



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3130908

Semester – III

Subject Name: Applied Mathematics for Electrical Engineering

Type of course: Basic Science Course

Prerequisite: The students are required to have a reasonable understanding of Calculus, Differential equations and Linear algebra and introductory knowledge of probability and statistics.

Rationale:

There is different kind of systems which requires through mathematical analysis tools. The type of systems which requires such tools are linear systems, nonlinear systems and dynamical systems. Apart from them, it requires systematic study of uncertainty (randomness) by probability - statistics and curve fitting. The different methods like numerical methods are required to be studied.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	2	0	5	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs	% Weightage
01	Numerical Solutions: Roots of Algebraic and Transcendental Equations : Bisection, false position, Secant and Newton-Raphson methods, Fixed Point Iteration, Rate of convergence, Applications to electrical engineering problems.	06	14 %
02	Interpolation: Finite Differences, Forward, Backward and Central operators, Interpolation by polynomials: Newton's forward, Backward interpolation formulae, Newton's divided formulae and Lagrange's interpolation formulae for unequal intervals, Applications to electrical engineering problems.	06	14 %
03	Numerical Integration: Newton-Cotes formula, Trapezoidal and Simpson's formulae, error formulae, Gaussian quadrature formulae, Applications to electrical engineering problems	04	10%
04	Numerical solution of Ordinary Differential Equations: Picard, Taylor, Euler methods and Runge-Kutta methods, Applications to electrical engineering problems	04	10%
05	Curve fitting by the numerical method: Curve fitting by of method of least squares, fitting of straight lines, second degree parabola and more general curves.	04	10%
06	Basic Probability: Experiment, definition of probability, conditional probability, independent events, Bayes' rule, Bernoulli trials, Random variables, discrete random variable, probability mass function, continuous random variable, probability density function, cumulative distribution function, properties of cumulative distribution function, Applications to electrical engineering problems.	10	22 %



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07	Basic Statistics: Measure of central tendency: Moments, Expectation, dispersion, skewness, kurtosis, Bounds on probability, Chebyshev's Inequality, Applications to electrical engineering problems.	08	20%
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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	35	20	0	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

- (1) E. Kreyszig, Advanced Engineering Mathematics, John Wiley (1999)
- (2) J. L. Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning
- (3) Chapra S.C, Canale, R P, Numerical Methods for Engineers , Tata McGraw Hill, 2003.
- (4) Gerald C. F. and Wheatley P.O. , Applied Numerical Analysis (5th Edition), Addison-Wesley, Singapore, 1998
- (5) P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall.
- (6) S. Ross, A First Course in Probability, 6th Ed., Pearson Education India.
- (7) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, Wiley.
- (8) D. C. Montgomery and G. C. Runger, Applied Statistics and Probability for Engineers, Wiley.

Course Outcomes:

After learning the course, the students should be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	solve algebraic equation related to electric engineering problem by using numerical methods and understand convergent of it	
CO-2	find unknown value of given data by using various interpolation methods and curve fitting	
CO-3	calculate integration and solve differential equations by using numerical methods	
CO-4	understand the terminologies of basic probability and their probability functions and apply it in electrical problems	
CO-5	understand the central tendency methods and apply it in electrical problems	



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List of Open Source Software/learning website:

- E-materials available at the website of NPTEL- <http://nptel.ac.in/>