

FR. Conceicao Rodrigues College Of Engineering

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

Department of Humanities & Sciences

F.E. (Batch A) (semester I) (2020-2021)

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.	2
	1.2. Expansion of $\sin n\theta$, $\cos n\theta$ in terms of sines and cosines of multiples of θ and	2
	Expansion of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$	2
	1.3. Powers and Roots of complex number.	
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.	3
	2.2 Logarithmic functions, Separation of real and Imaginary parts of Logarithmic Functions.	3
	# Self learning topics: Applications of complex number in Signal processing, Electrical circuits	

03	<p>Partial Differentiation</p> <p>3.1 Partial Differentiation: Function of several variables, Partial derivatives of first and higher order. Differentiation of composite function.</p> <p>3.2. Euler's Theorem on Homogeneous functions with two independent variables (with proof). Deductions from Euler's Theorem.</p> <p># Self learning topics: Total differentials, implicit functions, Euler's Theorem on Homogeneous functions with three independent variables.</p>	<p>3</p> <p>3</p>
04	<p>Applications of Partial Differentiation and Successive differentiation.</p> <p>4.1 Maxima and Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint.</p> <p>4.2 Successive differentiation: nth derivative of standard functions. Leibnitz's Theorem (without proof) and problems</p> <p># Self learning topics: Jacobian's of two and three independent variables (simple problems)</p>	<p>3</p> <p>3</p>
05	<p>Matrices Pre-requisite: Inverse of a matrix, addition, multiplication and transpose of a matrix</p> <p>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.</p>	<p>4</p> <p>2</p>
06	<p>Numerical Solutions of Transcendental Equations and System of Linear Equations and Expansion of Function.</p> <p>. 6.1 Solution of Transcendental Equations: Solution by Newton Raphson</p>	<p>2</p>

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

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-homogeneous linear equations.
- FEC101.2** 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.
- FEC101.3** Use partial differentiation to obtain the extremum value of the given function of two or three variables
- FEC101.4** 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	PO1 0	PO1 1	PO1 2
FEC101.1	3											
FEC101.2	2											
FEC101.3	3											
FEC101.4	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:

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

Upon completion of this course students will be able to:

CO	CO Statement	CO Target	Target Range
CO1	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	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	2.5
CO3	Use partial differentiation to obtain the extreme value of the given function of two or three variables	60% Students Scoring 60% of Marks	2.5
CO4	Find the nth derivative of a given function using Leibnitz's theorem [Successive differen.]	60% Students Scoring 60% of Marks	2.5

Lecture Plan : SEMI- FEC101

Lect No	Topic Planned	Planned Date	Actual Date	Mapped with CO	Content Delivery Method
1	Introduction to the matrices	20/1/21	20/1/21	CO1	Black board teaching
2	Types of Matrices	21/1/21	21/1/21	CO1	
3	Properties of Matrices	22/1/21	22/1/21	CO1	
4	Rank of the Matrix	25/1/21	25/1/21	CO1	
5	find Rank of the Matrix & examples on that	27/1/21	27/1/21	CO1	
6	solving system of equations homogeneous equ	28/1/21	28/1/21	CO1	
7	System of non homogeneous Equation	29/1/21	29/1/21	CO1	
8	Examples on above	1/2/21	1/2/21	CO1	
9	Normal form of the Matrix	3/2/21	3/2/21	CO1	
10	Introduction to complex numbers	4/2/21	4/2/21	CO2	
11	examples on initial concept	5/2/21	5/2/21	CO2	
12	Revise De Movire's theorem	8/2/21	8/2/21	CO2	
13	Find nth roots of a number	9/2/21	9/2/21	CO2	
14	Find roots of the equation	10/2/21	10/2/21	CO2	
15	Expres powers into multiples	12/2/21	12/2/21	CO2	
16	Express multiples into powers	15/2/21	15/2/21	CO2	
17	Hyperbolic functions	17/2/21	17/2/21	CO2	
18	Inverse Hyperbolic Functions	18/2/21	18/2/21	CO2	
19	Find real and imaginary parts	22/2/21	22/2/21	CO2	
20	Logarithm of complex	24/2/21	24/2/21	CO2	
21	Introduction to partial Differentiation	25/2/21	25/2/21	CO3	
22	examples on initial concept of partial	26/2/21	26/2/21	CO3	
23	examples on chain rule	1/3/21	1/3/21	CO3	
24	examples on chain rule	3/3/21	3/3/21	CO3	
25	Euler's theorem	4/3/21	4/3/21	CO3	
26	Euler's theorem	5/3/21	5/3/21	CO3	
27	Practice on partial differentiation	15/3/21	15/3/21		
28	Maxima and Minima	17/3/21	16/3/21	CO3	
29	examples on above	18/3/21	17/3/21	CO3	
30	Lagranges' multiplier method	19/3/21	18/3/21		
31	Succesive Differentiation	22/3/21	22/3/21	CO4	
32	Problems on above (initial rules and formulae)	24/3/21	23/3/21	CO4	
33	Examples on above	25/3/21	24/3/21	CO4	
34	Leibnitz's Rule	26/3/21	25/3/21	CO4	
35	Mock test on complex numbers	31/3/21	31/3/21	CO4	

	Applied Mathematics 1
	List of Tutorials
Sr. No	
1.	Types and Properties of Matrices
2.	Solving system of Equations
3.	De Movire's theorem & hyperbolic functions
4.	Inverse, logarithmic functions , separation
5.	Partial Differentiation
6.	Successive Differentiation

TUTORIAL PLAN

	DIVISION -A			
	SEMESTER- I			
Tut. No	Topic Planned	Planned Date	Actual Date	Mapped with CO
	BATCH-A, B, C			
1	Types and Properties of Matrices	16/2/21	16/2/21	CO1
2	Solving system of Equations	23/2/21	23/2/21	CO1
3	De Movire's theorem & hyperbolic functions	2/3/21	2/3/21	CO2
4	Inverse, logarithmic functions , separation	16/3/21	19/3/31	CO2
5	Partial Differentiation	23/3/21	26/3/21	CO3
6	Successive Differentiation	30/3/21	30/3/21	CO4

