21HS103 ENGINEERING MATHEMATICS - I(C) LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS

Hours Per Week :

L	Т	Р	С
3	1	-	4

Total Hours : <u>L</u>TP 45 15 -

COURSE DESCRIPTION AND OBJECTIVES:

To acquaint students with principles of Mathematics through matrices, differential equations and numerical methods that serves as an essential tool in several Engineering applications.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	
1	Understand the concept of matrices and the method to solve the system of equation.	
2	Understand the Caley Hamilton theorem to evaluate inverse and power of a matrix.	
3	Understand the methods to solve first order differential equations	
4	Understand the methods to solve higher order differential equations	
5	Apply numerical methods to solve ODE.	

SKILLS:

- ✓ Find rank of a matrix using different methods.
- ✓ Compute the eigen values and eigen vectors of a matrix.
- ✓ Find numerical solution of a differential equation using appropriate method.



Source:

https://www. google.co.in/ search?q=mathematics+ pictures&source=Inms& tbm=isch&sa=X&ved= 0ahUKEwiQ-837IvXiAhVPVH0 KHe56CVEQ_ AUIECgB#imgrc= IeEr3WUOPHnmSM:

ACTIVITIES: UNIT – I

- o Differentiate the method to find rank of a matrix.
- o Differentiate the method to solve given differential equation.
- o Compute numerical solution to D.E and compare with the output obtained by softwares.

L-9, T-3

L-9. T-3

L-9, T-3

L-9, T-3

L-9, T-3

EIGEN VALUES AND EIGEN VECTORS: Eigen values, Eigen vectors, Properties (without proofs); Cayley-Hamilton theorem (without proof), Power of a matrix, Diagonalisation of a matrix.

MATRICES: Rank of a matrix, Normal form, Triangular form, Echelon form; Consistency of system

of linear equations, Gauss-Jordan method, Gauss elimination method, Gauss-Seidel method.

UNIT – III

UNIT – II

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS: Basic Definitions, Variable separable, Homogeneous differential equations, Linear differential equations, Bernoulli's differential equations, Exact and non-exact differential equations.

UNIT – IV

HIGHER ORDER ORDINARY DIFFERENTIAL EQUATIONS: Linear differential equations with constant coefficients, Homogeneous differential equations of second and higher order, Methods to find particular integral when RHS is of the form : e^{ax} , sin ax, cos ax and x^n .

UNIT – V

NUMERICAL METHODS TO SOLVE ORDINARY DIFFERENTIAL EQUATIONS: Taylor series method, Picard's method, Euler's and modified Euler's method, Runge-Kutta method.

TEXT BOOKS :

- H. K. Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", 3rd edition, S.Chand & Co., 2015.
- 2. B. S. Grewal, "Higher Engineering Mathematics", 44th edition, Khanna Publishers, 2018.

REFERENCE BOOKS :

- 1. John Bird, "Higher Engineering Mathematics", Routledge (Taylor & Francis Group), 2018.
- 2. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", Oxford Publications, 2015.
- 3. B. V. Ramana, "Advanced Engineering Mathematics", TMH Publishers, 2008.
- 4. N. P. Bali and K. L. Sai Prasad, "A Textbook of Engineering Mathematics I, II, III", Universal Science Press, 2018.
- 5. T. K.V. Iyengar et al., "Engineering Mathematics, I, II, III", S. Chand & Co., 2018.