# 20SH1105 - ENGINEERING MATHEMATICS - I

(Common to all Branches)

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| **Course Category:** | Basic Science | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3-1-0 |
| **Prerequisite:** | Intermediate Mathematics | **Sessional Evaluation:**  **Univ. Exam Evaluation:**  **Total Marks:** | 40  60  100 |
| **Objectives** | To make the student learn about   * The concepts of Newton’s law of cooling, Law of natural growth and decay. * Solving higher order differential equations with RHS of different types by using analytical techniques. * The concepts of first shifting theorem, Change of scale property, Laplace transformation of multiplied by t and division by t and transformation of derivatives and integrals. * The application of Solutions of Ordinary Differential Equations. * The basic concepts of Matrices. * Taylor’s and Maclaurin’s series, Maxima and Minima of the functions of two and three variables. | | |

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| **Course Outcomes** | Upon successful completion of this course students will be able to: | |
| CO1 | Attains skills in solving first order differential equations and its applications. |
| CO2 | Acquire knowledge in solving higher order differential equations by using various types. |
| CO3 | Acquire basic knowledge in Laplace transforms and their applications. |
| CO4 | Develop analytical skills in solving the Ordinary Differential Equations by using the Laplace transform technique. |
| CO5 | Understand effectively the analyzation of the Rank of the matrix, Consistency of system of linear equations, Eigen values and Eigen vectors. |
| CO6 | Attains skills in analysing the Taylor’s and Maclaurin’s series and Maxima and Minima of the functions of two and three variables. |
| **Course Content** | UNIT - I  **First order Differential Equations**: Differential Equations of first order and first degree – exact, linear and Bernoulli. Applications to Newton’s law of cooling, Law of natural growth and decay.  UNIT - II  **Higher order Differential Equations:** Homogeneous linear differential equations of second and higher order with constant coefficients with R.H.S. of the type,  or,,V and .  UNIT - III  **Laplace Transformation:** Laplace Transformations of standard functions, First shifting theorem, Change of scale property, Laplace transformation of multiple by t and division by t, Transformation of derivatives and integrals.  UNIT - IV  **Inverse Laplace Transformation:** Inverse transforms, Method of partial fractions, Shifting property, Inverse Laplace transform of a multiple by s and division by s, Inverse Laplace transform of derivatives and integrals, Convolution theorem. Application to Solutions of Ordinary Differential Equations.  UNIT - V  **Matrices:** Rank of Matrix by Echelon form, System of homogenous and non- homogenous linear equations, Eigen values and Eigen vectors and their properties.  UNIT - VI  **Differential Calculus:** Taylor’s and Maclaurin’s series, Maxima and Minima of function of two variables and Lagrangian method of multipliers with three variables only. | |
| **Text Books and References** | Text Books:   1. Higher Engineering Mathematics - B. S. Grewal, Kanna Publishers, New Delhi. 2. Engineering Mathematics - B.V. Ramana, Tata McGraw-Hill Education Pvt. Ltd, New Delhi. | |
| Reference Books:   1. Higher Engineering Mathematics - H.K. Dass, Er. Rajnish Verma, S. Chand Publication, New Delhi. 2. Advanced Engineering Mathematics - N.P. Bali & M. Goyal, Lakshmi Publishers, New Delhi. 3. Advanced Engineering Mathematics - Erwin Kreyszig, Wiley, India | |