Department of Mechanical Engineering

ENGINEERING MATHEMATICS -IV
(Numerical Methods, Probability and Statistics)

Course Code	19BS1401	Year	II	Semester	II
Course Category	Basic Sciences course	Branch	ME	Course Type	Theory
Credits	3	L – T – P	3 – 0 – 0	Prerequisites	NIL
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes		Levels
After successful completion of the course, the student will be able to		
CO1	Determine approximate root of an equation and apply different methods to calculate the value of interpolating polynomial at given point	L1
CO2	Evaluate integrals making use of quadrature formulae and solve ordinary differential equations by Euler's, R.K. methods.	L4
CO3	Use discrete and continuous distribution models to calculate probabilities for appropriate random variables.	L5
CO4	Understand and apply the basic concepts of inferences concerning means and proportions to the decision making process.	L2
CO5	Interpret hypotheses test for small samples.	L1

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1: Low)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										2	2	
CO2	3	2										2	2	
CO3	3	2										2	2	
CO4	3	2										2	2	
CO5	3	2										2	2	

Syllabus		
Unit No.	Contents	Mapped COs
I	**SOLUTION TO ALGEBRAIC AND TRANSCENDENTAL EQUATIONS** Solution of algebraic and transcendental equations: Bisection method and Newton-Raphson's method. Finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Lagrange's formula.	CO1
II	**NUMERICAL DIFFERENTIATION AND INTEGRATION** Numerical Differentiation- Newton's forward and backward difference formulae, numerical integration- trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules. Ordinary differential equations: Euler's, modified Euler's, Runge-Kutta method of fourth order for solving first order equations.	CO2
III	**PROBABILITY** Random variables (discrete and continuous), probability density functions,	

	probability distribution: Binomial - Poisson - normal distribution and their properties (mathematical expectation and variance).	CO3
IV	**TESTING OF HYPOTHESIS** Formulation of null hypothesis, critical regions, level of significance. Large sample tests: Test for single proportion, difference of proportions, test for single mean and difference of means.	CO4
V	**SMALL SAMPLE TESTS** Student's t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test)	CO5

Learning Recourse(s)
Text Book(s)
1. B.S. Grewal, *Higher Engineering Mathematics,* Khanna Publishers, 44/e, 2019. 2. T.K.V.Iyenger, Krishna Gandhi and others, *Probability & Statistics*, S.Chand.
Reference Book(s)
1.   Erwin Kreyszig, *Advanced Engineering Mathematics*, 9/e, John Wiley & Sons, 2006. 2.   Miller and Freund's, *Probability and Statistics for Engineers*,Pearson.
e-Resources & other digital material
1. https://www.nptel.ac.in/courses/111/107/111107105/ 2. https://www.nptel.ac.in/courses/111/105/111105041/ 3. https://www.nptel.ac.in/courses/111/106/111106112/ 4. https://www.nptel.ac.in/courses/111/105/111105090/