Sankalchand Patel University

Faculty of Engineering and Technology

Semester-IV (Civil Engineering)

In Effect from Academic Year 2017-18

Subject Code : 1ET1060401	**Subject Title: Numerical and Statistical Methods for Civil Engineering**
Pre-requisite Subject	Calculus, Differential equations and Linear algebra, Probability and Statistics.

Course Objective: To understand the applications of numerical methods. To solve equations numerically, to evaluate integrals numerically, to solve ordinary differential equations numerically. To apply mathematical concepts in various subjects of relevant branch.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory		Practical		Total (T+P)
Lecture	Tutorial	Practical	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	2	-	5	70	30	-	-	100

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1.	**Reorientation** Definition of probability, Exhaustive events, Pair wise independent events, Multiplicative law of probability, Conditional probability, Baye's theorem	03	7 %
2.	**Probability Distributions** Random variable, Mathematical Expectation, Standard Deviation, Binomial, Poisson and Normal distributions, Mean, Median, Mode	05	12 %
3.	**Descriptive Statistics** Mean, Median, Mode, Standard deviation, Skewness	03	7 %
4.	**Correlation and Regression** Bivariate distribution, Correlation coefficients, Regression lines, Formulas for Regression coefficients, Rank correlation	04	10 %
5.	**Curve Fitting** Fitting of Linear, Quadratic, Exponential and Logarithmic curves, Least squares method	03	7 %
6.	**Finite Differences and Interpolation** Finite Differences, Forward, Backward and Central operators, Interpolation by polynomials: Newton's forward ,Backward interpolation formulae, Gauss & Stirling's central difference formulae, Newton's divided and Lagrange's formulae for unequal intervals	08	19 %
7.	**Numerical Integration** Newton-Cotes formula, Trapezoidal and Simpson's formulae, error formulae, Gaussian quadrature formulae	03	7 %

8.	**Solution of a System of Linear Equations** Gauss elimination, partial pivoting , Gauss-Jacobi and Gauss Seidel methods	03	7 %
9.	**Roots of Algebraic and Transcendental Equations** Bisection, false position, Secant and Newton-Raphson methods, Rate of convergence	04	10 %
10.	**Numerical solution of Ordinary Differential Equations** Taylor series method, Euler method, Runge-Kutta method of order four, Milne's Predictor-Corrector method	06	14 %

Course Outcome: Students will be able to apply mathematical concepts to engineering problems of their relevant branches after studying this course.

List of Reference Books:

1. E. Kreyszig, Advanced Engineering Mathematics (8th Edition), John Wiley (1999)
2. S. D. Conte and Carl de Boor, Elementary Numerical Analysis-An Algorithmic Approach (3rd Edition), McGraw-Hill, 1980
3. C.E. Froberg, Introduction to Numerical Analysis (2nd Edition), AddisonWesley,1981
4. Gerald C. F. and Wheatley P.O. , Applied Numerical Analysis (5th Edition),Addison-Wesley, Singapore, 1998
5. Johnson Richard A., Miller and Freund's - Probability and Statistics (8th Edition), PHI.
6. S.C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics (11th Edition), Sultan Chand & Sons.