

## LESSON PLAN: ENGINEERING MATHEMATICS-II

Discipline: <b>CIVIL ENGINEERING</b>	Semester: <b>2nd</b>	Name of the Teaching Faculty: <b>NAYAN KUMAR PRADHAN</b>
Subject: <b>ENGINEERING MATHEMATICS-II</b>	No. of days/per week class allotted: <b>06</b>	Semester From Date: 29/01/2024 To Date: 14/05/2024  No. of Weeks: 14
<b>Week</b>	<b>Class /Date</b>	<b>Theory</b>
1 <sup>ST</sup>	1st	<b>Chapter-I (Vector Algebra)</b> Introduction of scalar & vector, Representation of vector. Magnitude and direction of a vector, Types of vectors- Null Vector, Unit Vector, Parallel Vector, Negative Vector, Co-initial & Co-terminal Vector, Co-planer Vector and Equal Vector
	2nd	Vector Operation: Triangle law of Vector Addition. Properties of vector addition. Parallelogram law of vector addition. Multiplication of a vector with a scalar.
	3rd	Position vector of a point. Section formula
	4th	Problem practice base on the previous class
	5th	Analytical Problem proof using vector method
	6th	Tutorial
2 <sup>ND</sup>	1st	Component form of vectors: 2D & 3D. addition and scalar multiplication of vectors, magnitude, and unit vector in terms of component form
	2nd	Problem practice base on the previous class
	3rd	Multiplication of vectors: (i)Scalar Product or Dot Product and its properties
	4th	Angle between vectors, scalar and vector projection
	5th	Problem practice base on the previous class
	6th	Tutorial
3 <sup>RD</sup>	1st	(ii)Vector Product or Cross Product and its properties
	2nd	Geometrical meaning of cross product, Angle between vectors
	3rd	Area of triangle and parallelogram
	4th	Prove of some trigonometric Identities using vector method
	5th	Problem practice base on the previous class
	6th	Tutorial
4 <sup>TH</sup>	1st	<b>Chapter-II (Limits and Continuity)</b> Define Relations and Functions. Define Domain & Range Types of Functions: 1.Constant Function, 2.Identity Function
	2nd	3. Absolute Value function, 4. Greatest integer function, 5. Trigonometric functions 6. Exponential function 7. Logarithmic functions
	3rd	Algebraic Functions and Transcendental Functions. Introduction of limits

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	4th	Existence of Limit. Algebra of Limit, indeterminate forms
	5th	Evaluation of Limit: 1.Limit of Algebraic Function a. Limit of polynomial function b. Limit of rational function
	6th	Tutorial
5 <sup>TH</sup>	1st	c. Limit of irrational function
	2nd	2.Limit of Trigonometric function
	3rd	3. Limit of exponential function
	4th	4. Limit of logarithmic function
	5th	5. Limit at infinite
	6th	Tutorial
6 <sup>TH</sup>	1st	Continuity of a function at a point
	2nd	CLASS TEST
	3rd	<b>Chapter-III (Derivatives)</b> Derivative of a function at a point. Derivative of some standard functions using AB-into method such as 1. Constant function, 2. $f(x)=x^2, x^3, x^n$ , 3. $f(x)=e^x$ , 4. $f(x)=a^x$
	4th	5. $f(x)=\log x$ 6, Derivative of all trigonometric functions like $\sin x, \cos x, \tan x, \cot x, \sec x, \operatorname{cosec} x$ , and all inverse trigonometric functions
	5th	Algebra of derivative: Sum, Product and Quotient rules with examples
	6th	Tutorial
7 <sup>TH</sup>	1st	Problem practice base on the previous class
	2nd	Derivative of Composite functions (Use of chain rule)
	3rd	Problem practice base on the previous class
	4th	Method of Differentiations: 1. Parametric functions with examples
	5th	2. Derivative of Implicit functions with examples
	6th	Tutorial
8 <sup>TH</sup>	1st	3. Derivative using logarithmic function with examples
	2nd	4. Derivative of a function w.r.t another functions with examples
	3rd	Problem practice base on the previous class
	4th	Problem practice base on the previous class
	5th	INTERNAL ASSESSMENT
	6th	Tutorial
9 <sup>TH</sup>	1st	Application of Derivative: Successive differentiation up to 2nd order
	2nd	Problem practice base on the previous class
	3rd	Problem practice base on the previous class
	4th	Define partial derivative with some example
	5th	Problem practice base on the previous class
	6th	Tutorial
10 <sup>TH</sup>	1st	Problem practice base on the previous class
	2nd	Problem practice base on the previous class
	3rd	CLASS TEST
	4th	<b>Chapter-IV (Integration)</b> a) Definition of integration as inverse of differentiation b) Integral of standard functions (List of formulas) Algebra of Integrations.
	5th	c)Method of integration: (i) Integration by method of substitutions

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	6th	Tutorial
11 <sup>TH</sup>	1st	ii) Integration by parts with examples
	2nd	Problem practice base on the previous class
	3rd	d)Integration of the following types I. $\int \frac{dx}{x^2+a^2}$ , II. $\int \frac{dx}{x^2-a^2}$ or $\int \frac{dx}{a^2-x^2}$ , III. $\int \frac{dx}{\sqrt{x^2+a^2}}$ with examples
	4th	$\int \frac{dx}{\sqrt{x^2-a^2}}$ , $\int \frac{dx}{\sqrt{a^2-x^2}}$ , $\int \frac{dx}{x\sqrt{x^2-a^2}}$ with examples
	5th	$\int \sqrt{a^2-x^2} dx$ , $\int \sqrt{a^2+x^2} dx$ , $\int \sqrt{x^2-a^2} dx$
	6th	Tutorial
12 <sup>TH</sup>	1st	Problem practice base on the previous class
	2nd	Problem practice base on the previous class
	3rd	Definite integrals and its properties
	4th	Examples
	5th	Problem practice base on the previous class
	6th	Tutorial
13 <sup>TH</sup>	1st	Problem practice base on the previous class
	2nd	<b>Application of integration</b> i) Area enclosed by a curve and X-axis and example
	3rd	ii) Area of a circle with center at origin
	4th	<b>Chapter-V (Differential Equation)</b> Definition of ODE, PDE, a) Order and degree of a differential equation
	5th	Determining Order and degree of a differential equation with examples
	6th	Tutorial
14 <sup>TH</sup>	1st	b) Solution of differential equation Definition I. By method of separation of variable with examples
	2nd	method of separation of variable continues with problem solving
	3rd	Some more problems on separation of variables
	4th	CLASS TEST
	5th	Solving linear equation $\frac{dy}{dx} + Py = Qx$ Where P, Q are functions of x Problems on linear differential equation
	6th	Tutorial

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