



Subject Code: 01MA1281

Subject Name: Statistical and Numerical Methods

B.Tech. Year - II

Objective: Statistical and Numerical methods are one of the essential tools for learning Technology, Engineering and Sciences. This course lays the foundation for Numerical and statistical methods in subsequent semesters, so that students get a sound knowledge and important aspects of those techniques which can lead them to work in the platform of data science or artificial intelligence or any kind of statistics related field.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able to

- Understand the basic concepts of probability and distribution to realize the logic of data sciences. (Comprehension)
- Apply the concept of Data representation and Analysis in various field of engineering like image processing etc. (Application)
- Apply concept of Correlation and Regression in result analysis and Business forecasting using EXCEL. (Analysis)
- Define different types of errors for accuracy and precision of solutions to hike up the level of accuracy in daily calculations. (Knowledge)
- Express curve fitting and interpolation techniques to approximate a function into any known curve to analyse their behaviours. (Analysis)

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
3	2	-	4	50	30	20	25	25	150



Contents:

Unit	Topics	Contact Hours
1	Data representation and Analysis Revision of basic concept of statistics, Measure of central tendency and dispersion, Statistical diagram: scattered diagram, histogram, ogive curve, pie charts etc., Use of EXCEL software to compute statistical measures and diagrammatic representation	6
2	Regression and Correlation Measure of association between two variables. Types of correlation, Karl Pearson's Coefficient of correlation and its mathematical properties, Spearman's Rank correlation and its interpretations, Regression Analysis, linear regression equations, properties of regression coefficients, Use in forecasting and estimation computational through EXCEL.	6
3	Random variable and Probability distribution Revision of elementary concept of Probability, Discrete and continuous random variable, Mass, Density and cumulative distribution functions, expected values and variance of random variable, Standard probability distributions.	8
4	Errors in Digital computations Accuracy of numbers, Significant digits, Representation of numbers in computers, Computer arithmetic, Types of errors, Basic sources of errors and Errors in computations with digital computer	3
5	Roots of equations, Interpolation and Curve fitting Bisection method, False position (Regula-Falsi) and Newton-Raphson, Finite difference, Forward and backward differences, Interpolation and Extrapolation, Newton's forward interpolation formula, Newton's backward interpolation formula, Lagrange's interpolation formula and Newton's divided difference formula, Least squares curve fitting methods, linear and nonlinear curve fitting.	12
6	Numerical Integration and solution of ordinary differential equations Numerical Integration: Gaussian integration, Newton - cotes quadrature formula Composite rules: Trapezoidal rule and Simpson's rules, Solution of ODE by Euler's, Runge-Kutta (2 nd and 4 th order) methods.	7



	Total Hours	42
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References:

1. Miller and Freund's Probability and Statistics for Engineers:
Richard A Johnson, Prentice
2. Hall of India.
3. Introductory Methods of Numerical Analysis: S.S. Sastry,
Prentice Hall of India.
3. Computer Oriented Numerical Methods: V. Rajaraman,
Prentice Hall of India
4. Numerical methods with programs in C++: S Balachandra
Rao & C K Shantha
5. Numerical Methods with programs in C and C++:
Veerarajan & Ramchnadran. Tata McGraw Hill
6. A textbook of Computer based numerical and Statistical
Techniques: A. K. Jaiswal & Anju Khandelwal, New Age
International Publishers.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	30%	40%	10%	-	-

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory



Supplementary Resources:

1. <http://mathworld.wolfram.com/>
2. <http://en.wikipedia.org/wiki/Math>
3. <http://numericalmethods.eng.usf>