

Discipline: Civil Electrical, ETC & Mechanical Engg.	Semester: 2nd	Name of the Teaching Faculty: RAMAKANTA BEHERA (Lect. in Mathematics)
Subject: Engg. Math-II	No. of days/week class allotted: 6P (5 Lectures +1 Tutorial)	Semester from date: _____ To date: _____ No. of weeks: 16
Week	Class Day	Theory Topics
1 st	1 st	Chapter 2: LIMITS and CONTINUITY: 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 nd	v) Trigonometric function with example vi) Exponential function vii) Logarithmic function With examples
	3 rd	c) Introduction of limit: definition ,example d) Existence of limit with example
	4 th	e) Methods of evaluation of limit
	5 th	Methods of evaluation of limit continues with some examples
	6 th (Tutorial class)	Problems on existence of limit and evaluation of limit
2 nd	1 st	i) $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$ ii) $\lim_{x \rightarrow 0} \frac{a^x - 1}{x} \equiv \ln a = \log_e a$ Some problems using these formulae
	2 nd	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 rd	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 th	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 th	f) Definition of continuity of a function at a point, Existence of continuity with example
	6 th (Tutorial class)	Problems on limit and continuity
3 rd	1 st	Chapter 3: DERIVATIVES: a) Derivative of a function at a point b) Algebra of derivative
	2 nd	c) Derivative of standard functions: $x^n, a^x, \log x, e^x$
	3 rd	Derivative of standard functions continues: $\sin x, \cos x, \tan x$
	4 th	Derivative of standard functions continues: $\cot x, \sec x, \csc x, \sin^{-1}x$
	5 th	Derivative of standard functions continues: $\cos^{-1}x, \tan^{-1}x, \cot^{-1}x$
	6 th (Tutorial class)	Problem solving on trigonometric functions
4 th	1 st	Derivative of standard functions continues: $\sec^{-1}x, \csc^{-1}x,$ d) Derivatives of composite function
	2 nd	Derivatives of composite function (Chain rule) continues with examples
	3 rd	Derivatives of composite function (Chain rule) continues with examples
	4 th	e) Methods of differentiation of i) Parametric function with examples
	5 th	Methods of differentiation of ii) Implicit function with examples
	6 th (Tutorial class)	Solving problems on derivatives of parametric function and implicit function
5 th	1 st	Methods of differentiation of iii) Logarithmic function with example
	2 nd	Methods of differentiation of iv) A function wrt another function with example
	3 rd	f) Applications of derivatives: i) Successive differentiation (up to second order) Some problems on successive differentiation
	4 th	Solving problems on successive differentiation
	5 th	ii) Partial differentiation (function of two variables up to second order)
	6 th (Tutorial class)	Problems on derivative of logarithmic function and successive differentiation.
6 th	1 st	Partial differentiation continues
	2 nd	Some more problems on partial differentiation
	3 rd	Revision of derivative
	4 th	Chapter 4: INTEGRATION:

		<p>a) Definition of integration as inverse of differentiation</p> <p>b) Integral of standard functions</p>
	5 th	<p>c) Methods of integration:</p> <p>i) Integration by substitution with examples</p>
	6 th (Tutorial class)	Problems on integration by substitution
7 th	1 st	ii) Integration by parts with examples
	2 nd	Problems on integration by parts
	3 rd	<p>d) Integration of the following forms</p> <p>i) $\int \frac{dx}{x^2+a^2}$ ii) $\int \frac{dx}{x^2-a^2}$ iii) $\int \frac{dx}{a^2-x^2}$</p> <p>iv) $\int \frac{dx}{\sqrt{x^2+a^2}}$ with examples</p>
	4 th	<p>Integration of the following forms</p> <p>v) $\int \frac{dx}{\sqrt{a^2-x^2}}$ vi) $\int \frac{dx}{\sqrt{x^2-a^2}}$ vii) $\int \frac{dx}{x\sqrt{x^2+a^2}}$ viii) $\int \frac{dx}{\sqrt{a^2-x^2}}$ with examples</p>
	5 th	<p>Integration of the following forms</p> <p>ix) $\int \sqrt{a^2+x^2} dx$ x) $\int \sqrt{x^2-a^2} dx$ with problems</p>
	6 th (Tutorial class)	Problems on integration by parts
8 th	1 st	<p>e) Definite integrals and properties</p> <p>i) $\int_0^a f(x) dx = \int_0^a f(a-x) dx$</p> <p>ii) $\int_a^b f(x) dx = -\int_b^a f(x) dx$</p> <p>With problems</p>
	2 nd	<p>iii) $\int_a^c f(x) dx = \int_a^b f(x) dx + \int_b^c f(x) dx, a < b < c$</p> <p>iv) $\int_{-a}^a f(x) dx = 0, \text{ if } f(x) = \text{odd}$</p> <p>$= 2 \int_0^a f(x) dx, \text{ if } f(x) = \text{even}$</p> <p>With examples</p>
	3 rd	Solving problems on properties of definite integration
	4 th	f) Application of integration

		i) Area enclosed by a curve and X-axis and example
	5 th	ii) Area of a circle with centre at origin
	6 th (Tutorial class)	Solving problems on application of integration
9 th	1 st	Chapter 5: DIFFERENTIAL EQUATION: Definition, ODE, PDE, a) Order and degree of a differential equation
	2 nd	Determining Order and degree of a differential equation with examples
	3 rd	b) Solution of differential equation Definition i) By method of separation of variable with examples
	4 th	method of separation of variable continues with problem solving
	5 th	Some more problems on separation of variables
	6 th (Tutorial class)	Problems on determination of degree and order of a differential equation
10 th	1 st	ii) Linear equation example
	2 nd	$\frac{dy}{dx}$ Solving linear equation $\frac{dy}{dx} + Py = Q$, where P, Q are functions of x
	3 rd	Problems on linear differential equation
	4 th	Some more Problems on linear differential equation
	5 th	Revision of differential equation
	6 th (Tutorial class)	Revision of differential equation
11 th	1 st	Chapter 1: VECTOR ALGEBRA: a) Introduction: definition of scalar, vector with examples b) Types of vectors: null vector, parallel vector, collinear vectors with examples
	2 nd	c) Representation of a vector
	3 rd	d) Magnitude and direction of vectors with examples
	4 th	e) Addition and subtraction of vectors with examples
	5 th	Properties of vector addition and position vector
	6 th (Tutorial class)	Problems on magnitude and f) position vector
	12 th	1 st
	2 nd	h) Geometrical meaning of dot product
	3 rd	Problems on dot product
	4 th	i) Angle between two vectors with example
	5 th	j) Scalar and vector projection of two vectors with examples
	6 th (Tutorial class)	Problems on Scalar and vector projection of two vectors

13 th	1 st	k) Vector product and geometrical meaning
	2 nd	Problems on vector product
	3 rd	Revision
	4 th	
	5 th	
	6 th	
14 th	1 st	Previous year question discussion
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	
15 th	1 st	Previous year question discussion
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	
16 th	1 st	Previous year question discussion
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	

Learning Resources:

1. Elements of Mathematics_Vol-1 & 2 (Odisha State Bureau of Text Book Preparation &Production)
2. Mathematics Part-I & Part-II Textbook for Class XII, NCERT Publication
3. Text Book Of Engg. Mathematics Part-II (Kalyani Publication)