

**GOVT. POLYTECHNIC, KORAPUT**  
**LESSON PLAN (ENGG. MATHEMATICS II)**

Discipline: Electrical/Mechanical Engg.	Semester: 2 <sup>nd</sup>	Name of the teaching faculty: D.P Tripathy, Lect. Mathematics
Subject: Engg. Mathematics II Th 3	No. of days/week class allotted: 5+1	Semester from date: 15/3/22 To date: 12/7/22
Week	Class Day	Theory Topics
1 <sup>st</sup>	1 <sup>st</sup>	<b>Chapter 2: LIMITS and CONTINUITY:</b> a) Definition of a function b) Types of functions i) Constant function, ii) identity function iii) Absolute value function iv) The greatest integer function with examples
	2 <sup>nd</sup>	v) Trigonometric function with example vi) Exponential function vii) Logarithmic function With examples
	3 <sup>rd</sup>	c) Introduction of limit: definition , example d) Existence of limit with example
	4 <sup>th</sup>	e) Methods of evaluation of limit
	5 <sup>th</sup>	Methods of evaluation of limit continues with some examples
	6 <sup>th</sup> (Tutorial class)	problems on existence of limit and evaluation of limit
2 <sup>nd</sup>	1 <sup>st</sup>	i) $\lim_{x \rightarrow 0} \frac{x^n - a^n}{x - a} = na^{n-1}$ ii) $\lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \log_e a$ Some problems using these formulae
	2 <sup>nd</sup>	iii) $\lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$ iv) $\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}} = e$ Some problems using these formulae
	3 <sup>rd</sup>	v) $\lim_{x \rightarrow \infty} (1 + \frac{1}{x})^x = e$ vi) $\lim_{x \rightarrow 0} \frac{\log(1+x)}{x} = 1$ Some problems using these formulae
	4 <sup>th</sup>	vii) $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ viii) $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$ Some problems using these formulae
	5 <sup>th</sup>	f) Definition of continuity of a function at a point, Existence of continuity with example

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	6 <sup>th</sup> (Tutorial class)	Problems on limit and continuity
3 <sup>rd</sup>	1 <sup>st</sup>	<b>Chapter 3: DERIVATIVES:</b> a) Derivative of a function at a point b) Algebra of derivative
	2 <sup>nd</sup>	c) Derivative of standard functions: $x^n, a^x, \log_a x, e^x$
	3 <sup>rd</sup>	Derivative of standard functions continues: $\sin x, \cos x, \tan x$
	4 <sup>th</sup>	Derivative of standard functions continues: $\cot x, \sec x, \csc x, \sin^{-1} x$
	5 <sup>th</sup>	Derivative of standard functions continues: $\cos^{-1} x, \tan^{-1} x, \cot^{-1} x$
	6 <sup>th</sup> (Tutorial class)	Problem solving on trigonometric functions
4 <sup>th</sup>	1 <sup>st</sup>	Derivative of standard functions continues: $\sec^{-1} x, \csc^{-1} x,$ d) Derivatives of composite function
	2 <sup>nd</sup>	Derivatives of composite function(Chain rule) continues with examples
	3 <sup>rd</sup>	Derivatives of composite function(Chain rule) continues with examples
	4 <sup>th</sup>	e) Methods of differentiation of i) Parametric function with examples
	5 <sup>th</sup>	Methods of differentiation of ii) Implicit function with examples
	6 <sup>th</sup> (Tutorial class)	Solving problems on derivatives of parametric function and implicit function
5 <sup>th</sup>	1 <sup>st</sup>	Methods of differentiation of iii) Logarithmic function with example
	2 <sup>nd</sup>	Methods of differentiation of iv) A function wrt another function with example
	3 <sup>rd</sup>	f) Applications of derivatives: i) Successive differentiation (up to second order) Some problems on successive differentiation
	4 <sup>th</sup>	Solving problems on successive differentiation
	5 <sup>th</sup>	ii) Partial differentiation (function of two variables up to second order)
	6 <sup>th</sup> (Tutorial class)	Problems on derivative of logarithmic function and successive differentiation.
6 <sup>th</sup>	1 <sup>st</sup>	Partial differentiation continues
	2 <sup>nd</sup>	Some more problems on partial differentiation
	3 <sup>rd</sup>	Revision of derivative
	4 <sup>th</sup>	<b>Chapter 4: INTEGRATION:</b> a) Definition of integration as inverse of differentiation b) Integral of standard functions
	5 <sup>th</sup>	c) Methods of integration: i) Integration by substitution with examples

