Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

Structural Engineering

Analytical and Numerical Methods for Structural Engineering

(GR22D5006)

I M.Tech - I Semester

(2022-2023)

V Naresh Kumar Varma

Assistant Professor

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

Design of Concrete Structures - I

Course File Check List

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SYLLABUS

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   :ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Unit-I
Fundamentals of Numerical Methods: Error Analysis; Floating-Point Approximation of a Number; Loss of Significance and Error Propagation; Stability in Numerical Computation.
Solution of Nonlinear Algebraic and Transcendental Equations:
Bisection Method; Fixed-Point Iteration Method; Secant Method; Newton Method; Rate of Convergences; Solution of a System of Nonlinear Equations; Unconstrained Optimization.

Unit-II
Elements of Matrix Algebra: Solution of Systems of Linear Equations-Direct method – Cramer's rule, Gauss – Elimination Method-Gauss Jordan elimination – Triangulation (LU Decomposition) method – Iterative methods -Jacobi – Iteration method – Gauss – Siedel iteration, Eigen Value Problems- Jacobi method for symmetric matrices- Power method

Unit-III
Curve Fitting: Linear Interpolation - Higher Order Interpolation - Lagrange Interpolation Interpolating polynomials using finites differences- Hermite Interpolation -piece-wise and spline Interpolation. Fitting a straight-line, Second-degree curve, Exponential curve, power curve by method of least squares.

Unit-IV
Numerical Differentiation & Integration: Solution of Ordinary and Partial Differential Equations - Numerical Integration – Double integration using Trapezoidal and Simpson's method. Euler's method – Backward Euler method – Midpoint method – single step method-Taylor's series method- R-K Methods. Boundary value problems. Finite Difference Schemes.

Unit-V

Computer Algorithms: Algorithms – developing an algorithm for simple mathematical problems. Introduction to Fuzzy Logic and Neural Networks - applications in Civil and Structural Engineering. Application to simply supported beams and columns – calculation of slope and deflection – Application to find Eigen values and mode shape of columns.

Text Books:
1. An Introduction to Numerical Analysis, Atkinson K.E., J. Wiley and Sons, 1989.
2. Theory and Problems of Numerical Analysis, Scheid F, McGraw Hill Book Company, (Shaum Series), 1988.

Reference Books:
1. Introductory Methods of Numerical Analysis, Sastry S. S, Prentice Hall of India, 1998.
2. Computer Based Numerical Analysis, Dr. M. Shanta Kumar, Khanna Book Publishers, New Delhi.
3. Numerical Methods for Scientific and Engineering Computations, M.K. Jain and S.R.K.Iyengar, New Age International Pvt. Ltd., 2005.

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

Department of Civil Engineering

TIME TABLE

COURSE: Analytical and Numerical Methods in Structural Engineering

I YEAR I SEM   **w.e.f: 03-11-2022**

I M.TECH(GR20) – I SEMESTER   **AY: 2022-23.**

Day/Hour	9.00 – 10.00	10.00 – 11.00	11.00 – 12.00	12.00-01.00	01.00 – 02.00	02.00 – 03.00	03.00 – 04.00
MON							
TUE					ANMSE		
WED				LUNCH BREAK			
THU		ANMSE	ANMSE				
FRI			ANMSE				
SAT							

Signature of HOD   Signature of faculty

Programme Educational Objectives (PEO's)

PEO1: Graduates of the program will equip with professional expertise on the theories, process, methods and techniques for building high-quality structures in a cost-effective manner.

PEO2: Graduates of the program will be able to design structural components using contemporary softwares and professional tools with quality practices of international standards.

PEO3: Graduates of the program will be effective as both an individual contributor and a member of a development team with professional, ethical and social responsibilities.

PEO4: Graduates of the program will grow professionally through continuing education, training, research, and adapting to the rapidly changing technological trends globally in structural engineering.

Program Outcomes (PO's)

Graduates of the Civil Engineering programme will be able to
PO 1: An ability to independently carry out research / investigation and development to solve practical problems

PO 2: An ability to write and present a substantial technical report / document.

PO 3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor's.

