**19SH1104 – ENGINEERING MATHEMATICS – I**

(Common to all branches)

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| **Course category:** | Basic Sciences | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-1-0 |
| **Prerequisite:** | Intermediate Mathematics | **Sessional Evaluation:**  **External Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course**  **Objectives** | Students undergoing this course are expected to: | |
| 1. The concepts of Newton’s law of cooling, Law of natural growth and decay. 2. Solutions of higher order linear differential equations with RHS of the different types. 3. 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. 4. The concepts of Inverse Laplace transform and their applications. 5. The solution of system of linear equations by matrices. 6. Taylor’s and Maclaurin’s series, Maxima and Minima of the functions of two and three variables. | |
| **Course Outcomes** | Upon successful completion of the course , the students will be able to: | |
| CO1 | Attains skills in solving first order differential equations and its applications. |
| CO2 | Solve the linear differential equations related to various engineering fields. |
| 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 | Develop the use of matrix algebra techniques that is needed by engineers for practical applications. |
| CO6 | Attains skills in analyzing the Taylor’s and Maclaurin’s series and maxima and minima of the functions of two and three variables. |
| **Course**  **Content**  **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 – Region of convergence – 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 Laplace transform – Method of partial fractions – Shifting property – Inverse Laplace transform of 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 – Cayley-Hamilton theorem (without proof)-Eigen values and Eigen vectors and their properties.  **UNIT - VI**  **DIFFERENTIAL CALCULUS:** Taylor’s and Maclaurin’s series of single variable – Maxima and minima of function of two variables – Lagrangian method of multipliers with three variables only. | |
| **Text Books and Reference Books** | **TEXT BOOKS:**   1. Higher Engineering Mathematics – B.S.Grewal, Khanna 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 | |

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| Contribution of Course Outcomes towards achievement of Program Outcomes (3-High, 2-Medium, 1-Low) | | | | | | | | | | | | | | |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | - | - |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | 2 | - | - |
| CO3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 3 | - | - |
| CO4 | 3 | 3 | 3 | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO5 | 3 | 3 | 3 | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO6 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | - | - |