Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20BS1101	BS	3	--	--	3	30	70	3 Hrs.

MATHEMATICS-I
(LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS)
(Common to AIDS, CE, CSE, ECE, EEE, IT & ME)

Pre-requisites: Calculus of functions of a single variable and Matrices.

Course Objectives: Students are expected to learn

1.	Concepts of linear algebra and methods of solution of linear simultaneous algebraicequations.
2.	Eigen values, Eigen vectors and quadratic forms.
3.	First order ordinary differential equations and some simple geometrical and physical applications.
4.	Orthogonal trajectories, Simple electrical circuits and Newton's law of cooling.
5.	Methods of solution of linear higher order ordinary differential equations.
6	Concepts of Laplace transforms and their applications for solving ODE.

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

S.No	Outcome	KL
1.	Solve a given system of linear algebraic equations	K3
2.	Determine Eigen values and Eigen vectors of a system represented by a matrix.	K3
3.	Solve ordinary differential equations of first order and first degree.	K3
4.	Applythe knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits	K3
5.	Solve linear ordinary differential equations of second order and higher order.	K3
6.	Determine Laplace transform, inverse Laplace transform and solve linear ODE	K3

SYLLABUS

UNIT-I (10 Hrs)	**Linear systems of equations:** Rank, Echelon form, Normal form, consistency of system of linear equations, Solution of linear systems by Gauss elimination, Jacobi and Gauss-Seidel methods.
UNIT-II (10 Hrs)	**Eigen values - Eigen vectors and Quadratic forms:** Eigen values, Eigen vectors, Properties, Cayley-Hamilton theorem, Inverse and powers of a matrix using Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic forms, Reduction of a Quadratic form to Canonical form.
UNIT-III (10 Hrs)	**Differential equations of first order and first degree:** Linear, Bernoulli, Exact, Reducible to exact types. Applications: Orthogonal trajectories, Newton's Law of cooling, Simple electrical circuits.(R-L and R-C circuits only)
UNIT-IV (8 Hrs)	**Linear differential equations of higher order:** Linear Non-homogeneous equations of higher order with constant coefficients with source (RHS) term of the type e^{ax}, sin ax, cos ax, polynomials in x, $e^{ax} V(x)$, x V(x). Simultaneous differential equations with constant coefficients, Method of Variation of parameters.

	Laplace transformation:
UNIT-V **(12 Hrs)**	Laplace transforms of standard functions, properties,transforms of tf(t), f(t)/t, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function; Inverse Laplace transforms, convolution theorem (without proof). Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Text Books:

1.	B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	B. V. Ramana,Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
3.	N.P.Bali&Manish Goyal, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1.	V. Ravindranath&P. Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.
2.	Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
3.	Michael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson.
4.	Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
5.	Peter O'Neil, Advanced Engineering Mathematics, Cengage Learning.
6.	Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
7.	Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, New Delhi.