FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Humanities & Sciences

F.E. (Batch A) (semester I) (2019-2020)

Lesson Plan

Subject: Applied Mathematics I (FEC101)

Credits-4

Syllabus:

Module No	Topic	Hours Planned
01	Complex Numbers Pre-requisite: Review of Complex Numbers-Algebra of Complex Number, Cartesian, polar and exponential form of complex number 1.1. Statement of D'Moivre's Theorem. 1.2. Expansion of sinn θ, cosnθ in terms of sines and cosines of multiples of θ and Expansion of sinnθ, cosnθ in powers of sinθ, cosθ 1.3. Powers and Roots of complex number.	 **2** **2** **2**
02	Hyperbolic function and Logarithm of Complex Numbers 2.1. Circular functions of complex number and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic functions. Separation of real and imaginary parts of all types of Functions. 2.2 Logarithmic functions, Separation of real and Imaginary parts of Logarithmic Functions. # Self learning topics: Applications of complex number in Signal processing,	 **3** **3**

	Electrical circuits	
03	Partial Differentiation 3.1 Partial Differentiation: Function of several variables, Partial derivatives of first and higher order. Differentiation of composite function. 3.2.Euler's Theorem on Homogeneous functions with two independent variables (with proof). Deductions from Euler's Theorem. # Self learning topics: Total differentials, implicit functions, Euler's Theorem on Homogeneous functions with three independent variables.	**3** **3**
04	Applications of Partial Differentiation and Successive differentiation. 4.1 Maxima and Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint. 4.2 Successive differentiation: nth derivative of standard functions. Leibnitz's Theorem (without proof) and problems # Self learning topics: Jacobian's of two and three independent variables (simple problems)	**3** **3**
05	Matrices Pre-requisite: Inverse of a matrix, addition, multiplication and transpose of a matrix 5.1.Types of Matrices (symmetric, skew- symmetric, Hermitian, Skew Hermitian, Unitary, Orthogonal Matrices and properties of Matrices). Rank of a Matrix using Echelon forms, reduction to normal form and PAQ form. 5.2.System of homogeneous and non –homogeneous equations, their consistency and solutions. # Self learning topics: Application of inverse of a matrix to coding theory.	**4** **2**
06	Numerical Solutions of Transcendental Equations and System of Linear Equations and Expansion of Function. . 6.1 Solution of Transcendental Equations: Solution by Newton Raphson	**2**

	method and Regula –Falsi. . 6.2 Solution of system of linear algebraic equations, by (1) Gauss Jacobi Iteration Method, (2) Gauss Seidal Iteration Method. . 6.3 Taylor's Theorem (Statement only) and Taylor's series, Maclaurin's series (Statement only).Expansion of $e^{\square}$ sin(x), cos(x), tan(x), sinh(x), cosh(x), tanh(x), log(1+x), (x) , (x) , (x) . # Self learning topics: Indeterminate forms, L- Hospital Rule, Gauss Elimination Method, Gauss Jordan Method.	**2** **2**

Course Outcomes:

Upon completion of this course students will be able to:

FEC101.1 Use the concept of rank of matrix to solve the given system of homogeneous and non-homogeneouslinear equations.

FEC101.2 Apply Numerical Methods to solve the given system of equations.

FEC101.3 Understand the basics of Complex numbers, obtain roots of complex numbers using De Moivre's theorem and also real and imaginary parts of a given complex number.

FEC101.4 Use partial differentiation to obtain the extremum value of the given function of two or three variables

FEC101.5 Find the nth derivative of a given function using Leibnitz's theorem [Successive differen.]

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
FEC101.1	3											
FEC101.2	3											
FEC101.3	2											
FEC101.4	2											
FEC101.5	2											
TOTAL												
CO-PO MATRIX												

Justification

PO1: COs are mapped to this PO1 because the students gain basic knowledge on mathematical concepts required for higher semesters (mathematics and technical application)

CO Assessment Tools:

	Direct Methods										Indirect Methods
	T-1	**T-2**	**T-3**	**T-4**	**T-5**	**T-6**	**SCILAB**	**TEST 1**	**TEST 2**	**Uni. Exam**	**Course Exit Survey**
CO1	20%	20%						30%		30%	100%
CO2			20%				20%	30%		30%	100%
CO3				20%	20%				30%	30%	100%
CO4						40%			30%	30%	100%
CO5									70%	30%	100%

Upon completion of this course students will be able to:

CO	CO Statement	CO Target	Target Range
CO 1	Use the concept of rank of matrix to solve the given system of homogeneous and non-homogeneous linear equations	60% Students Scoring 60% of Marks	2.5
CO2	Apply Numerical Methods to solve the given system of equations.	60% Students Scoring 60% of Marks	2.5
CO3	Understand the basics of Complex numbers, obtain roots of complex numbers using De Moivre's theorem and also real and imaginary parts of a given complex number.	60% Students Scoring 60% of Marks	2.1
CO4	Use partial differentiation to obtain the extreme value of the given function of two or three variables	60% Students Scoring 60% of Marks	2.4

CO5	Find the nth derivative of a given function using Leibnitz's theorem [Successive differen.]	60% Students Scoring 60% of Marks	2.4

