Course Name : 03 Years Diploma in Engineering

Semester : Second

Subject Title : Engineering Mathematics-II

Subject Code : 202

Teaching and Examination Scheme:-

Teaching Scheme			Examination Scheme					
L TH	T	P	Full Marks.	External Exam Marks	Internal Exam Marks	External Pas Marks	Total Pass Marks	Duration of External Exams
03	01		100	80	20	26	40	3 Hrs

NOTE:

Internal marks will be allotted on the basis of two snap tests and 2 assignment of equal marks to be conducted by the faculty teaching the subject.

Rationale:

The subject is extension of Engineering Mathematics - 1 of First Semester and stepping into the prerequisites to learn Applied Mathematics applicable in engineering solutions. Engineering Mathematics lay down the foundation to understand and express principles and laws involved in other technological subjects. The study of Engineering Mathematics will help to develop the skills essential for new emerging avenues.

Objective:

The student will be able to acquire knowledge of mathematical terms, concepts and principles. They can acquire sufficient mathematical techniques and can develop the ability to apply mathematical methods to solve technical and day to day practical problems.

Sub Objective:

This course is divided into five units. After completion of this course one could become able to learn the following.

1. Intuitive meaning of Function, Limit and Continuity for solving the problems
2. Differentiation and its meaning in engineering situations
3. Applications of the Differentiation

3.1 Understand the Geometrical Applications of Derivatives

3.2 Use Derivatives to find extreme values of functions

3.3 The concept of Derivatives as Rate Measure

3.4 Use Derivatives to find Radius of Curvature.

4. Basic terms of Statistics And Prob

5. Complex Number

5.1 Representation of Complex numbers in various forms

5.2 Definition of complex number, its operations and property.

5.3 De-Moivre's theorem (without proof) and simple problems.

Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	**1. Function, Limit and Continuity** 1.1 Function ▪ Definition of variable, constant, intervals and their type ▪ Definition of Function, value of a function and types of functions, Simple Examples ▪ Definition of sinh x, cosh x and tanh x and some hyperbolic identities 1.2 **Use the concepts of Limit for solving the problems** ▪ Explain the concept of limit and intuitive meaning of $\lim_{x\to a} f(x)=l$ and its properties. ▪ Derive the Standard limits $\lim_{x\to a}\frac{x^n-a^n}{x-a}$, $\lim_{x\to 0}\frac{\sin x}{x}$, $\lim_{x\to 0} Cosx$, $\lim_{x\to 0}\frac{\tan x}{x}$, $\lim_{x\to 0}\frac{a^x-1}{x}$, $\lim_{x\to 0}\frac{e^x-1}{x}$, $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$, $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x$ with simple example. ▪ Evaluate the limits of the type $\lim_{x\to\infty}\frac{f(x)}{g(x)}$. ▪ Explain the Concept of continuity of a function at a point and in interval with some examples whether a given function is continuous or not.	06	12

	2. **Differentiation and its meaning in engineering situations** ▪ Concept of derivative of a function y = f(x) from the first principle as $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ and Standard notations to denote the derivative of a function. ▪ Derivatives of elementary functions like x^n, a^x, e^x, log x, sin x, cos x, tanx, secx, cosecx, cot x and Invise Trigonometrical function using the first principles. ▪ Rules for differentiation of sum, difference, scalar multiplication, product and quotient of functions with illustrative and simple examples. ▪ Differentiation of a function of a function (Chain rule) with illustrative examples such as (i) $\sqrt{t^2+\frac{2}{t}}$ (ii) $x^2\sin 2x$ (iii) $\frac{x}{\sqrt{x^2+1}}$ (iv) $\log\left(\sin(\cos x)\right)$.etc ▪ Differentiation of a function with respect to another function and also differentiation of parametric functions with examples. ▪ Derivatives of some simple hyperbolic functions (without Proof). ▪ Differentiation of implicit function with examples. ▪ Logarithmic differentiation of some functions with examples like $[f(x)]^{g(x)}$. ▪ Concept of higher order derivatives (second and third order) with examples. ▪ Concept of functions of several variables, partial derivatives and difference between the ordinary and partial derivatives with simple examples.	**12**	**24**

	3. Applications of the Differentiation 3.1 Geometrical Applications of Derivatives ▪ State the Geometrical meaning of the derivative as the slope of the tangent to the curve y=f(x) at any point on the curve. ▪ Equation of tangent and normal to the curve y=f(x) at any point on it. ▪ The concept of angle between two curves and procedure for finding the Angle between two given curves with illustrative examples. 3.2 Use of Derivatives to find extreme values of functions ▪ The concept and condition of increasing and decreasing functions with illustrative examples. ▪ Find the extreme values (maxima or minima) of a function of single variable - simple problems yielding maxima and minima. 3.3 Concept of Derivatives as Rate Measure with illustraribe examples. 3.4 Concept of Derivatives to find Radius of Curvature with illustraribe examples.	**14**	**24**
	4. Statistics ▪ Measures of Central tendency (mean, median, mode) for ungrouped and grouped frequency distribution. ▪ Graphical representation (Histogram and Ogive Curves) to find mode and median ▪ Measures of Dispersion such as range, mean deviation, Standard Deviation, Variance and coefficient of variation. Comparison of two sets of observations.	**04**	**08**
	5. Complex Number. ▪ Represent the complex number in various forms like modulus-amplitude, polar form, Exponential (Euler) form – illustrate with examples ▪ Modulus, Conjugate and Argument of Complex Number and their properties. ▪ Operations on complex numbers (Equality, Addition, Subtraction, Multiplication and Division) with examples. ▪ Square root of complex number ▪ Cube roots of units and their properties, simple problems based on them. ▪ De-Moivre's theorem (without proof) and simple problems.	**6**	**12**
	Total	**42**	**80**

Tutorial: Tutorials are to be used to get enough practice for solving problems. It is suggested that in each tutorial at least five problems should be solved.

Learning Resources:

Books:

Sr. No	Title	Authors	Publications
1	Mathematics: A Textbook for Class XI Part I & II	National Council of Educational Research and Training	
2	Mathematics: A Textbook for Class XII Part I & II	National Council of Educational Research and Training	
3	Mathematics for Class XI Volume I and II	R. D. Sharma	Dhanpat Rai Publication, New Delhi.
4	Mathematics for Class XII Volume I and II	R. D. Sharma	Dhanpat Rai Publication, New Delhi.
5	Higher Engineering Mathematics	B.S Grewal	Khanna Publication, New Delhi
6	Higher Sr. Secondary School Mathematics for XI & XII	R.S. Agrawal	Bharti Bhawan, Patna

Note:

In board examination, question setter may be advised to select 20% questions of objective, 30% of short type and remaining 50% of long type based on basic concepts, formula and calculations respectively.

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