PO 4: Possesses critical thinking skills and solves core, complex and multidisciplinary structural engineering problems.

PO 5: Assess the impact of professional engineering solutions in an environmental context along with societal, health, safety, legal, ethical and cultural issues and the need for sustainable development.

PO 6: Recognize the need for life-long learning to improve knowledge and competence.

Signature of HOD   Signature of faculty

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(Autonomous)

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COURSE OBJECTIVES

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   :ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

On completion of this Subject/Course the student shall be able to:

S.No	Objectives
1	To analyse the performance of various interpolation technique and perform error analysis.
2	To develop the skill of solving linear algebraic systems by direct and iteration methods.
3	To compare various numerical differentiation and integration techniques.
4	To explain the various techniques to study Initial value problems in Ordinary Differential Equations.
5	To solve a range of problems on applicable software.

Signature of HOD   Signature of faculty

Note: Please refer to Bloom's Taxonomy, to know the illustrative verbs that can be used to state the objectives.

COURSE OUTCOMES

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

On completion of this Subject/Course the student shall be able to:

S.No	Outcomes
1	Apply numerical methods to find the roots of a Nonlinear Algebraic and Transcendental equations and perform error analysis.
2	Solve linear algebraic system by direct and iteration methods and apply the knowledge of Eigen values and Eigen vectors to some contents in engineering.
3	Apply the knowledge of interpolation and extrapolation of uniform and non-uniform data to certain contents of Civil Engineering.
4	Apply the knowledge of numerical differentiation and integration to some contents of Civil Engineering
5	Formulate simple problems into programming models

Signature of HOD   Signature of faculty

Note: Please refer to Bloom's Taxonomy, to know the illustrative verbs that can be used to state the objectives.

Gokaraju Rangaraju Institute of Engineering & Technology
M.Tech - Structural Engineering
Academic Year: 2021- 2022
ROLLLIST

S.No	Reg. No	Name
1	22241D2001	ADDAGATLA MAHESH KUMAR
2	22241D2002	AHMED ABDUL AZEEM
3	22241D2003	BAIRAPAKA BHARATH
4	22241D2004	BARLAPUDI ACHSAH KEERTHANA
5	22241D2005	CHAKALI SOWMYA
6	22241D2006	CHAPPIDI NARESH
7	22241D2007	DANTHALA HARIDEEP KUMAR
8	22241D2008	DEVIREDDY ANISH
9	22241D2009	DHARAVATH NAGENDAR
10	22241D2010	GANGAPURAM SUSHANTH REDDY
11	22241D2011	JEREPOTHULA RAVALIKA
12	22241D2012	KADABOHINA SAI PAVAN
13	22241D2013	KASUMURU BHARATH KUMAR
14	22241D2014	MACHARLA SRINIVAS
15	22241D2015	MALLI SREENIVASULU
16	22241D2016	SHAIK ABDUL MUQEED
17	22241D2017	SHAIK ZABI ULLAH
18	22241D2018	SONWANE SAHIL SHIVAJIRAO
19	22241D2019	L LAKSHMI NARAYANA

Signature of HOD   Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

(Autonomous)

Structural Engineering

<u>GUIDELINES TO STUDY THE COURSE/SUBJECT</u>

Academic Year   :   2022-23

Name of the Program: M.Tech   Year: I   Semester: I

Course   : ANMSE   Course Code: GR22D5006

Name of the faculty   : V Naresh Kumar Varma   Dept.: Civil Engineering

Designation   : Assistant Professor

Guidelines to study the course Computer-Oriented Numerical Methods in Engineering

This course is a study of mathematical techniques used to model engineering systems. It involves the development of mathematical models and the application of the computer to solve engineering problems using the following computational techniques: Taylor Series approximation, numerical differentiation, root-finding using bracketing and open methods, linear and polynomial curve fitting, solution methods for matrix equations, numerical integration, and the solution of differential equations.

 Students should have the following prerequisites

1. Fundamentals of Matrices

2. Basics of Interpolation

3. Basics of Differentiation and

4. Basics of Integration

Where will this subject help?

