cauchy Riemann equations – theorems and examples, Alternate forms of C.R equations – theorems and	7	To get necessary & sufficient condition for differentiability	Lecture	Formative Assessment

		problems				
	3	Analytic functions – definition and problems	5	To discuss some properties of analytic function	Lecture	Test
	4	Harmonic functions – definitions, theorems and problems	7	To find analytic functions	Lecture with group discussion	Assignment
	5	Bilinear transformations – elementary transformation and cross ratio	7	To determine the image of given region under bilinear transformation	Lecture with PPT	Test
III	1	Definite integral – definitions, theorems and examples	4	To evaluate definite integral	Lecture	Assignment
	2	Cauchy's theorem – definition and theorems	5	To prove Cauchy's theorems	Lecture	Test
	3	Cauchy's integral formula – theorems and problems	5	To evaluate integrals	Lecture with group discussion	Test
IV	1	Taylor's series-	5	To expand given function as Taylor's series	Lecture	Assignment

					with group discussion	
	2	Laurent's Series – Laurent's theorem and problems	5	To expand given function as Laurent's series	Lecture	Formative Assessment
	3	Zeros of analytic functions – definition and problems	3	To determine zeros of analytic functions	Lecture	Assignment
	4	Singularities – definitions and examples	2	To find singularity of a given function	Lecture	Test
V	1	Residues –definition, lemmas and problems	5	To find residue of a given function	Lecture	Test
	2	Cauchy's residue theorem – theorems and examples	4	To evaluate given definite integrals	Lecture	Test
	3	Evaluation of definite integrals – method and problems	5	To evaluate given definite integrals	Lecture	Formative Assessment

Course Instructor (Aided): Dr. M. K. Angel Jebitha   HoD (Aided): Dr. V.M. Arul Flower
Mary Course Instructor (S.F): Ms. V. Pincy Kala   HoD (Aided): Ms. J. Anne Mary Leema

Semester V
Major Core VII- Linear Algebra
Course Code: MC2051

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

Objectives:
1. To introduce the algebraic system of Vector Spaces, inner product spaces.
2. To use the related study in various physical applications.

Course Outcomes

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 the 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

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I	**Vector spaces**					
	1.	Vector spaces - Definition	4	To understand Vector spaces and their Definition	Lecture Illustration	Evaluation through slip test
	2.	Vector spaces - Examples	4	To giveexamples of vector spaces on different fields.	Lecture Illustration	quiz, test
	3.	Subspaces	5	To prove many theorems related to subspaces and derive some examples.	Lecture Illustration	Evaluation through slip test
	4.	Linear transformation.	5	To determine linear transformations and study their properties and types.	Lecture Illustration	Class test
II	**The span of a Set**					
	1	Span of a Set	3	To understand about Span of a Set	Lecture Illustration	Home Assignment
	2	Linear Independence	4	To identify the Linear Independence and dependence of a set	Lecture Illustration	Evaluation through slip test
	3	Basis and Dimension	3	To calculate the Basis and Dimension of a given set	Lecture Illustration	Formative Assessment
	4	Rank and Nullity	4	To find the rank and nullity of a given set	Lecture Illustration	Online Quiz, Test
	5	Matrixof a Linear Transformation	4	To calculate the Matrixof a Linear Transformation	Lecture Illustration	Home Assignment
III	**Cayley-Hamilton Theorem**					

	1	Characteristic Equation	4	To understand basic concepts ofCharacteristic Equation	Lecture Illustration	Slip Test
	2	Cayley-Hamilton Theorem	5	To analyze the Cayley-Hamilton Theorem for matrix	Lecture Illustration	Online quiz
	3	Eigenvalues and Eigen vectors	5	To determine the Eigen values and Eigenvectors of the matrix	Lecture Illustration	Online Assignment
	4	Properties of Eigenvalues.	4	To study the Properties of Eigenvalues.	Lecture Illustration	SlipTest
IV	**Inner Product Spaces**					
	1	Inner Product Spaces - Definition	4	To understand the definition of inner product space	Lecture Illustration	Slip Test
	2	Inner Product Spaces - examples	4	To verify examples of Inner Product Spaces	Lecture Illustration	Home Assignment
	3	Orthogonality	5	To study theorthogonalitycondition and related theorems	Lecture Illustration	quiz
	4	Orthogonal complement	5	To study the Orthogonal complement and related theorems	Lecture Illustration	Formative Test, Online Quiz
V	**Bilinear forms**					
	1	Bilinear forms	3	To understand the Bilinear forms	Lecture Illustration	Class Test
	2	Quadratic forms	3	To understand the Quadratic forms	Lecture Illustration	Formative assessment
	3	Reduction of a quadratic form to the diagonal form	3	To derive the Reduction of a quadratic form to the diagonal form	Lecture Illustration	Online Quiz
	4	Partially ordered set-Lattices	3	To learn the Partially ordered set-Lattices	Lecture Illustration	Online Assignment
	5	Distributive Lattices-Modular Lattices-	3	To find the distributive Lattices-Modular Lattices	LectureIllustration	Class test

	6	Boolean Algebra.	3	To learn the Boolean Algebra	Lecture Illustration	Slip test

Course Instructor: Ms. J.C. Mahizha   HoD: Dr.T. Sheeba Helen

Course Instructor: Ms.Anne Mary Leema   HoD(SF): Dr.S.Kavitha

Semester   : V   **Major Core VIII**

Name of the Course :Real Analysis II

CourseCode   : MC2052

No. of hours per week	Credit	Total No. of hours	Mar ks
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 conceptsBounded 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 understandabout 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 andBaire'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 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 R	3	To learn the conceptConnected subsets	Lecture with Illustration	Evaluation through appreciative inquiry
	3	Connectedness and	3	To understandthe	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   **HoD:Dr. T.Sheeba Helen**
Course Instructor S.F: Ms. Monisha   **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

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/evaluation
		develop the ability to solve problems in graph theory				

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 basedon weightedgraphs - Chinese Post-man Problem - Travelling Sales-man 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 – Euleriandigraphs -**					

	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 understandabout 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   **HoD(Aided): Dr. T. Sheeba Helen**
Course Instructor (S.F): Dr. G. JovitVinishMelma   **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 differentiatedecision 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 programms	Slip test
	4	The WHILE Statement and The DO Statement	3	To express WHILE Statement and DO Statement in programmes	Lecture with Small programms	Formative Assessment Test
	5	The FOR Statement.	3	To express GOTO statement in programmes	Lecture with Small programms	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 andBackward 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 programsin 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 programsin 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 understandnumericalsolution 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 **HoD:Dr. T.Sheeba Helen**
Course Instructor: Ms. Princykala **HoD(SF): Dr.S.Kavitha**