23BS1301: NUMERICAL & STATISTICAL METHODS
SYLLABUS

Course Code	23BS1301	Year	II	Semester	I
Course Category	Basic Science course	**Branch**	Freshman Engineering /CE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Differentiation & Integration
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

	After successful completion of the course, the student will be able to
CO1	**Interpret** the basic concepts of Numerical and statistical Methods .(L2)
CO2	**Apply** different Numerical methods to solve the problems of numerical differentiation, integration, ordinary differential equations.(L3)
CO3	**Apply** concepts of probability and random variables to real life problems. (L3)
CO4	**Estimate** the interpolated values, approximate roots, areas and derivatives. (L4)
CO5	**Analyze** the data to test of hypothesis corresponding to mean, proportions for large and small samples. (L4)

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	2												1	
CO2	3												1	
CO3	3												1	
CO4		3											1	
CO5		3											1	

UNIT No.	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**
II	**Numerical Differentiation and Integration** Numerical Differentiation- Newton's forward and backward difference formulae. Numerical integration- trapezoidal rule, Simpson's $(\frac{1}{3})^{rd}$ and $(\frac{3}{8})^{th}$ **rules**. Ordinary differential equations: Euler's, modified Euler's, Runge-Kutta method of fourth order for solving first order equations. (All theorems/properties without proofs)	**CO1,CO2, CO4**
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**
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**

	Small Sample Tests	**CO1,CO3, CO5**
V	Student's t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test)	

Learning Resource(s)

Text Book(s)

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44/e, 2019.
2. Numerical Methods by T. Veerarajan, Tata McGeaw-Hill Education Publishers.
3. Miller and Freund's, Probability and Statistics for Engineers , Pearson.

Reference Book(s)

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
2. T.K.V.Iyenger, Krishna Gandhi and others, Probability & Statistics, S.Chand.

e- Resources & other digital material

1. https://nptel.ac.in/courses/111/107/111107105/
2. https://nptel.ac.in/courses/111/105/111105041/
3. https://nptel.ac.in/courses/111/106/111106112/
4. https://nptel.ac.in/courses/111/105/111105090/5.FED

Moodle