

## LESSON PLAN

**Name of the Subject:** MATHEMATICAL METHODS (14BT1BS04)

**Class & Semester:** I B.Tech year wise all branches except CE and ME

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	2	T1	Solutions of non-Homogeneous equations by Cramer's rule, Matrix inversion method, Gauss elimination and Gauss sieidel iteration methods.
2	Normal form of a matrix	1	T1	
3	Inverse of a matrix by normal form.	1	T1	
4	Homogenous linear system of equations	2	T1	
5	Non-homogenous system of linear equations.	2	T1	
6	Solution of equations - Gauss elimination method.	1	T1	
7	Eigen values & Eigen vectors and properties.	3	T1	
8	Cayley Hamilton Theorem – verification and applications	2	T1	
9	Inverse and powers of a matrix using Cayley Hamilton Theorem,	1	T1	
10	Diagonalization of a matrix	1	T1	
11	Quadratic forms & Nature of QF	2	T1	
12	Normal form of Q F	2	T1	
<b>13 Total periods required:</b>		<b>20</b>		
<b>UNIT – II: NUMERICAL SOLUTIONS, CURVE FITTING AND INTERPOLATION</b>				
13	Numerical solutions of equations by Bisection method	2	T1	Numerical solutions of equations by iteration method Fitting power curves to the given data.
14	Numerical solutions of equations by Regula-Falsi method	2	T1	
15	Numerical solutions of equations by Newton – Raphson's method	2	T1	
16	Fitting of a straight line by least square method	2	T1	Interpolation by Gauss forward, Gauss backward, Sterling's, Bessel's and Everett's Formulae, Newton's divided difference formula
17	Fitting of a parabola by least square method	1	T1	
18	Fitting of an exponential curve by least square method	1	T1	
19	Interpolation - forward difference , backward difference & central difference operators (definitions)	1	T1	

20	Relationships between different types of operators	2	T1	
21	Interpolation by Newton's Forward formula	2	T1	
22	Interpolation by Newton's Backward formula,	2	T1	
23	Lagranges Interpolation formula	2	T1	
<b>Total periods required:</b>		<b>19</b>		
<b>UNIT -III: NUMERICAL DIFFERENTIATION, INTEGRATION AND SOLUTIONS OF ODE</b>				
24	Numerical differentiation using Newton's forward formula	3	T1	Numerical differentiation by Gauss forward, Gauss backward, Sterling's formulae.
25	Numerical differentiation using Newton's backward formula.	3	T1	
26	Numerical integration by Trapezoidal rule	1	T1	
27	Numerical integration by Simpsons 1/3 rule,	2	T1	Numerical integration by Boole's and Weddel's rule.  Solutions of ODE by predictor corrector methods : Milne's method and Adam- Boshforth method
28	Numerical integration by Simpsons 3/8 rule.	2	T1	
29	Numerical solutions of ordinary differential equations using Taylor series	3	T1	
30	Numerical solutions of ordinary differential equations using Modified Euler's method	3	T1	
31	Numerical solutions of ordinary differential equations using Runge – Kutta method (4 <sup>th</sup> order only).	3	T1	
<b>Total periods required:</b>		<b>20</b>		
<b>UNIT – IV: TRANSFORMATION TECHNIQUES</b>				
32	Fourier series Dirichlet's conditions, Euler's formulae.	2	T1	Finite Fourier Transforms
33	Fourier series of Even and odd functions.	2	T1	
34	Half-range Fourier sine and cosine expansions.	2	T1	
35	Fourier integral theorem (statement only), Fourier sine and cosine integrals	3	T1	
36	Fourier sine and cosine transforms, inverse transforms.	3	T1	
37	Z – transforms, properties	2	T1	
38	Damping rule, shifting rule	1	T1	
39	Initial and final value theorems	2	T1	

40	Convolution theorem	2	T1	
41	Inverse Z- transforms	3	T1	
42	Solution of difference equations by Z- transforms.	3	T1	
<b>Total periods required:</b>		<b>25</b>		
<b>UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS</b>				
43	Formation of Partial differential equations	3	T1	
44	Solutions of first order linear p.d.e. using Method of grouping ,Lagrange's method.	3	R1	
45	Method of separation of variables	3	T1	
46	Solutions of one dimensional Wave equation	3	T1	
47	Heat equation.	2	T1	
48	Two dimensional Laplace equation	2	T1	
<b>Total periods required:</b>		<b>16</b>		
<b>Grand total periods required:</b>		<b>100</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:**

- R1. B.S. Grewal, Higher Engineering Mathematics, Khanna publishers, Delhi, 42/e, 2012.  
R2 S.S.Sastry, Introductory methods of Numerical Analysis, Prentice Hall of India, 4/e, 2005.

**Signature of the faculty Member**

**Signature of the HOD**

