BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING

REGULATION	BR23				
II B.TECH I SEMESTER	Course Code: 23BS3T01	L	T	P	C
		3	0	0	3
Course Title:	NUMERICAL TECHNIQUES AND STATISTICAL METHODS				

Course Objectives:

1 To elucidate the different numerical methods to solve non-linear algebraicequations.
2To disseminate the use of different numerical techniques for carrying outnumerical integration.
3To familiarize the students with the foundations of probability and statisticalmethods.
4To equip the students to solve application problems in their disciplines.

Course Outcomes: At the end of the course Student will be able to

CO	Statement	Blooms level
CO1	. Apply numerical methods to find the solution algebraic and transcendental equations and interpolate the polynomials	L3
CO2	Apply numerical methods to evaluate the definite integrals and to find the solution of initial value problems	L3
CO3	Apply various Probability distributions for both discrete and continuous random variables Apply various Probability distributions for both discrete and continuous random variables	L3
CO4	Compute the mean and variance of samples with and without replacement	L5
CO5	Infer the statistical inferential methods based on small and large sampling tests	L4

UNIT-I: Iterative Methods:

Introduction - Solutions of algebraic and transcendental equations :Bisection method - Secant method - Method of false position - Iteration method - Newton- Raphson method (One variable and simultaneous Equations)
Interpolation: Forward, backward and central difference operators - Properties - Newton's forward and backward formulae for interpolation - Interpolation with unequal intervals - Lagrange's interpolation formula.

Dr M C S MADAN HOD &BOS, Department of Civil Engineering, BVCITS Batlapalem	Dr G Yesuratnam Professor of Civil Engineering JNTU Kakinada . (University Nomine)	Dr A Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi.	Dr B Raghuram kadali, Asst Assistant Professor, Department of civil Engineering, NIT Warangal.	Mr P Rajesh Sr Engineer(P)SDVVL Survey &Constructions, Kakinada (Industrial Expert)	Mr Chakradhar Prasad Assistant Professor, Department of civil DNR College of Engineering Technology Bhimavaram. (Alumni Member)

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UNIT-II: Numerical integration, Solution of ordinary differential equations with initial conditions:

Trapezoidal rule - Simpson's $1/3^{rd}$ and $3/8^{th}$rule - Solution of initial value problems by Taylor's series - Picard's method of successive approximations - Euler's method - Modified Euler's Method - Runge - Kutta method (second and fourth order) -Milne's Predictor and Corrector Method.

UNIT-III: Probability and Distributions:

Baye's theorem - Random variables - Discrete and Continuous random variables - Distribution functions - Probability mass function, Probability density function and Cumulative distribution functions - Mathematical Expectation and Variance - Binomial, Poisson, Uniform and Gaussian distributions.

UNIT-IV: Sampling Theory for Large & Small Samples:

Introduction - Population and Samples - Sampling distribution of Means and Variance - Point and Interval estimations - Maximum error of estimate - Central limit theorem (without proof).

UNIT-V: Tests of Hypothesis:

Introduction - Hypothesis - Null and Alternative Hypothesis - Type I and Type II errors - Level of significance - One tail and two-tail tests - Test of significance for large samples and Small Samples: Single and two means - Single and two proportions - Student's t- test, F-test, x^2 - test.

Textbooks:

1. **B.S.Grewal,** Higher Engineering Mathematics, 44^{th}Edition, KhannaPublishers.
2. **Miller and Freund's,** Probability and Statistics for Engineers, 7/e, Pearson,2008.

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ReferenceBooks:

1. **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineeringand Science, Tata Mc. Graw Hill Education.
2. **M. K. Jain, S.R.K.Iyengar and R.K.Jain,** Numerical Methods for Scientificand Engineering Computation, New Age International Publications.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.
4. **S.C.Gupta and V.K.Kapoor**, Fundamentals of Mathematical Statistics, 11/e,Sultan Chand & Sons Publications, 2012.
5. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and StatisticsEngineers and the Scientists, 8th Edition, Pearson 2007.
6. **Jay l. Devore,** Probability and Statistics for Engineering and the Sciences,8th Edition, Cengage.

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