

**Diploma in Engineering (All branch except Mining, Arch & Non Tech)**

**Semester : Third**

**Subject Title : Engineering Mathematics-III**

**Subject Code: 301**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
L	T	P	Full Marks.	External Exam Marks	Internal Exam Marks	External Pas Marks	Total Pass Marks	Duration of External Exams
TH								
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 & 2 of First year 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 and to execute management plans with precision.

Sub Objective:

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

- Intuitive meaning and Methods of finding integration definite integration and its properties.
- Application of Integration in finding Area, volume of irregular shapes.
- Methods of solving differential equation of first order and first degree.
- Methods for finding approximate roots by using bisection, Regula-falsi, Newton-Raphson method, Gauss elimination, Jacobi and Gauss- Seidal methods.
- Use of Binomial, Normal and Poisson distributions for solving different examples.

- Use of Laplace transform for solving problems of Differential Equations.
- Use of Fourier series for expansion of function at the given intervals

Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	<b>Integration:</b> 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by trigonometrical transformation. 1.3.2 Integration by substitution 1.3.3 Integration by parts. 1.3.4 Integration of rational and irrational functions. 1.3.5 Integration by Partial fractions.	7	16
	<b>1.4 Definite Integration.</b> 1.4.1 Concept of definite integrations with examples. 1.4.2 Properties of definite integral with simple problems.	3	
	<b>1.5 Applications of definite integrals.</b> 1.5.1 Area under the curve. 1.5.2 Area bounded by two curves.	3	
2	<b>Differential Equation</b> 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation. 2.2 Solution of differential equations of first order and first Degree such as variable separable form, reducible to Variable separable, Homogeneous and Linear Differential Equation.	6	16
	<b>2.3 Applications of Differential equations.</b> 2.3.1 Rectilinear motion (motion under constant and variable acceleration) 2.3.2 Newton's Law of Cooling	3	
3	<b>Numerical Methods</b> <b>3.1 Solution of algebraic equations</b> Bisection method, Regula falsi method and Newton-Raphson method.	3	16
	<b>3.2 Solution of simultaneous equations containing 3 unknowns</b>		

	<p>3.2.1 Gauss elimination method.</p> <p>3.2.2 Jacobi's Iterative method.</p> <p>3.3.3 Gauss Seidal method.</p>	3	
	<p><b>3.3 Interpolation</b></p> <p>3.3.1 Concept of interpolation and extrapolation.</p> <p>3.3.2 Different operators (<math>\Delta, \nabla</math> &amp; <math>E</math>), relation between them, some problems based on operators, formation of Difference Table.</p> <p>3.3.3 Newton's Forward and Backward difference interpolation formulae.</p> <p>3.3.4 Lagrange's interpolation formula.</p> <p>3.3.5 Problems based on above.</p>	6	
	<p><b>3.4 Numerical Differentiation &amp; Integration.</b></p> <p>3.4.1 Newton's forward and backward difference formulae for first and second order differentiation at any point.</p> <p>3.4.2 Numerical integration Trapezoidal rule and Simpson's <math>1/3^{\text{rd}}</math> rule.</p>	3	
4	<p><b>4.1 Probability:</b></p> <p>4.1.1 Definition of random experiment, sample space, event occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely)</p> <p>4.1.2 Definition of probability, addition and multiplication theorems of probability.</p>	05	16
	<p><b>4.2 Probability Distribution</b></p> <p>4.2.1 Binomial distribution.</p> <p>4.2.2 Poisson's distribution.</p> <p>4.2.3 Normal distribution</p> <p>4.2.4 Simple examples based on above.</p>	05	
5	<p><b>Laplace Transform</b></p> <p>5.1 Definition of Laplace transforms Laplace transform of standard functions.</p> <p>5.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by <math>t^n</math>, division by <math>t</math>.</p> <p>5.3 Inverse Laplace transforms. Properties-linearly first shifting, second shifting. Method of partial fractions,</p>	3	
6	<p><b>Fourier Series</b></p> <p>6.1 Definition of Fourier series (Euler's formula).</p> <p>6.2 Series expansion of continuous functions in the intervals <math>(0, 2l), (-l, l), (0, 2\pi), (-\pi, \pi)</math></p>	3	16

7	<b>Linear Programming</b> <b>7.1 Introduction</b> <b>7.2 Solution of Linear Programming problem (LPP) by Graphical Method.</b>	3	
	<b>TOTAL:</b>	56	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:**

**Text Book:**

Sr. No	Title	Authors	Publications
1	Higher Engg. Mathematics	B. S. Grewal	Dhanpat Rai

**Ref. Books:**

Sr. No	Title	Authors	Publications
1	Engineering Mathematics	H.K.Das	S.Chand & Company LTD, New Delhi
2	Higher Engineering Mathematics	B.V,Ramana	Mcgraw Hill Education (India) Private limited , New Delhi
3	Practical Mathematics	I.B. Prasad	Khanna
4	Introductory Method of Numerical Analysis	S.S.Shastrri	P.H.I
5	Linear Programming	G. Hadley	
6	A text book for class 12, Part- I & II	NCERT	NCERT, Delhi

**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.

