(w.e.f. from A.Y 2022-2023)

NIRMA UNIVERSITY
Institute of Technology
Bachelor of Technology-Electronics and Instrumentation Engineering
Semester III

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Course Code	**2MA306**
Course Title	**Applied Mathematics for Electronics and Instrumentation Engineering**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to-

1. apply principles of probability and probability distribution
2. relate calculus of function of complex variables in engineering field
3. use Laplace transformation technique to solve ordinary differential equations
4. comprehend numerical methods in solving algebraic, transcendental and ordinary differential equations

Syllabus: Teaching hours:

Unit I **10**

Laplace Transforms: Definition, Linearity property, Laplace transforms of elementary functions, Shifting theorem Inverse Laplace transforms of derivatives and integrals, Convolution theorem, Application of Laplace transforms in solving ordinary differential equations related to engineering field

Unit II **10**

Functions of Complex Variables: Analytic function, Cauchy – Riemann equation (Cartesian and Polar forms), Harmonic functions, Conformal mappings, Complex integration, Cauchy's theorem and integral formula, Singularities, Taylor's and Laurent's Series theorem, Evaluation of integrals using residues

Unit III **6**

Iterative Methods: Motivation, errors, truncation error, rounded off error, absolute error, relative error and percentage error, Solution of algebraic and transcendental equation by bisection, False position, Secant, Newton-Raphson iteration and extended iteration methods, Rate of convergence of the iteration methods, Comparisons of iterative methods

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Unit IV 3

Numerical Solution of ordinary differential equations: Taylor series method, Euler's Method, Runge-Kutta method of 4th order

Unit V 5

Statistics: Measure of central tendency and dispersion, Correlation and Regression

Unit VI 11

Theory of Probability and distribution: Permutations & Combinations, Definition of probability, Application of permutations and combination, Conditional probability, Bayes' Theorem, Markov chain, Concept of random variable, Probability density and distribution functions, Mean and Variance, Moments, Probability distribution, Binomial, Poisson and normal probability distributions

Tutorials:

This shall consists of at least 8 tutorials based on the syllabus.

Self-Study:

Self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from the self-study contents.

Suggested Readings^:

1. A. Papoulis and S. Unnikrishna Pillai, Probability, Random variables and Random Processes, Tata McGraw Hill
2. M.J. Ablowitz & A.S. Fokas, Complex variables – Introduction & Application, Cambridge University Press
3. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4. S. C. Chapra and R.P. Canale, Numerical Methods for Engineers with Programming and Software Applications,, McGraw Hill
5. S.D. Conte and Carl de Boor, Elementary Numerical Analysis – An Algorithmic Approach, McGrwaw Hill
6. C.E. Froberg, Introduction to Numerical Analysis, Addison Wesley
7. H K Dass, Advanced Engineering Mathematics, S. Chand & Co.

L = Lecture, T = Tutorial, P = Practical, C = Credit ^ this is not an exhaustive list

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