JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislative vide Act No. 14 of 2002)
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Criteria	2 Teaching-learning and Evaluation
Key Indicator	2.6 Student Performance and Learning Outcomes
Metric	2.6.1 The institution has stated learning outcomes (generic and programme specific) / graduate attributes which are integrated into assessment process and widely publicized through the website and other documents

COs of All Courses – Department of Mathematics

(BTech)

Semester-I

SNo	Course Codes	Course Name	Course Outcomes
1.	18B11MA111	ENGINEERING MATHEMATICS I	CO 1: Evaluate partial derivatives with its physical significance and expand functions of several variables. CO 2: Find maxima and minima of functions of several variables with / without constraints. CO 3: Find areas and volumes of solids using multiple integration. CO 4: Understand the calculus of vectors and vector valued functions with their physical significance CO 5: Use Laplace transforms and inverse Laplace transforms to solve IVP. CO 6: Solve linear systems of equations and perform diagonalization of matrices.
2.	18B11MA112	BASIC MATHEMATICS I	CO 1: Understand the basic properties of Matrices and Determinant, Solution of system of linear equations. CO 2: Understand the various concept of vectors and coordinate geometry. CO 3: Understand complex numbers and their properties; geometrical representation, Polar form. DeMoivre's theorem. Roots of complex numbers. CO 4: Work with sets, relations and functions. CO 5: Understand the basic concept of Differential Calculus; limit and continuity. Derivative. Rules of differentiation. Tangent to a curve. Taylor's series. Maxima and minima. CO 6: Understand the basic concept of Integral Calculus; Integrals of elementary functions. Substitution and partial fractions. Definite integral as a limit of sum. Properties of definite integrals. Application to areas and lengths.

Semester-II

SNo	Course Codes	Course Name	Course Outcomes
1.	18B11MA211	ENGINEERING MATHEMATICS II	CO 1: Solve problems related to convergence of series

			CO 2: Understand basics of Ordinary Differential equation CO 3: Comprehend series solution with certain special functions e.g. Bessel, Legendre Eqn. CO 4: understand partial differential Eqn and Solve Heat, wave & Laplace equation CO 5: Understand Functions of a complex variable, Analytic functions, Mobius Transformation CO 6: Solve Contour integration and find Taylor's and Laurent's series CO7: Evaluate certain real definite and improper integrals.
2.	18B11MA212	BASIC MATHEMATICS II	CO 1: Understand the idea of sequence and series and to learn about their convergence CO 2: learn concepts of calculus of two or more variables CO 3: learn the fundamentals of differential equations and their types CO 4: Solve various types of differential equations CO 5: Understand basic statistics and learn to find mean mode, median and standard deviation. CO 6: Numerically solve various problems using standard methods

Semester-III

SNo	Course Codes	Course Name	Course Outcomes
1.	18B11MA312	PROBABILITY AND STATISTICAL TECHNIQUES	CO 1: Compute and interpret measures of central tendency and dispersion of data; Construct and analyze graphical displays (histogram, bar & pie charts, etc.) to summarize data.

			CO 2: Construct sample spaces of random experiments; identify and specify events; apply discrete/continuous probability distributions to evaluate event probabilities; use *central limit theorem* to find probabilities for sampling distributions. CO 3: Conduct hypotheses tests & construct point & confidence-interval estimates concerning population parameters based on sample data; perform and interpret chi-square test of goodness-of-fit and test of independence. CO 4: Compute correlation coefficient to decide the linear relationship that may exist between two variables of interest; find the equation of regression line and predict the value of one variable based on the value of the other variable. CO 5: Identify and evaluate common sampling techniques such as F-test in ANOVA - evaluating or approximating the p-value of the test statistic - and design simple experimental.
2.	18B11MA313	PROBABILITY AND STATISTICS	CO 1: Construct sample spaces of random experiments; identify and specify events, and perform set operations on events; understand the axiomatic approach of probability theory; compute probabilities by counting; evaluate conditional probability, and apply Bayes' theorem to simple situations. CO 2: Express random variables by using distribution function and density functions; calculate moments related to random variables; understand the concept of inequalities and probabilistic limits; understand the intrinsic need of (functions of) random variables for the analysis of random phenomena.

			CO 3: Compute probability distributions and correlation measures of bivariate random variables; obtain marginal and conditional distributions of random variables; find probabilities for outcomes of various events related to an uncertain phenomenon using appropriate probability distributions as models. CO 4: Compute correlation coefficient to decide the linear relationship that may exist between two variables of interest; find the equation of regression line and second degree curve, and to predict the value of one variable based on the value of the other variable. CO 5: Use *central limit theorem* to find probabilities for sampling distributions; conduct hypotheses tests and construct confidence-interval estimates concerning population parameters based on sample data; perform and interpret chi-square test of goodness-of-fit and test of independence.
3.		NUMERICAL METHODS	CO 1: Find the roots of the nonlinear equations and system of nonlinear equations. CO 2: Solve the system of linear equations using Direct methods and find Eigenvalues. CO 3: Perform interpolation of a polynomial using various techniques. CO 4: Perform Cubic-spline interpolation and approximations CO 5: Perform Numerical Differentiation, Numerical Integration and find double integration. CO 6: Solve initial value problems and boundary value problems. CO 7: Find Numerical solutions of parabolic, elliptic and hyperbolic partial differential equations

Semester-IV

SNo	Course Codes	Course Name	Course Outcomes
1.	18B11MA411	PROBABILITY THEORY AND RANDOM PROCESSES	CO 1: Construct sample spaces of random experiments; identify and specify events, and perform set operations on events; compute probabilities by counting; evaluate conditional probability, and apply Bayes' theorem to simple situations. CO 2: Express random variables by using CDFs, PMFs; calculate moments related to random variables; understand the concept of inequalities and probabilistic limits. Understand the axiomatic approach of probability theory and intrinsic need of (functions of) random variables for the analysis of random phenomena; CO 3: Compute probability distributions and correlation measures of bivariate random variables; obtain marginal and conditional distributions of random variables; find probabilities for outcomes of various events related to an uncertain phenomenon using appropriate probability distributions as models. CO 4: Conduct hypotheses tests concerning population parameters based on sample data; perform and interpret chi-square test of goodness-of-fit and test of independence; find the equation of regression line and second degree curve, and to predict the value of one variable based on the value of the other variable. CO 5: Identify and classify random processes and determine covariance and spectral density of stationary and ergodic random processes; demonstrate specific applications to Gaussian process.
2.	18B11MA421	BIOSTATISTICS	CO1: Perform correlation and regression analysis and draw conclusions and apply to Bio-informatics models. CO 2: Use method of least squares and

			evaluate least squares estimates. CO 3: Execute non parametric tests and run tests and draw conclusions. CO 4: Understand stochastic processes and find ensemble averages, mean function, auto Correlation and auto-covariance functions, SSS and WSS processes. CO 5: Understand the Markov chains and apply Markov processes. CO 6: Apply clustering algorithms and its applications to large databases and use clustering with categorical attributes.
3.	18B11MA413	DISCRETE MATHEMATICS	CO1: Understand set operations, various types of relations & their representations, solving recurrence relations CO2: comprehend the discrete structures of lattices, Propositions with proof of validity of arguments and quantifiers CO3: Understand various types of graphs, paths, spanning tree ,planarity of graphs and coloring theorems CO4: Recognize Algebraic structures; Groups, Subgroups, Rings, Fields with extension to concepts of vector spaces, dimensions and linear transformations. CO5: Comprehend Languages, grammars, finite state automata & finite state machines.