1. To develop the skill of solving linear algebraic systems by direct and iteration methods.
2. To illustrate advanced matrix techniques in the determination of Eigen values and Eigen vectors of square matrix.

3. To analyze the performance of various interpolation technique and perform error analysis.
4. To compare various numerical differentiation and integration techniques.
5. To explain the various techniques to study Initial and Boundary value problems in ODE.
6. To solve a range of problems on applicable software.
7. To develop the skill of solving linear algebraic systems by direct and iteration methods.

Books/Material

S.No.	Text Books
1	M.K.Jain-S.R.K.Iyengar, R.K.Jain Numerical methods for scientific and engineering computations, Willey Eastern Limited, 1987
2	S.S.Sastry, Numerical methods.
3	Curtis I.Gerala, Applied numerical analysis, Addisson Wasley published campus.

S.No.	Suggested / Reference Books
1	C.Chopra, Raymond P.Canal, Numerical methods for Engineers Stevan, Mc. Graw Hill book Company, 4th edition, 2002.
2	C.Xavier, C Language and Numerical methods, New age international publisher, 2003.
3	Dr. M.Shanta Kumar, Computer based numerical analysis, Khanna Book publishers, New Delhi.

Course Design and Delivery System

1. The course syllabus is written into number of learning objectives and learning outcomes.
2. These learning objectives and outcomes will be achieved through lectures, assessments, assignments, experiments in the laboratory, projects, seminars and presentations, etc.,
3. Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
4. The learning process will be carried out through assessment of knowledge, skills and attitude by various methods and the student will be given guidance to refer to the textbooks, reference books, journals etc.,

The faculty be able to -

- Understand the principles of learning
- Understand the psychology of students
- Develop instructional objectives for a given topic
- Prepare course, lesson and unit plan
- Understand different methods of teaching and learning
- Use appropriate teaching and learning aids
- Plan and deliver lectures effectively
- Provide feedback system to students using various methods of assessments and tools of Evaluation
- Act as a guide, advisor, counselor, facilitator, motivator and not just as a teacher alone.

Signature of HOD   Signature of Faculty

COURSE SCHEDULE

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   :   ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

The Schedule for the whole Course / Subject is:

S. No.	Description	Duration (Date)		Total No. of Periods
		From	To	
1.	**UNIT-1** Fundamentals of Numerical Methods & Solution of Nonlinear Algebraic and Transcendental Equations:	03/11/22	25/11/22	14
2.	**UNIT-II** Elements of Matrix Algebra	29/11/22	16/12/22	12
3.	**UNIT-III** Curve Fitting	20/12/22	12/01/23	10
4.	**UNIT-IV** Numerical Differentiation & Integration	12/01/23	16/02/23	14
5.	**UNIT-V** Computer Algorithms Applications	16/02/23	24/02/23	7

Total No. of Instructional periods available for the course: 56 Hours / Periods

Signature of H.O.D   Signature of faculty

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SCHEDULE OF INSTRUCTIONS

COURSE PLAN

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   :   ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

S. No.	Unit No	Date	Topics	Objectives & Outcomes Nos.	References(Text book, Journal…)
1	-	03-11-2022	Introduction to ANMSE	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
2	-	04-11-2022	Applications of Numerical Methods in Structural Engineering	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
3	Unit I	08-11-2022	Error Analysis	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
4	Unit I	10-11-2022	Floating-Point Approximation of a Number	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
5	Unit I	10-11-2022	Loss of Significance and Error Propagation	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
6	Unit I	11-11-2022	Stability in Numerical Computation	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar

7	Unit I	15-11-2022	Solution of Nonlinear Algebraic and Transcendental Equations	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
8	Unit I	17-11-2022	Bisection Method	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
9	Unit I	17-11-2022	Fixed-Point Iteration Method	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
10	Unit I	18-11-2022	Secant Method	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
11	Unit I	22-11-2022	Newton Method	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
12	Unit I	24-11-2022	Regula Falsi Methods	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
13	Unit I	24-11-2022	Rate of Convergences	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
14	Unit I	25-11-2022	Unconstrained Optimization	Cob1, CO1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
15	Unit II	29-11-2022	Solutions of Linear Equations - Direct Method	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
16	Unit II	01-12-2022	Cramer's Rule	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
17	Unit II	01-12-2022	Gauss - Elimination Method	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
18	Unit II	02-12-2022	Gauss - Jordan Elimination	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar

				Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
19	Unit II	06-12-2022	LU Decomposition Method	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
20	Unit II	08-12-2022	Iterative Methods - Jacobi Iteration method	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
21	Unit II	08-12-2022	Gauss - Siedel Iteration	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
22	Unit II	09-12-2022	Introduction to Eigen Values & Eigen Vectors	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
23	Unit II	13-12-2022	Jacobi method for symmetric matrices	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
24	Unit II	15-12-2022	Power Method, Inverse Power Method	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
25	Unit II	15-12-2022	Nearest Eigen Value by Power Method	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
26	Unit II	16-12-2022	Solving Unit - II Problems	Cob2, CO2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
27	Unit III	20-12-2022	Introduction to Interpolation	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
28	Unit III	22-12-2022	Linear & Higher Order Interpolation	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
29	Unit III	22-12-2022	Lagrange Interpolation	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
30	Unit III	30-12-2022	Hermite Interpolation	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar

31	Unit III	03-01-2023	Piecewise and Spline Interpolation	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
32	Unit III	05-01-2023	Interpolating polynomials using finite differences	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
33	Unit III	05-01-2023	Newtons Divided Difference Interpolation	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
34	Unit III	06-01-2023	Fitting a straight-line by method of least squares	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
35	Unit III	10-01-2023	Second-degree curve, power curve by method of least squares.	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
36	Unit III	12-01-2023	Exponential curve by method of least squares.	Cob1, CO3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
37	Unit IV	12-01-2023	Numerical Solution of Ordinary differential equations	Cob3, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
38	Unit IV	17-01-2023	Numerical Integration	Cob3, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
39	Unit IV	19-01-2023	Double integration using Trapezoidal method.	Cob3, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
40	Unit IV	20-01-2023	Double integration using Simpson's method.	Cob3, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
41	Unit IV	24-01-2023	Integration Methods Problem Solving	Cob3, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
42	Unit IV	27-01-2023	Numerical Solution of Partial differential equations	Cob3, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar

43	Unit IV	31-01-2023	Euler's method – Backward Euler method	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
44	Unit IV	02-02-2023	Midpoint method – single step method	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
45	Unit IV	02-02-2023	Euler's Method Problem Solving	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
46	Unit IV	07-02-2023	Taylor's series method	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
47	Unit IV	09-02-2023	Taylor's series method	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
48	Unit IV	09-02-2023	R-K Methods	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
49	Unit IV	10-02-2023	R-K Methods	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
50	Unit IV	14-02-2023	Boundary value problems by finite difference method	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
51	Unit IV	16-02-2023	Boundary value problems	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
52	Unit IV	16-02-2023	Finite Difference schemes	Cob4, CO4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
53	Unit V	17-02-2023	Introduction Algorithms	Cob5, CO5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
54	Unit V	21-02-2023	Pseudo Codes	Cob5, CO5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar

55	Unit V	23-02-2023	Computer Algorithms	Cob5, CO5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
56	Unit V	23-02-2023	Numerical Solutions for Different Structural Problems	Cob5, CO5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar
57	Unit V	24-02-2023	Fuzzy Logic Neural Network.	Cob5, CO5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar

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SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   :   ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

Unit No. 1

Topics/Sub Topics	Date	No. of Periods	Objectives & Outcomes No.	References (Text book, Journal…)	Blooms Taxonomy level
Error Analysis	08-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K1
Floating-Point Approximation of a Number	10-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K1
Loss of Significance and Error Propagation	10-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K1
Stability in Numerical Computation	11-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Solution of Nonlinear Algebraic and Transcendental Equations	15-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Bisection Method	17-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2

