**20SH1102-ENGINEERING MATHEMATICS –I**

(Common to all branches)

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| **Course Category:** | | Basic Science | | **Credits:** | 3 |
| **Course Type:** | | Theory | | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre – requisite:** | | Intermediate Mathematics | | **Sessional Evaluation:**  **External Evaluation:**  **Total Marks:** | 40  60  100 |
| **Course Objectives** | To make the student learn about   1. The concepts of Newton’s law of cooling, Law of natural growth and decay. 2. Solving higher order differential equations with RHS of different types by using analytical techniques. 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 application of solutions of Ordinary Differential Equations. 5. The basic concepts of Matrices. 6. Taylor’s and Maclaurin’s series, Maxima and Minima of the functions of two and three variables. Learn about Gamma and Beta functions | | | | |
| **Course Outcomes** | CO1 | | Attains skills in solving first order differential equations and its applications. | | |
| CO2 | | Acquire knowledgein 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 analyzing the Taylor’s and Maclaurin’s series and Maxima and Minima of the functions of two and three variables. Apply Gamma and Beta functions to evaluate integrals. | | |
| **Course**  **Content** | **UNIT – I**  Differential equations of first order and first degree – Exact, linearand Bernoulli equations. Applications: to Newton‘s law of cooling,law of natural growth and decay, orthogonal trajectories.  **UNIT - II**  Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type eax, Sin ax, cos ax, polynomials in x, eax V(x), xkV(x), method of variation of parameters.  **UNIT - III**  Laplace transform of standard functions – First shifting Theorem, Change of scale property – Laplace transformation of multiple by t and division by t –Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Laplace transform of Periodic function.  **UNIT - IV**  Inverse Laplace transform of standard functions – Method of partial fractions – Shifting property – Inverse Laplace transform of amultiple by s and division by s – Differentiation and integration of Inverse Laplace transform – Convolution theorem – Application of Laplace transforms to ordinary differential equations of first and second order.  **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. Cayley-Hamilton Theorem (without proof).  **UNIT - VI**  **Calculus**: Taylor’s and Maclaurin’s series – Maxima and Minima of function of three variables with Lagrangian multipliers method – Beta and Gamma functions and their applications. | | | | |
| **Textbooks & Reference books** | **TEXTBOOKS:**   1. B.S.Grewal,*“Higher Engineering Mathematics”*, Khanna Publishers, New Delhi. 44th edition, 1965. 2. B.V. Ramana,*“Engineering Mathematics”*, Tata McGraw-Hill Education Pvt. Ltd, New Delhi, 1stediton,2017.   **REFERENCES:**   1. H.K. Dass, Er. RajnishVerma, *“Higher Engineering Mathematics”*, S. Chand Publications, New Delhi, 2014. 2. N.P. Bali & M. Goyal, *“Advanced Engineering Mathematics*”, Lakshmi Publishers, New Delhi. 1st edition, 2015. 3. Erwin Kreyszig, *“Advanced Engineering Mathematics*” Wiley publications, India.10th edition, 2010. | | | | |