

**SREE VIDYANIKETHAN ENGINEERING COLLEGE**

(Autonomous)

Sree Sainath Nagar, A. Rangampet-517 102

**Department of Mechanical Engineering**

**Lesson Plan**

**Name of the Subject:** MATRICES AND NUMERICAL METHODS (14BT3BS01)

**Class & Semester:** II - B. Tech. I - semester ME

**Name of the faculty Member:**

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
<b>UNIT – I : MATRIX THEORY AND APPLICATIONS</b>				
1	Rank of a matrix – echelon form	1	T1	Solutions of Non-Homogeneous equations by
2	Normal form - inverse of a matrix by row operations	1	T1	
3	Homogenous system of linear equations	2	T1	Cramer’s rule, Matrix inversion method, Gauss elimination and Gauss siedel methods
4	Non Homogenous Linear systems – consistency and solutions of linear system of equations.	1	T1	
5	Gauss elimination method.	1	T1	
6	Eigen values – Eigen vectors – properties.	2	T1	Diagonalization of a matrix
7	Cayley - Hamilton Theorem (without proof) – Inverse and powers of a matrix using Cayley- Hamilton Theorem	2	T1	Quadratic forms and normal forms of QF
<b>Total periods required:</b>		<b>10</b>		
<b>UNIT II : NUMERICAL SOLUTIONS, CURVE FITTING AND INTERPOLATION</b>				
8	Solutions of Equations by Bisection method	1	T1	Fitting of power curves to given data.
9	Solutions of Equations by Regula -falsi Method	1	T1	
10	Solutions of Equations by Newton Raphson’s Method	1	T1	
11	Fitting a straight line by least square method	1	T1	Interpolation by Gauss forward , Gauss backward and sterling’s formulae.
12	Fitting a parabola by least square method	1	T1	
13	Fitting of exponential curves by least square method.	1	T1	
14	Interpolation – Forward ,back ward and central difference operators & Interpolation by Newton’s forward formula	1	T1	Interpolation by Newton’s divided difference formula
15	Interpolation by Newton’s backward formula	1	T1	
16	Interpolation by Lagrange’s interpolation formula	1	T1	
<b>Total periods required:</b>		<b>9</b>		
<b>UNIT III : NUMERICAL DIFFERENTIATION, INTEGRATION AND SOLUTIONS OF O D E</b>				

17	Numerical differentiation using Newton's forward formula	1	T1	Numerical differentiation by Gauss forward, Gauss backward and sterling's formulae.
18	Numerical differentiation using Newton's backward formula	1	T1	
20	Numerical integration by trapezoidal rule	1	T1	
21	Simpsons 1/3 <sup>rd</sup> Rule	1	T1	Numerical integration by Boole's and waddle's rule.
22	Numerical integration by Simpsons 3/8 <sup>th</sup> Rule.	1	T1	
23	Numerical Solutions of ordinary differential equations - Euler's method	1	T1	Solutions of ODE by predictor corrector methods: Milne's method and Adam Boshforth method.
24	Euler's modified method	1	T1	
25	Runge – Kutta method ( 4 <sup>th</sup> order only ).	1	T1	
<b>Total periods required:</b>		<b>08</b>		
<b>UNIT-IV : FOURIER SERIES AND FOURIER TRANSFORMS</b>				
26	Fourier series of functions in $(0, 2\pi)$ , $(-\pi, \pi)$ , $(0, 2\ell)$ , $(-\ell, \ell)$ . Euler's formulae	2	T1	Finite Fourier transforms.
27	Fourier series of even and odd functions	1	T1	
28	Fourier series of periodic functions.	1	T1	
29	Half - range Fourier sine and cosine expansions.	2	T1	Solutions of difference equations by z- transforms
30	Fourier integral theorem (statement only). Fourier sine and cosine integrals	1	T1	
31	Fourier sine and cosine transforms	2	T1	
<b>Total periods required:</b>		<b>09</b>		
<b>UNIT-V : PARTIAL DIFFERENTIAL EQUATIONS</b>				
32	Formation of partial differential equations	2	T1	Solutions of first order linear pde by grouping and Lagrange's methods Solution of two dimensional Laplace equation.
33	Solutions of second order p.d.e. by method of separation of variables	3	T1	
34	Solutions of one dimensional wave equation	2	T1	
35	Solutions of one dimensional heat equation	2	T1	
<b>Total periods required:</b>		<b>09</b>		
<b>Grand total periods required:</b>		<b>45</b>		

**TEXTBOOK:**

T1. T.K.V. Iyenger, B.Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, **Mathematical Methods**, S.Chand and Company, 8/e, 2013.

**REFERENCE BOOKS:**

1. B.S. Grewal, **Higher Engineering Mathematics**, Khanna publishers, Delhi, 42/e, 2012.
2. S.S.Sastry, **Introductory methods of Numerical Analysis**, Prentice Hall of India, 4/e, 2005.

Signature of the faculty Member

Signature of the Chairman (BOS)

## **framing the syllabus**