GOVERNMENT POLYTECHNIC MAYURBHANJ, TIKARPADA

LESSON PLAN

Discipline: **Mechanical Engg./ Metallurgical Engg.**	Semester: **2nd**	Name of the teaching Faculty: **Sangram Kesari Deo, PTGF in Mathematics**
Subject: **TH3: ENGINEERING MATHEMATICS-II**	Number of classes allotted per week : (5 Lecture)	Semester from date :20.03.2022 to date: 27.06.2023

Sl no	Week	Class	Chapter	Detailed topic to be covered	Remark
1	1st	Class 1	Chapter 1 Vector Algebra (15 periods)	a) Introduction b) Types of vectors (null vector, parallel vector , collinear vectors) (in component form)	
2		Class 2		c) Representation of vector d) Magnitude and direction of vectors	
3		Class 3		e) Addition and subtraction of vectors f) Position vector	
4		Class 4		Problem solving and Tutorial Class	
5		Class 5		g) Scalar product of two vectors	
6	2nd	Class 1		h) Geometrical meaning of dot product	
7		Class 2		i) Angle between two vectors	
8		Class 3		j) Scalar and vector projection of two vectors	
9		Class 4		k) Vector product and geometrical meaning (Area of triangle and parallelogram)	
10		Class 5		Problem solving and Tutorial Class	
11	3rd	Class 1		a) Definition of function, based on set theory	
12		Class 2		b) Types of functions i) Constant function ii) Identity function iii) Absolute value function iv)The Greatest integer function	
13		Class 3		v) Trigonometric function vi) Exponential function vii) Logarithmic function	
14		Class 4		Problem solving and Tutorial Class	

15		Class 5		c) Introduction of limit	
16		Class 1		d) Existence of limit	
17		Class 2		e) Methods of evaluation of limit (i) $\lim_{x\to 0}\frac{x^n-a^n}{x-a}=na^{n-1}$ (ii) $\lim_{x\to 0}\frac{a^x-1}{x}=\ln a$ (iii) $\lim_{x\to 0}\frac{e^x-1}{x}=1$	
18	4th	Class 3	Chapter 2 Limits and Continuity (12 Periods)	(iv) $\lim_{x\to 0}(1+x)^{\frac{1}{x}}=e$ (v) $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x=e$ (vi) $\lim_{x\to 0}\frac{\log(1+x)}{x}=1$ (vii) $\lim_{x\to 0}\frac{\sin x}{x}=1$ (viii) $\lim_{x\to 0}\frac{\tan x}{x}=1$	
19		Class 4		Problem solving and Tutorial Class	
20		Class 5		e) Definition of continuity of a function at a point and problems based on it	
21		Class 1		Problem solving and Tutorial Class	
22		Class 2		a) Derivative of a function at a point	
23	5th	Class 3		b) Algebra of derivative	
24		Class 4		Problem Solving & Tutorial Class	
25		Class 5		c) Derivative of standard functions: $x^n, a^x, \log_a x, e^x, \sin x, \cos x, \tan x, \sec x, \operatorname{cosec} x$, $\sin^{-1} x, \cos^{-1} x, \tan^{-1} x$, $\cot^{-1} x, \sec^{-1} x, \operatorname{cosec}^{-1} x$	
26		Class 1		Problem Solving & Tutorial Class	
27		Class 2		d) Derivative of composite function (Chain Rule)	
28	6th	Class 3	Chapter 3 Derivatives (21 Periods)	Problem Solving & Tutorial Class	
29		Class 4		e) Methods of differentiation of i) Parametric function	
30		Class 5		ii) Implicit function	
31		Class 1		Problem Solving & Tutorial Class	
32		Class 2		iii) Logarithmic function	

33	7th	Class 3		Problem Solving & Tutorial Class	
34		Class 4		iv) a function with respect to another function	
35		Class 5		Problem Solving & Tutorial Class	
36	8th	Class 1		f) Applications of Derivative i) Successive Differentiation (up to second order)	
37		Class 2		Problem Solving & Tutorial Class	
38		Class 3		ii) Partial Differentiation (function of two variables up to second order)	
39		Class 4		ii) Partial Differentiation (function of two variables up to second order)	
40		Class 5		Problem Solving & Tutorial Class	
41	9th	Class 1	Chapter-4 Integration (15 Periods)	Introduction to Integration a) Definition of integration as inverse of differentiation	
42		Class 2		Problem solving and Tutorial Class	
43		Class 3		b) Integrals of standard functions	
44		Class 4		b) Integrals of standard functions	
45		Class 5		Problem solving and Tutorial Class	
46	10th	Class 1		c) Methods of integration i) Integration by substitution	
47		Class 2		Problem solving and Tutorial Class	
48		Class 3		ii) Integration by parts	
49		Class 4		Problem solving and Tutorial Class	
50		Class 5		Problem solving and Tutorial Class	
51	11th	Class 1		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) $\int \frac{dx}{\sqrt{x^2+a^2}}$ (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) $\int \sqrt{a^2-x^2}dx$ (ix) $\int \sqrt{a^2+x^2}dx$ (x) $\int \sqrt{x^2-a^2}dx$	
52		Class 2		Problem solving and Tutorial Class	
53		Class 3		(iv) $\int \frac{dx}{\sqrt{x^2+a^2}}$ (v) $\int \frac{dx}{\sqrt{x^2-a^2}}$ (vi) $\int \frac{dx}{\sqrt{a^2-x^2}}$	

54		Class 4		(vii) $\int \frac{dx}{x\sqrt{x^2-a^2}}$ (viii) $\int \sqrt{a^2-x^2}dx$ (ix) $\int \sqrt{a^2+x^2}dx$ (x) $\int \sqrt{x^2-a^2}dx$	
55		Class 5		Problem Solving and Tutorials	
56		Class 1		Problem Solving and Tutorials	
57		Class 2		e) Definite integral, properties of definite integrals	
58	12th	Class 3		(i) $\int_0^a f(x)\,dx = \int_0^a f(a-x)dx$ (ii) $\int_a^b f(x)dx = -\int_b^a f(x)\,dx$ (iii) $\int_0^c f(x)dx = \int_0^b f(x)dx + \int_b^c f(x)dx, \quad a < b < c$ (iv) $\int_{-a}^a f(x)dx = 0$, if $f(x)$ is odd $= 2\int_0^a f(x)dx$, if $f(x)$ is even	
59		Class 4		Problem Solving and Tutorials	
60		Class 5		f) Application of integration i) Area enclosed by a curve and X – axis ii) Area of a circle with centre at origin	
61		Period		Problem Solving and Tutorials	
62		Class 2		Introduction to Differential equation a) Order and degree of a differential equation	
63		Class 3		Problem Solving and Tutorials	
64	13th	Class 4		b) Solution of differential equation i) 1st order and 1st degree equation by the method of separation of variables	
65		Class 5		Problem Solving and Tutorials	
66		Class 1		ii) Solution of Linear Differential equation, $\frac{dy}{dx} + Py = Q$ where P,Q are functions of x.	
67		Class 2		Problem Solving and Tutorials	
68	14th	Class 3	Chapter 5 DIFFERENTIAL EQUATION (12 Periods)	Problem Solving and Tutorials	
69		Class 4		Problem Solving and Tutorials	
70		Class 5		Problem Solving and Tutorials	
71		Class 1		Problem Solving and Tutorials	
72		Class 2		Previous year questions and Answer Discussion	
73	15th	Class 3		Previous year questions and Answer Discussion	
74		Class 4		Previous year questions and Answer Discussion	
75		Class 5		Previous year questions and Answer Discussion	