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| **Course code** | **Course Title** | **Core/ Elective** | | | | | |
| BS202HS | Engineering Mathematics –  II | Core | | | | | |
| L | T | P/D | Credits | CIE | SEE |
| 3 | 1 | 0 | 4 | 40 | 60 |
| **Prerequisite:** Basics of Differentiation, Integration and Trigonometric results.  **Course Objectives:** The objective of this course is to make the student   * Study the concepts of sequences, series, and their properties. * Provide the over view of ordinary differential equations of first order and their application to mathematical problems. * Solving higher order ordinary differentiation by various mathematical methods. * Evaluate improper integrals using Beta and Gamma functions * Study Laplace transforms and its applications to differential equations.   **Course Outcomes:**  After completion of the course, the student will be able to   * **CO.1**. To Test for the convergence and divergence of infinite series using the comparison test, Ratio test, Cauchy’s nth root test, Leibnitz’s test, and also analyzing the nature of series. * **CO.2.** Solve the ordinary differential equations of first order and their physical and geometrical applications. * **CO.3** Solve the ordinary differential equations of second and higher with constant and variable coefficient by different methods. Solution of non- homogeneous equations, Euler-Cauchy equation. Method of variation of parameters. * **CO.4** Evaluate the improper integrals using beta and gamma functions. Solution of Legendre polynomials. * **CO.5** Evaluate Laplace Transforms, Inverse Laplace Transforms of functions and their applications to ordinary differential equations. | | | | | | | |
| **Unit-I (10Hrs)**  **Sequence and series**: Sequences—General properties of series, Series of positive terms, Comparison test, tests of convergence-D’Alembert’s Ratio test, Cauchy’s nth root test, Raabe’s test, Logarithmic test, Alternating series, Series of positive and negative terms, Absolute convergence, and Conditional convergence.  **Unit-II (10Hrs)**  **Differential Equations of First Order**: Exact Differential Equations, Integrating Factors, Linear differential Equations, Bernoulli's Equation, Riccati's and Clairaut's differential equations, Orthogonal Trajectories of a  Given Family of Curves, Applications of differential equations-L-C,L-R | | | | | | | |

circuit.

### Unit-III (12Hrs)

**Differential Equations of Higher Order:** Solutions of second and higher order linear Homogenous Equations with Constant Coefficients, Solutions of non-homogeneous linear differential equations, Method of Variation of Parameters, solution of Euler-Cauchy Equation, Applications of differential equations-L-CR circuit.

### Unit-IV (8Hrs)

**Special functions**: Gamma Function, Beta Function, Relation between Gamma and Beta Functions, Error Function, Power Series Method, Legendre's Differential Equations and Legendre's Polynomial Pn(x), Orthogonal property of Legendre's Polynomial Rodrigue's Formula (with proof).

### Unit-V (10Hrs)

Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof). Solution of ordinary differential Equations using Laplace Transforms**.**

### TEXT BOOKS:

T1. Dr.B.S. Grewal, Higher. Engineering Mathematics, Khanna Publications, 43rd Edition,2014. (Unit 1-5)

T2. Advance Engineering Mathematics by Jain and Iyengar,5th Edition, Narosa Publications (Unit 1-5)

T3.B. V. Ramana, Higher Engineering Mathematics,3rd Edition 2015.

(Unit 1-5)

### REFERENCES/ SUGGESTED READING:

R1. M.D Raisinghania, Ordinary Differential Equations, 11th Revised Edition R2. S.S. Sastry, Engineering mathematics, 3rd Edition, Paperback

R3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley, 9th Edition, 2012.

R4. Peter. V. O’ Neil, Advance Engineering Mathematics,’ Publisher, Global Engineering 7th Edition, 2012