MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN

Department of civil & EEE Engineering

Name of the Subject	STATISTICS & NUMARICAL METHODS	Name of the handling Faculty	Mrs.A.Archana
Subject Code	MA8452	Year / Sem	II/IV
Acad Year	2021-2022	Batch	2020-24

Course Objective

To introduce the basic concepts of solving algebraic and transcendental equations.

To introduce the numerical techniques of interpolation in various intervals in real life situations

To acquaint the student with understanding of numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.

To acquaint the knowledge of various techniques and methods of solving ordinary differential equations

To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

Course Outcome-On successful completion of this course, the student will be able to

Understand the basic concepts and techniques of solving algebraic and transcendental equations.

Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations

Apply the numerical techniques of differentiation and integration for engineering problems.

Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

Text Books

1	Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New

Reference Books

1	Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Education, Asia, New Delhi, 2007.
2	Gerald. C. F. and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi, 2006.
3	Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition, Prentice Hall, 1992.
4	Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 3rd Edition, New Delhi, 2007.
5	Sastry, S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
	UNIT I-SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS						
1	Newton-Raphson method	R3	2	BB	L1	CO1	PO1
2	Newton-Raphson method and fixed point method	R3	2	BB	L1	CO1	PO1

3	Gauss Elimination method.	R3	2	BB	L1	CO1	PO2
4	Gauss Elimination method, Gauss-Jordan methods	R3	2	BB	L1	CO1	PO3
5	Iterative methods of Gauss-Jacobi and Gauss-Seidel and class test	R3	1	BB	L1	CO1	PO4 & PO10
6	Iterative methods of Gauss-Jacobi and Gauss-Seidel and class test	R3	1	BB	L1	CO1	PO1
7	Matrix Inversion by Gauss-Jordan method	R3	1	BB	L1	CO1	PO2
8	Eigenvalues of a matrix by Power method . Class test.	R3	1	BB	L1	CO1	PO3
Suggested Activity: Assignment given							
Evaluation method: Evaluation of Assignment							
UNIT II- INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION							
9	Lagrange’s and Newton’s divided difference interpolations	R3	2	BB	L2	CO2	PO1
10	Newton’s forward and backward difference interpolation	R3	2	BB	L2	CO2	PO2
11	Newton’s forward and backward difference interpolation and class test	R3	2	BB	L2	CO2	PO3
12	Approximation of derivates using interpolation polynomials	R3	2	BB	L2	CO2	PO4 & PO10
13	cubic spline	R3	1	BB	L2	CO2	PO1
14	cubic spline	R3	1	BB	L2	CO2	PO2
15	Interpolation with equal intervals	R3	1	BB	L2	CO2	PO3
Suggested Activity: Assignment given							
Evaluation method: Evaluation of Assignment							
UNIT III-NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS							
14	numerical integeration using trapezoidal	R3	2	BB	L3	CO3	PO1
15	Romberg method	R3	2	BB	L3	CO3	PO2
16	Two point & three point gaussian quadrature formulae	R3	2	BB	L3	CO3	PO1
17	Two point & three point gaussian quadrature formulae	R3	1	BB	L3	CO3	PO2
18	Numerical double integrations using Trapezoidal and Simpson’s 1/3 rules.	R3	1	BB	L3	CO3	PO3
19	Evaluation of double integrals by Trapezoidal and Simpson’s 1/3 rules	R3	1	BB	L3	CO3	PO1
Suggested Activity: Assignment given							
Evaluation method: Evaluation of Assignment							
UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS							
20	Taylor’s series method	R3	2	BB	L3	CO4	PO2
21	Euler’s method	R3	2	BB	L3	CO4	PO3
22	Modified Euler’s method	R3	2	BB	L3	CO4	PO1
23	Fourth order Runge - Kutta method for solving first order equations	R3	2	BB	L3	CO4	PO2
24	Multi step methods - Milne’s and Adams	R3	2	BB	L3	CO4	PO1
25	Bash forth predictor corrector methods for solving first order equations.	R3	2	BB	L3	CO4	PO3

Suggested Activity: Assignment given							
Evaluation method: Evaluation of Assignment							
UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS							
26	Finite difference methods for solving second order two	R3	2	BB	L3	CO5	
27	point linear boundary value problems	R3	2	BB	L3	CO5	
28	Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular	R3	2	BB	L3	CO5	
29	One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods	R3	2	BB	L3	CO5	
30	One dimensional wave equation by explicit method.	R3	2	BB	L3	CO5	

Blooms Level

Level 1 (L1) : Remembering	Lower Order Thinking	Fixed Hour Exams	**Level 4 (L4) : Analysing**		Higher Order Thinking	Projects / Mini Projects
Level 2 (L2) : Understanding			**Level 5 (L5) : Evaluating**			
Level 3 (L3) : Applying			**Level 6 (L6) : Creating**			

Mapping syllabus with Bloom's Taxonomy LOT and HOT

Unit No	**Unit Name**	**L1**	**L2**	**L3**	**L4**	**L5**	**L6**	LOT	HOT	**Total**
Unit 1	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	6	0	0	0	0	0	6	0	6
Unit 2	INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION	0	0	0	0	7	0	0	7	7
Unit 3	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	0	8	0	0	0	0	8	0	8
Unit 4	FOR ORDINARY DIFFERENTIAL EQUATIONS	0	0	0	7	0	0	0	7	7
Unit 5	PROBLEMS IN ORDINARY AND PARTIAL	0	0	6	0	0	0	6	0	6
Total		6	8	6	7	7	0	20	14	34
Total Percentage		17.647	23.53	17.647	20.588	20.588	0	58.82	41.1765	100

CO PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	1	1	**1**	**1**									
CO2	2	1	1		**1**									
CO3	2	1												
CO4	2	1												
CO5	2	1												
Avg	2	1		**1**	**1**									

Justification for CO-PO mapping	
CO1	PO1 - Graduate attains highly basic knowledge about newton raphson method Equations, PO2 - Graduate will be able to analyze the problems on guassseidal and gauss jacobi equation, PO3 - Graduate will be development of eigen value of power method.
CO2	PO1 - Graduate attains basic knowledge of general knowledge of Approximation of derivates using interpolation polynomials , PO2 - Graduate will be able to analyze a Numerical single integrations using Trapezoidal and Simpson's 1/3 rules. , PO3 - Graduate will be designed and development of newtons interpolation difference.
CO3	PO1 - Graduate attains highly basic knowledge about Taylor's series method ,Euler's method, , PO2 - Graduate will be able to analyze fourth order runge kutta method , PO3 - Graduate will be able to develop the Finite difference methods for solving second order equations.
CO4	O1 - Graduate will be understanding knowledge on single step method , PO2 - Graduate will be able to analyze the problem by Modified Euler's method , PO3 - Graduate will be development of solutions by multi step metod
CO5	PO1 - Graduate attains basic knowledge about Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain, PO2 - Graduate will be able to analyze the problem using one dimensional wave equation, PO3 - Graduate will be develop a formation crank nickelson method

3	**High level**	**2**	**Moderate level**	**1**	Low level

Name & Sign of Faculty Incharge : Mrs. A.Archana

Name & Sign of Subject Expert :

Head of the Department :

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