Lecture Plan : SEMI- FEC101

Lect No	Topic Planned	Planned Date	Actual Date	Mapped with CO	Content Delivery Method
1	Introduction to the matrices	13/8/19	13/8/19	CO1	Black board teaching
2	Types of Matrices	14/8/19	14/8/19	CO1	
3	Properties of Matrices	16/8/19	16/8/19	CO1	
4	Rank of the Matrix	19/8/19	21/8/19	CO1	
5	find Rank of the Matrix & examples on that	21/8/19	22/8/19	CO1	
6	solving system of equations homogeneous equ	22/8/19	23/8/19	CO1	
7	System of non homogeneous Equation	23/8/19	27/8/19	CO1	
8	Examples on above	27/8/19	28/8/19	CO1	
9	Examples on above	28/8/19	30/8/19	CO1	
10	**Normal form of the Matrix**	30/8/19	11/9/19	CO1	
11	Jacobi Iteration Method	11/9/19	13/9/19	CO2	
12	Gauss Seidel Method	13/9/19	17/9/19	CO2	
13	Introduction to complex numbers	17/9/19	18/9/19	CO3	
14	examples on initial concept	18/9/19	20/9/19	CO3	
15	Revise De Movire's theorem	20/9/19	24/9/19	CO3	
16	Find nth roots of a number	24/9/19	25/9/19	CO3	
17	Find roots of the equation	25/9/19	27/9/19	CO3	
18	Expres powers into multiples	27/9/19	1/10/19	CO3	
19	Express multiples into powers	27/9/19	7/10/19	CO3	
20	Hyperbolic functions	1/10/19	9/10/19	CO3	
21	Inverse Hyperbolic Functions	4/10/19	10/10/19	CO3	
22	Find real and imaginary parts	9/10/19	10/10/19	CO3	
23	Examples on above	11/10/19	11/10/19	CO3	
24	Logarithem of complex	15/10/19	14/10/19	CO3	
25	More problems on above	16/10/19	15/10/19	CO3	
26	Introduction to partial Differentiation	18/10/19	16/10/19	CO4	
27	examples on initial concept of partial	22/10/19	17/10/19	CO4	
28	examples on chain rule	23/10/19	18/10/19	CO4	

29	examples on chain rule	25/10/19	19/10/19	CO4	
30	Euler's theorem	29/10/19	22/10/19	CO4	
31	Euler's theorem	30/10/19	23/10/19	CO4	
32	Maxima and Minima	1/11/19	24/10/19	CO4	
33	examples on above		25/10/19	CO4	
34	Succesive Differentiation		30/10/19	CO5	
35	Problems on above (initial rules and formulae)		31/10/19	CO5	
36	Examples on above		1/11/19	CO5	
37	Leibnitz's Rule		4/11/19	CO5	
38	Examples on above		5/11/19	CO5	
39	Expansions				

	AppliedMathematics 1
	List of Tutorials
Sr. No	
1.	Types and Properties of Matrices
2.	Solving system of Equations
3.	Numerival methods to solve system of equations
4.	De Movire's theorem & hyperbolic functions
5.	Inverse, logarithmic functions , separation
6.	Partial Differentiation
7.	Successive Differentiation

TUTORIAL PLAN

	DIVISION -A			
	SEMESTER- I			
Tut. No	**Topic Planned**	**Planned Date**	**Actual Date**	**Mapped with CO**
	BATCH-A			
1	Types and Properties of Matrices	27/8/19 30/8/19	27/8/19 30/8/19	CO1

2	Solving system of Equations	13/9/19 17/9/19	13/9/19 17/9/19	CO1
3	Numerival methods to solve system of equations	20/9/19 24/9/19	20/9/19 24/9/19	CO2
4	De Movire's theorem & hyperbolic functions	279/19 1/10/19	1/10/19	CO3
5	Inverse, logarithmic functions , separation	11/10/19 15/10/19	11/10/19	CO3
6	Partial Differentiation	18/10/19 22/10/19	22/10/19	CO4
	BATCH-B			
1	Types and Properties of Matrices	28/8/19 29/8/19	28/8/19 29/8/19	CO1
2	Solving system of Equations	11/9/19 18/9/19	11/9/19 18/9/19	CO1
3	Numerival methods to solve system of equations	19/9/19 25/9/19	19/9/19 25/9/19	CO2
4	De Movire's theorem & hyperbolic functions	26/9/19 3/9/19	31/9/19	CO3
5	Inverse, logarithmic functions , separation	9/10/19 10/10/19	9/10/19	CO3
6	Partial Differentiation	16/10/19 17/10/19	17/9/19	CO4
	BATCH-C			

1	Types and Properties of Matrices	26/8/19 27/8/19	26/8/19 27/8/19	CO1
2	Solving system of Equations	9/9/19 16/9/19	9/9/19 16/9/19	CO1
3	Numerival methods to solve system of equations	17/9/19 23/9/19	17/9/19 23/9/19	CO2
4	De Movire's theorem & hyperbolic functions	24/9/19 30/9/19	30/9/19	CO3
5	Inverse, logarithmic functions , separation	1/10/19 7/10/19	7/10/19	CO3
6	Partial Differentiation	14/10/19 15/10/19	15/10/19	CO4