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/evaluation
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

				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

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

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

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