NUMERICAL & STATISTICAL METHODS

Course Code	20BS1301	Year	II	Semester	I
Course Category	Basic Sciences	**Branch**	ME	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Pre-requisites**	Nil
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes: Upon successful completion of the course, the student will be able to

CO	Statement	Skill	BTL	Units
CO1	**Understand** the basic concepts of Numerical and statistical Methods	Understand	L2	1,2,3,4,5
CO2	**Apply** different Numerical methods to solve the problems of numerical differentiation, integration, ordinary differential equations.	Apply	L3	1,2,
CO3	**Apply** concepts of probability and random variables to real life problems.	Apply	L3	3,4,5
CO4	**Estimate** the interpolated values, approximate roots, areas and derivatives.	Analyze	L4	1,2,5
CO5	**Analyse** the data to test of hypothesis corresponding to mean, proportions for large and small samples.	Analyze	L4	3,4,5
CO6	**Apply different methods to solve** Numerical and statistical problems and submit a report.	Apply	L3	1,2,3,4,5

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														
CO2	3								2	2			2	
CO3	3								2	2			2	
CO4		3											2	
CO5		3											2	
CO6	3								2	2			2	

Syllabus		
UNIT	**Contents**	**Mapped COs**
I	**Solution to Algebraic and Transcendental Equations** Solution of algebraic and transcendental equations: Bisection method, method of false position 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. (All theorems/properties without proofs)	**CO1, CO2, CO4, CO6**
II	**Numerical Differentiation and Integration** Numerical Differentiation- Newton's forward and backward difference formulae. Numerical integration- trapezoidal rule, Simpson's $\frac{1^{rd}}{3}$ and $\frac{3^{th}}{8}$ rules. Ordinary differential equations: Euler's, modified Euler's, Runge-	**CO1, CO2, CO4, CO6**

	Kutta method of fourth order for solving first order equations. (All theorems/properties without proofs)	
III	**Probability** Random variables (discrete and continuous), probability density functions, probability distribution: Binomial - Poisson - normal distribution and their properties (mathematical expectation and variance). (All theorems/properties without proofs)	**CO1, CO3, CO5, CO6**
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.	**CO1, CO3, CO5, CO6**
V	**Small Sample Tests** Student's t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test)	**CO1, CO3, CO5, CO6**

Learning Resourse(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/ 5.FED Moodle