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

**Semester : Third**

**Subject Title : Engineering Mathematics-III**

**Subject Code: 301**

**Teaching and Examination Scheme:**

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| **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 & 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

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| Chapter | Name of the Topic | Hours | Marks |
| 01 | **Integration:**  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 |
| **1.4 Definite Integration**.  1.4.1 Concept of definite integrations with examples.  1.4.2 Properties of definite integral with simple problems. | 3 |
| **1.5** **Applications of definite integrals.**  1.5.1 Area under the curve.  1.5.2 Area bounded by two curves. | 3 |
| 2 | **Differential Equation**  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 |
| 2.3 **Applications of Differential equations.**  2.3.1 Rectilinear motion (motion under constant and variable  acceleration)  2.3.2 Newton’s Law of Cooling | 3 |
| 3 | **Numerical Methods**  **3.1 Solution of algebraic equations**  Bisection method, Regula falsi method and Newton–  Raphson method. | 3 | 16 |
| **3.2 Solution of simultaneous equations containing 3 unknowns**  3.2.1 Gauss elimination method.  3.2.2 Jacobi’s Iterative method.  3.3.3 Gauss Seidal method. | 3 |
| **3.3 Interpolation**  3.3.1 Concept of interpolation and extrapolation.  3.3.2 Different operators ,relation between them, some  problems based on operators , formation of Difference  Table.  3.3.3 Newton’s Forward and Backward difference interpolation formulae.  3.3.4 Lagrange’s interpolation formula.  3.3.5 Problems based on above. | 6 |
| **3.4 Numerical Differentiation &Integration.**  3.4.1 Newton’s forward and backward difference formulae for  first and second order differentiation at any point.  3.4.2 Numerical integration  Trapezoidal rule and Simpson’s 1/3rdrule. | 3 |
| 4 | **4.1 Probability:**  4.1.1 Definition of random experiment, sample space, event  occurrence of event and types of events (impossible,  mutually exclusive, exhaustive, equally likely)  4.1.2 Definition of probability, addition and multiplication  theorems of probability. | 05 | 16 |
| **4.2 Probability Distribution**  4.2.1 Binomial distribution.  4.2.2 Poisson’s distribution.  4.2.3 Normal distribution  4.2.4 Simple examples based on above . | 05 |
| 5 | **Laplace Transform**  5.1 Definition of Laplace transforms Laplace transform of standard functions**.**  5.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by tn, division by t.  5.3 Inverse Laplace transforms. Properties-linearly first shifting, second shifting. Method of partial fractions, | 3 | 16 |
| 6 | **Fourier Series**  6.1 Definition of Fourier series (Euler’s formula).  6.2 Series expansion of continuous functions in the intervals  (0,2*l*),(−*l*,*l*),(0,2π),(−π,π) | 3 |
| 7 | **Linear Programming**  **7.1 Introduction**  **7.2 Solution of Linear Programming problem (LPP) by Graphical Method.** | 3 |
|  | **TOTAL:** | 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:**

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

**Ref. Books:**

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| --- | --- | --- | --- |
| **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.Shastri | 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.

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