**19SH2101-ENGINEERING MATHEMATICS –III**

( Common to CE, ME, EEE & ECE)

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| **Course Category:** | Basic Sciences | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture – Tutorial – Practical:** | 2-1-0 |
| **Pre-requisite:** | Intermediate Mathematics | **Sessional Evaluation:****External Exam Evaluation:****Total Marks:** | 4060100 |

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| **Course Objectives:** | To make the student learn about: |
| 1. The basic concepts of numerical solutions of simultaneous linear and non-linear algebraic equations.
2. The numerical methods to solve Ordinary Differential Equations by using Taylor’s series method, Picard’s method, Euler’s and Modified Euler’s Methods and Runge-Kutta methods of 2nd and 4th order.
3. The concepts of Cauchy - Riemann equations, Construction of Analytic function, Line integral, Cauchy’s theorem and Cauchy’s integral formula.
4. The concepts of Residues.
5. The Properties of Z**-** Transforms, shifting properties, initial value and final value theorems and the applications of difference equations.
6. Foundation of the probability and statistical methods.
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| **Course Outcomes:** | Upon successful completion of the course, the students will able to: |
| CO1 | Have a sound knowledge in analyzing the simultaneous linear and non-linear algebraic equations by various numerical methods. |
| CO2 | Understand effectively the significance numerical methods to solve Ordinary Differential Equations. |
| CO3 | Understand effectively the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and also Cauchy’s integral formula. |
| CO4 | Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues. |
| CO5 | Attains skills in analyzing the Z**-**Transforms and their applications. |
| CO6 | Have a well-founded knowledge of standard distributions (Binomial, Poisson and Normal distributions) which can describe real life phenomena. |
| **Course Content:** | **UNIT - I****Solution of Simultaneous Linear and Non-linear Algebraic Equations:** Iteration method, Gauss Jordon method, Gauss Elimination with Pivotal condensation method, Triangular Factorization method, Gauss-Seidal method and Newton-Raphson method**UNIT - II****Numerical Solution of Ordinary Differential Equations:** Solution by Taylor’s Series, Picard’s Method of Successive Approximations, Euler’s Methods and Runge-Kutta Method of 2nd order and 4th order.**UNIT-III****Complex Analysis:** Analytical functions, Cauchy - Riemann equations, Construction of Analytic function, Complex integration - Line integral, Cauchy’s theorem, Cauchy’s integral formula and Generalized Cauchy’s integral formula.**UNIT-IV****Residues**: Taylor’s theorem and Laurent’s theorem (without proof), Singularities, Poles, Residues, Residue theorem and Evaluation of real definite integrals.**UNIT-V****Z-Transforms:** Z**-**Transform of some standard functions, Properties of Z**-**Transforms, Shifting Properties, Initial value theorem and final value theorem, Inverse Z-Transform, Convolution theorem, Inversion by partial fractions and Applications to difference equations.**UNIT-VI****Probability and Statistics**: Introduction, Random variables, Discrete and Continuous distributions, Binomial distribution, Poisson distribution and Normal distribution. |
| **Text Books &****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.3. Advanced Engineering Mathematics - Erwin Kreyszig, Wiley, India**REFERENCE BOOKS:**1.Higher Engineering Mathematics - H.K. Dass, Er. RajnishVerma, S. Chand Publication, New Delhi.2.Engineering Mathematics -III - Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S. Ranganatham, Dr.M.V.S.S.N. Prasad, S. Chand Publication, New Delhi3.Special functions and complex variables (Engineering Mathematics-III) – Shahnaz Bathul, PHI, New Delhi. |
| **e-Resources** | 1.<https://nptel.ac.in/courses>2.<https://freevideolectures.com/university/iitm> |