

FR. Conceicao Rodrigues College Of Engineering

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

Department of Humanities & Sciences

F.E. (Batch B) (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 $\sin(x)$, $\cos(x)$, $\tan(x)$, $\sinh(x)$, $\cosh(x)$, $\tanh(x)$, $\log(1+x)$, $(x)^{-1}$, $(x)^{-2}$, $(x)^{-3}$.	
	# 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

P01: COs are mapped to this P01 because the students gain basic knowledge on mathematical concepts required for higher semesters (mathematics and technical application)

CO Assessment Tools:

	Indirect Methods						TEST 1	TEST 2	Uni. Exam	Course Exit Survey
	T-1	T-2	T-3	T-4	T-5	T-6				
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
CO 1	Use the concept of rank of matrix to solve the given system of homogeneous and non-homogeneous linear equations	70% Students Scoring 70% 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.	70% Students Scoring 70% of Marks	2.5
CO3	Use partial differentiation to obtain the extreme value of the given function of two or three variables	70% Students Scoring 70% of Marks	2.5
CO4	Find the nth derivative of a given function using Leibnitz's theorem [Successive differen.]	70% Students Scoring 70% 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	22/1/21	22/1/21	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	1/2/21	1/2/21	CO1	
7	System of non homogeneous Equation	2/2/21	2/2/21	CO1	
9	Normal form of the Matrix	3/2/21	3/2/21	CO1	
10	examples on Normal form and extra problems	5/2/21	5/2/21	CO1	
10	Introduction to complex numbers	8/2/21	8/2/21	CO2	
11	examples on initial concept	9/2/21	9/2/21	CO2	
12	Revise De Movire's theorem	10/2/21	10/2/21	CO2	
14	Find nth roots of a number	12/2/21	12/2/21	CO2	
15	Find roots of the equation	15/2/21	15/2/21	CO2	
16	Expres powers into multiples	16/2/21	16/2/21	CO2	
17	Express multiples into powers	17/2/21	17/2/21	CO2	
18	Hyperbolic functions	17/2/21	17/2/21	CO2	
19	Inverse Hyperbolic Functions	18/2/21	18/2/21	CO2	
20	Find real and imaginary parts	22/2/21	22/2/21	CO2	
21	Examples on above	24/2/21	24/2/21	CO2	
22	Logarithem of complex	25/2/21	25/2/21	CO2	
23	More problems on above	26/2/21	26/2/21	CO2	
24	Introduction to partial Differentiation	26/2/21	26/2/21	CO3	
25	examples on initial concept of partial	1/3/21	1/3/21	CO3	
26	examples on chain rule	2/3/21	2/3/21	CO3	
27	examples on chain rule	3/3/21	3/3/21	CO3	
28	Euler's theorem	5/3/21	5/3/21	CO3	
29	Euler's theorem	8/3/21	8/3/21	CO3	
30	Maxima and Minima	15/3/21	15/3/21	CO3	
31	examples on above	16/3/21	16/3/21	CO3	
32	Langrange's multiplier method	17/3/21	17/3/21		
33	Examples on above	18/3/21	18/3/21		
32	Succesive Differentiation	22/3/21	22/3/21	CO4	
33	Problems on above (initial rules and formulae)	23/3/21	23/3/21	CO4	
34	Examples on above	24/3/21	24/3/21	CO4	
35	Leibnitz's Rule	26/3/21	26/3/21	CO4	
36	Mock test on complex numbers	30/3/21	30/3/21	CO4	
	Practice on complex numbers	31/3/21	31/3/21	CO2	

	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 -B			
	SEMESTER- I			
Tut. No	Topic Planned	Planned Date	Actual Date	Mapped with CO
	BATCH-A, B, C			
1	Types and Properties of Matrices	18/2/21	18/2/21	CO1
2	Solving system of Equations	25/2/21	25/2/21	CO1
3	De Movire's theorem & hyperbolic functions	4/3/21	4/3/21	CO2
4	Inverse, logarithmic functions , separation	18/3/21	19/3/21	CO2
5	Partial Differentiation	25/3/21	25/3/21	CO3
6	Successive Differentiation	1/4/21	1/4/21	CO4

