**20SH2101 - ENGINEERING MATHEMATICS - III**

**(*New regulations with effect from 2020 -21)***

**(Common ECE, EEE & CE)**

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| **Course Category:** | Basic Sciences | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture -Tutorial-Practical:** | 3-1-0 |
| **Pre – requisite:** | Intermediate Mathematics | **Sessional Evaluation:****External Evaluation:****Total Marks:** | 4060100 |

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| **Course****Objectives:** | 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:** | After completing the course the student will be 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-KuttaMethod 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. |
| **Textbooks:** | 1. B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, New Delhi.
2. B.V. Ramana, *Engineering Mathematics*, Tata McGraw-Hill Education Pvt. Ltd, New Delhi.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley, India.
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| **Reference:** | 1. H.K. Dass, Er. RajnishVerma, *Higher Engineering Mathematics*, S. Chand Publication, New Delhi.
2. Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S. Ranganatham, Dr.M.V.S.S.N. Prasad, *Engineering Mathematics –III*, S. Chand Publication, New Delhi
3. Special functions and complex variables (Engineering Mathematics-III) – Shahnaz Bathul, PHI, New Delhi.
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