



Name of Department:- Mathematics

1. Subject Code: Course Title:
2. Contact Hours: L: T: P:
3. Semester: I
4. Credits:
5. Pre-requisite: Basic Knowledge of Mathematics
6. Course Outcomes: After completion of the course students will be able to

- CO1. Understand the concept of matrices.
- CO2. Solve the system of linear equations.
- CO3. Understand the concept of differential calculus and apply to various discipline of Engineering.
- CO4. Analyze the maximum / minimum values of functions of two or more variables with its application to engineering systems.
- CO5. Solve the multiple integrals and apply to find the area and volumes.
- CO6. Utilize the vector calculus in different engineering systems.

7. Detailed Syllabus

UNIT	CONTENTS	Contact Hrs
Unit - I	Matrices Elementary row and column transformations. Rank of a matrix, linear dependency and independency, Consistency of a system of linear equations, Hermitian, Skew-Hermitian, Unitary matrices, Characteristic equation, Cayley-Hamilton theorem, Eigen values and Eigen vectors, Diagonalization.	10
Unit - II	Calculus-I: Sequence and Series: Leibnitz test, Cauchy Root test and Ratio test Introduction of differential calculus, higher order derivatives, Successive Differentiation, Leibnitz's theorem, Limits, Continuity and	12

	Differentiability of two variables, Partial Differentiation, homogeneous function, Euler's theorem, Taylor's and Maclaurin's expansions of one and two variables.	
Unit – III	Calculus-II Extrema (Maxima/ Minima) of functions of two variables, method of Lagrange's multipliers. Introduction of Jacobian, properties of Jacobian, Jacobian of implicit and explicit functions, functional dependence.	7
Unit – IV	Multiple Integrals Introduction to integration, Double and triple integrals, Change of order of integration, Beta and Gamma functions. Applications to area, volume, Dirichlet's integral.	7
Unit – V	Vector Calculus Introduction to Vectors, Gradient, Divergence and Curl of a vector and their physical interpretation, Line, Surface and Volume integrals, Green's, Stoke's and Gauss's divergence theorem (without proof).	9
	Total	45

Reference Books:

- C. B. Gupta, S. R. Singh and Mukesh Kumar, "Engineering Mathematics for Semesters I and II" McGraw Hill Education, First edition 2015.
- Ramana, B. V., "Higher Engineering Mathematics", Tata McGraw Hill publications, 2007
- R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication, 2004.
- Grewal, B. S., "Higher Engineering Mathematics", 40e, Khanna Publications, India, 2009
- Kreyszig, Erwin., "Advanced Engineering Mathematics", 9e, Wiley Publications, 2006.



Name of Department:- Mathematics

1. Subject Code: Course Title:
2. Contact Hours: L: T: P:
3. Semester: II
4. Credits:

5. Pre-requisite: Basic Knowledge of Mathematics

6. Course Outcomes: After completion of the course students will be able to

CO1. Solve the linear ordinary differential equations.

CO2. Apply the Laplace transforms in linear and simultaneous linear differential equations.

CO3. Apply the Fourier series for signal analysis in various engineering discipline.

CO4. Classify the partial differential equations and to solve homogeneous partial differential equations with constant coefficients.

CO5. Apply method of separation of variables to solve 1D heat, wave and 2D Laplace equations.

CO6. Find the series solution of differential equations and comprehend the Legendre's polynomials, Bessel functions and its related properties.

7. Detailed Syllabus

UNIT	CONTENTS	Contact Hrs
Unit - I	Differential equation Ordinary differential equation of first order (Exact and reducible to exact differential equations), linear differential equations of nth order with constant coefficients, Complementary functions and particular integrals, Euler Homogeneous differential equation, Method of variation of parameters and its applications.	8
Unit - II	Laplace Transform Introduction of Laplace Transform, Its Existence theorem and properties, Laplace transform of derivatives and integrals, Inverse Laplace transform, Laplace transform of periodic functions, Unit step function and Dirac delta function, Convolution theorem, Applications	10

	to solve simple linear and simultaneous linear differential equations.	
Unit – III	Fourier series Periodic functions, Fourier series of periodic functions of period 2π , Euler's formula, Fourier series having arbitrary period, Change of intervals, Even and odd functions, Half range sine and cosine series.	7
Unit – IV	Partial differential equations Introduction to partial differential equations, Solution of linear partial differential equations with constant coefficients of second order and their classifications: parabolic, hyperbolic and elliptic partial differential equations. Method of separation of variables for solving partial differential equations, one dimensional Wave and heat conduction equations, Laplace equation in two dimensions.	12
Unit – V	Special Function Series solution of differential equations, Legendre's differential equations and Polynomials, Bessel's differential equations and Bessel's Functions, Recurrence relations, Generating Functions, Rodrigue's formula.	9
	Total	45

Reference Books:

- C. B. Gupta, S. R. Singh and Mukesh Kumar, "Engineering Mathematics for Semesters I and II" McGraw Hill Education, First edition 2015.
- E. Kreyszig, Advanced Engineering Mathematics, Wiley India, 2006.
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 2009.
- C. Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
- R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication, 2004.



Name of Department:- Mathematics

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2. Contact Hours: L: T: P:
3. Semester: I
4. Credits:

5. Pre-requisite: Basic Knowledge of Mathematics

6. Course Outcomes: After completion of the course students will be able to

CO1. Understand the concept of Matrices and determinants.

CO2. Identify and understand the significance of Differentiation and Integration in Bio Technology.

CO3. Solve the linear differential equations.

CO4. Illustrate linear and nonlinear algebraic equations.

CO5. Explain the applications of probability and Statistics in Bio Technology.

CO6. Use of Mathematics and their applications in Bio Technology.

7. Detailed Syllabus

UNIT	CONTENTS	Cont act Hrs
Unit – I	Definitions, type of matrices, properties of matrices, algebra of matrices (Addition, subtractions and multiplication), Determinants, Properties of determinants, Adjoint of matrix, Inverse of a matrix, System of linear equations, Eigen values and Eigen vectors for order 2.	10
Unit – II	Limit (L'Hospital Rule) and Continuity, Differentiation of Standard functions, Basic Rule of Differentiation (product rule, quotient rule, chain rule), Maxima and minima for one variable, Integration (Integration by part, Integration by Substitution).	10
Unit - III	Differential equations, Differential equations of first order and first degree. Variable separable method, Homogeneous differential equations, linear differential equations , Linear differential equations of second order with constant coefficients, complimentary function and	8

	particular integral	
Unit – IV	Numerical solution of linear and nonlinear algebraic equations(using Bisection method, Iterative method, Newton Raphson method), Numerical Integration (trapezoidal and Simpson’s rule)	7
Unit – V	Mean, median, mode and standard deviation, Random variables, Binomial, Poisson and normal distributions, Correlation and regression analysis.	10
	Total	45

Reference Books:

- C. B. Gupta, S. R. Singh and Mukesh Kumar, “Engineering Mathematics for Semesters I and II” McGraw Hill Education, First edition 2015.
- B. S. Grewal: Higher Engineering Mathematics, Khanna Publications, 2009.
- Agarwal. Remedial Mathematics, Shree Sai Prakashan Meerut, 2006.
- Piskunov N: Differential & Integral calculus, Moscow Peace Puse., 1982.
- Vashitha. Remedial Mathematics, Krishna Publications, Meerut, 2007.