

Discipline: Civil/Electrical /Mechanical Engg.	Semester: 2 <sup>nd</sup>	Name of the Teaching Faculty: Suraj Kumar Garada
Subject: Engg. Mathematics II (Th 3)	No. of days/week class allotted: 5+1	No. of weeks:16 Semester from: 14/03/22 to 18/06/22
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 (Based on set theory) b) Types of functions i) Constant function, ii) Identity function iii) Absolute value function iv) The Greatest Integer Function
	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) $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$ ii) $\lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \ln a = \log_e a$
	2 <sup>nd</sup>	iii) $\lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$ iv) $\lim_{x \rightarrow 0} (1 + x)^{\frac{1}{x}} = e$
	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
	6 <sup>th</sup> (Tutorial class)	Problems on limit and continuity
3 <sup>rd</sup>	1 <sup>st</sup>	<b>Chapter 3: DERIVATIVES:</b> <b>a)</b> Derivative of a function at a point <b>b)</b> Algebra of derivative
	2 <sup>nd</sup>	<b>c)</b> Derivative of standard functions: $x^n, a^x, \log x, e^x$
	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>
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>		<b>e)</b> 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>
	2 <sup>nd</sup>	Methods of differentiation of iv) A function wrt another function with example
	3 <sup>rd</sup>	<b>f)</b> 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>
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>

		<p><b>a)</b> Definition of integration as inverse of differentiation</p> <p><b>b)</b> Integral of standard functions</p>
	5 <sup>th</sup>	<p><b>c)</b> Methods of integration:</p> <p>i) Integration by substitution with examples</p>
	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>	<p><b>d) Integration of the following forms</b></p> <p>i) <math>\int \frac{dx}{x^2+a^2}</math> ii) <math>\int \frac{dx}{x^2-a^2}</math> iii) <math>\int \frac{dx}{a^2-x^2}</math></p> <p>iv) <math>\int \frac{dx}{\sqrt{x^2+a^2}}</math> with examples</p>
	4 <sup>th</sup>	<p><b>Integration of the following forms</b></p> <p>v) <math>\int \frac{dx}{\sqrt{a^2-x^2}}</math> vi) <math>\int \frac{dx}{\sqrt{x^2-a^2}}</math> vii) <math>\int \frac{dx}{\sqrt{x^2+a^2}}</math> viii) <math>\int \frac{dx}{\sqrt{a^2-x^2}}</math> with examples</p>
	5 <sup>th</sup>	<p><b>Integration of the following forms</b></p> <p>ix) <math>\int \sqrt{a^2+x^2} dx</math> x) <math>\int \sqrt{x^2-a^2} dx</math> with problems</p>
	6 <sup>th</sup> (Tutorial class)	Problems on integration by parts
8 <sup>th</sup>	1 <sup>st</sup>	<p><b>e) Definite integrals and properties</b></p> <p>i) <math>\int_0^a f(x) dx = \int_0^a f(a-x) dx</math></p> <p>ii) <math>\int_a^b f(x) dx = -\int_b^a f(x) dx</math></p> <p>With problems</p>
	2 <sup>nd</sup>	<p>iii) <math>\int_a^c f(x) dx = \int_a^b f(x) dx + \int_b^c f(x) dx, a &lt; b &lt; c</math></p> <p>iv) <math>\int_{-a}^a f(x) dx = 0, \text{ if } f(x) = \text{odd}</math></p> <p><math>= 2 \int_0^a f(x) dx, \text{ if } f(x) = \text{even}</math></p> <p>With examples</p>
	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
	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>	$\frac{dy}{dx}$ 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>	<b>c) Representation of a vector</b>
	3 <sup>rd</sup>	<b>d) Magnitude and direction of vectors with examples</b>
	4 <sup>th</sup>	<b>e) Addition and subtraction of vectors with examples</b>
	5 <sup>th</sup>	Properties of vector addition and position vector
	6 <sup>th</sup> (Tutorial class)	Problems on magnitude and f) position vector
12 <sup>th</sup>	1 <sup>st</sup>	<b>g) scalar product of two vectors with examples</b>
	2 <sup>nd</sup>	<b>h) Geometrical meaning of dot product</b>
	3 <sup>rd</sup>	Problems on dot product
	4 <sup>th</sup>	<b>i) Angle between two vectors with example</b>
	5 <sup>th</sup>	<b>j) Scalar and vector projection of two vectors with examples</b>
	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>	
	6 <sup>th</sup>	
14 <sup>th</sup>	1 <sup>st</sup>	<b>Previous year question discussion</b>
	2 <sup>nd</sup>	
	3 <sup>rd</sup>	
	4 <sup>th</sup>	
	5 <sup>th</sup>	
	6 <sup>th</sup>	
15 <sup>th</sup>	1 <sup>st</sup>	<b>Previous year question discussion</b>
	2 <sup>nd</sup>	
	3 <sup>rd</sup>	
	4 <sup>th</sup>	
	5 <sup>th</sup>	
	6 <sup>th</sup>	
16 <sup>th</sup>	1 <sup>st</sup>	<b>Previous year question discussion</b>
	2 <sup>nd</sup>	
	3 <sup>rd</sup>	
	4 <sup>th</sup>	
	5 <sup>th</sup>	
	6 <sup>th</sup>	