LESSON PLAN

SUBJECT: ENGG. MATHEMATICS II

BRANCH: COMMON

SEMESTER: 2ND (2022-23)

NAME OF THE FACULTY: Manas Kumar Mahalik

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15/03/23

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Discipline: Electrical/Mechanical Engg.	Semester: 2nd	Name of the teaching faculty: Manas Kumar Mahalik
Subject: Engg. Mathematics II Th 3	No. of days/week class allotted: 5+1	Semester from date: 20/03/2023 To date:27/06/2023 No. of weeks: 14
Week	Class Day	Theory Topics
1st	1st	**Chapter 2: LIMITS and CONTINUITY:** 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
	2nd	v) Trigonometric function with example vi) Exponential function vii) Logarithmic function With examples
	3rd	c) Introduction of limit: definition , example d) Existence of limit with example
	4th	e) Methods of evaluation of limit
	5th	Methods of evaluation of limit continues with some examples
	6th (Tutorial class)	problems on existence of limit and evaluation of limit
2nd	1st	i) $\lim_{x\to 0} \frac{x^n - a^n}{x - a} = na^{n-1}$ ii) $\lim_{x\to 0} \frac{a^x - 1}{x} = \log_e a$ Some problems using these formulae
	2nd	iii) $\lim_{x\to 0} \frac{e^x - 1}{x} = 1$ iv) $\lim_{x\to 0} (1+x)^{\frac{1}{x}} = e$ Some problems using these formulae
	3rd	v) $\lim_{x\to \infty} (1+\frac{1}{x})^x = e$ vi) $\lim_{x\to 0} \frac{\log(1+x)}{x} = 1$ Some problems using these formulae
	4th	vii) $\lim_{x\to 0} \frac{\sin x}{x} = 1$ viii) $\lim_{x\to 0} \frac{\tan x}{x} = 1$ Some problems using these formulae
	5th	f) Definition of continuity of a function at a point,

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

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	5th	c) Methods of integration: i) Integration by substitution with examples
	6th (Tutorial class)	Problems on integration by substitution
7th	1st	ii) Integration by parts with examples
	2nd	Problems on integration by parts
	3rd	d) Integration of the following forms 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
	4th	Integration of the following forms 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) $\sqrt{a^2-x^2}\,dx$ with examples
	5th	Integration of the following forms ix) $\sqrt{a^2+x^2}\,dx$ x) $\sqrt{x^2-a^2}\,dx$ with problems
	6th (Tutorial class)	Problems on integration by parts
8th	1st	e) Definite integrals and properties 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
	2nd	iii) $\int_a^c f(x)dx = \int_a^b f(x)dx + \int_b^c f(x)dx, \quad a<b<c$ $\int_{-a}^{a} f(x)dx = 0$, $if\ \ f(x) = odd$ iv) $= 2\int_0^a f(x)dx$, $if\ \ f(x, = even$ With examples
	3rd	Solving problems on properties of definite integration
	4th	f) Application of integration i) Area enclosed by a curve and X-axis and example

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	5th	ii) Area of a circle with centre at origin
	6th (Tutorial class)	Solving problems on application of integration
9th	1st	**Chapter 5: DIFFERENTIAL EQUATION:** Definition, ODE, PDE, a) Order and degree of a differential equation
	2nd	Determining Order and degree of a differential equation with examples
	3rd	b) Solution of differential equation Definition i) By method of separation of variable with examples
	4th	method of separation of variable continues with problem solving
	5th	**Some more problems on separation of variables**
	6th (Tutorial class)	Problems on determination of degree and order of a differential equation
10th	1st	**ii)** Linear equation example
	2nd	Solving linear equation $\frac{dy}{dx} + Py = Q$, where P, Q are functions of x
	3rd	Problems on linear differential equation
	4th	Some more Problems on linear differential equation
	5th	**Revision of differential equation**
	6th (Tutorial class)	**Revision of differential equation**
11th	1st	**Chapter 1: VECTOR ALGEBRA:** a) Introduction: definition of scalar , vector with examples b) Types of vectors: null vector, parallel vector, collinear vectors with examples
	2nd	**c)** Representation of a vector
	3rd	d) Magnitude and direction of vectors with examples
	4th	e) Addition and subtraction of vectors with examples
	5th	Properties of vector addition and position vector
	6th (Tutorial class)	Problems on magnitude and f) position vector
12th	1st	g) scalar product of two vectors with examples
	2nd	h) Geometrical meaning of dot product
	3rd	Problems on dot product
	4th	i) Angle between two vectors with example
	5th	j) Scalar and vector projection of two vectors with examples
	6th (Tutorial class)	Problems on Scalar and vector projection of two vectors
13th	1st	k) Vector product and geometrical meaning
	2nd	Problems on vector product

	3rd	Revision
	4th	Revision
	5th	Revision
14th	1st	Revision
	2nd	Revision
	3rd	Revision
	4th	Revision
	5th	Revision

Signature of the Faculty 15/03/23