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	6 <sup>th</sup> (Tutorial class)	Problems on integration by substitution
7 <sup>th</sup>	1 <sup>st</sup>	ii) Integration by parts with examples
	2 <sup>nd</sup>	Problems on integration by parts
	3 <sup>rd</sup>	<b>d) Integration of the following forms</b> i) $\int \frac{dx}{x^2 + a^2}$ ii) $\int \frac{dx}{x^2 - a^2}$ iii) $\int \frac{dx}{a^2 - x^2}$ iv) $\int \frac{dx}{\sqrt{x^2 + a^2}}$ with examples
	4 <sup>th</sup>	<b>Integration of the following forms</b> v) $\int \frac{dx}{\sqrt{x^2 - a^2}}$ vi) $\int \frac{dx}{\sqrt{a^2 - x^2}}$ vii) $\int \frac{dx}{x\sqrt{x^2 + a^2}}$ viii) $\int \sqrt{a^2 - x^2} dx$ with examples
	5 <sup>th</sup>	<b>Integration of the following forms</b> ix) $\int \sqrt{a^2 + x^2} dx$ x) $\int \sqrt{x^2 - a^2} dx$ with problems
	6 <sup>th</sup> (Tutorial class)	Problems on integration by parts
8 <sup>th</sup>	1 <sup>st</sup>	<b>e) Definite integrals and properties</b> i) $\int_0^a f(x) dx = \int_0^a f(a-x) dx$ ii) $\int_a^b f(x) dx = -\int_b^a f(x) dx$ With problems
	2 <sup>nd</sup>	iii) $\int_a^c f(x) dx = \int_a^b f(x) dx + \int_b^c f(x) dx, a < b < c$  $\int_{-a}^a f(x) dx = 0, \text{ if } f(x) = \text{odd}$  iv) $= 2 \int_0^a f(x) dx, \text{ if } f(x) = \text{even}$  With examples
	3 <sup>rd</sup>	Solving problems on properties of definite integration
	4 <sup>th</sup>	<b>f) Application of integration</b> i) Area enclosed by a curve and X-axis and example
	5 <sup>th</sup>	ii) Area of a circle with centre at origin
	6 <sup>th</sup> (Tutorial class)	Solving problems on application of integration
9 <sup>th</sup>	1 <sup>st</sup>	<b>Chapter 5: DIFFERENTIAL EQUATION:</b> Definition, ODE, PDE, a) Order and degree of a differential equation

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	2 <sup>nd</sup>	Determining Order and degree of a differential equation with examples
	3 <sup>rd</sup>	b) Solution of differential equation Definition i) By method of separation of variable with examples
	4 <sup>th</sup>	method of separation of variable continues with problem solving
	5 <sup>th</sup>	<b>Some more problems on separation of variables</b>
	6 <sup>th</sup> (Tutorial class)	Problems on determination of degree and order of a differential equation
10 <sup>th</sup>	1 <sup>st</sup>	ii) Linear equation example
	2 <sup>nd</sup>	Solving linear equation $\frac{dy}{dx} + Py = Q$ , where P, Q are functions of x
	3 <sup>rd</sup>	Problems on linear differential equation
	4 <sup>th</sup>	Some more Problems on linear differential equation
	5 <sup>th</sup>	<b>Revision of differential equation</b>
	6 <sup>th</sup> (Tutorial class)	<b>Revision of differential equation</b>
11 <sup>th</sup>	1 <sup>st</sup>	<b>Chapter 1: VECTOR ALGEBRA:</b> a) Introduction: definition of scalar, vector with examples b) Types of vectors: null vector, parallel vector, collinear vectors with examples
	2 <sup>nd</sup>	c) Representation of a vector
	3 <sup>rd</sup>	d) Magnitude and direction of vectors with examples
	4 <sup>th</sup>	e) Addition and subtraction of vectors with examples
	5 <sup>th</sup>	Properties of vector addition and position vector
	6 <sup>th</sup> (Tutorial class)	f) position vector
12 <sup>th</sup>	1 <sup>st</sup>	g) scalar product of two vectors with examples
	2 <sup>nd</sup>	h) Geometrical meaning of dot product
	3 <sup>rd</sup>	Problems on dot product
	4 <sup>th</sup>	i) Angle between two vectors with example
	5 <sup>th</sup>	j) Scalar and vector projection of two vectors with examples
	6 <sup>th</sup> (Tutorial class)	Problems on Scalar and vector projection of two vectors
13 <sup>th</sup>	1 <sup>st</sup>	k) Vector product and geometrical meaning
	2 <sup>nd</sup>	Problems on vector product
	3 <sup>rd</sup>	<b>Revision</b>
	4 <sup>th</sup>	
	5 <sup>th</sup>	

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(HOD Math Rsc)

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