Fixed-Point Iteration Method	17-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Secant Method	18-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Newton Method	22-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Regula Falsi Methods	24-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Rate of Convergences	24-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Unconstrained Optimization	25-11-2022	1	COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Error Analysis	08-11-2022		COb-1& CO-1	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3

Signature of HOD   Signature of faculty

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject :   ANMSE   **Course Code** : GR22D5006

Name of the Faculty :   V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

Unit No. 2

Topics/Sub Topics	Date	No. of Periods	Objectives & Outcomes No.	References (Text book, Journal…)	Blooms Taxonomy level
Solutions of Linear Equations - Direct Method	29-11-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Cramer's Rule	01-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Gauss - Elimination Method	01-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Gauss - Jordan Elimination	02-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3

		1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
LU Decomposition Method	06-12-2022				
Iterative Methods - Jacobi Iteration method	08-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Gauss - Siedel Iteration	08-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Introduction to Eigen Values & Eigen Vectors	09-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Jacobi method for symmetric matrices	13-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Power Method, Inverse Power Method	15-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4
Nearest Eigen Value by Power Method	15-12-2022	1	COb-2 & CO-2	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4

Signature of HOD   Signature of faculty

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   :   ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Unit No. 3

Topics/Sub Topics	Date	No. of Periods	Objectives & Outcomes No.	References (Text book, Journal…)	Blooms Taxonomy level
Introduction to Interpolation	20-12-2022	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K1
Linear & Higher Order Interpolation	22-12-2022	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Lagrange Interpolation	22-12-2022	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Hermite Interpolation	30-12-2022	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2

		1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Piecewise and Spline Interpolation	03-01-2023				
Interpolating polynomials using finite differences	05-01-2023	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4
Newtons Divided Difference Interpolation	05-01-2023	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Fitting a straight-line by method of least squares	06-01-2023	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4
Second-degree curve, power curve by method of least squares.	10-01-2023	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4
Exponential curve by method of least squares.	12-01-2023	1	COb-1 & CO-3	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4

Signature of HOD   Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
(Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject : ANMSE   **Course Code** : GR22D5006

Name of the Faculty : V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

Unit No. 4

Topics/Sub Topics	Date	No. of Periods	Objectives & Outcomes No.	References (Text book, Journal…)	Blooms Taxonomy level
Numerical Solution of Ordinary differential equations	12-01-2023	1	COb-3 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Numerical Integration	17-01-2023	1	COb-3 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Double integration using Trapezoidal method.	19-01-2023	1	COb-3 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Double integration using Simpson's method.	20-01-2023	1	COb-3 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Integration Methods Problem Solving	24-01-2023	1	COb-3 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3

Numerical Solution of Partial differential equations	27-01-2023	1	COb-3 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Euler's method – Backward Euler method	31-01-2023	1	COb-4 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Midpoint method – single step method	02-02-2023	1	COb-4 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Euler's Method Problem Solving	02-02-2023	1	COb-4 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Taylor's series method	07-02-2023	1	COb-4 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
R-K Methods	09-02-2023	1	COb-4 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
R-K Methods	10-02-2023	1	COb-4 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3
Boundary value problems by finite difference method	14-02-2023	1	COb-4 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4
Finite Difference schemes	16-02-2023	1	COb-4 & CO-4	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4

Signature of HOD   Signature of faculty

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   :   ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Unit No. 5

Topics/Sub Topics	Date	No. of Periods	Objectives & Outcomes No.	References (Text book, Journal…)	Blooms Taxonomy level
Introduction Algorithms	16-02-2023	1	COb-5 & CO-5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Pseudo Codes	16-02-2023	1	COb-5 & CO-5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Computer Algorithms	17-02-2023	1	COb-5 & CO-5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Numerical Solutions for Different Structural Problems	21-02-2023	1	COb-5 & CO-5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K4

		1	COb-5 & CO-5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Fuzzy Logic.	23-02-2023				
Neural Network	23-02-2023	1	COb-5 & CO-5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K2
Applications	24-02-2023	1	COb-5 & CO-5	Numerical methods for scientific & Engg. computations by M. K. Jain & S.R.K Iyengar	K3

Signature of HOD   Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year **:** 2022-23   **Date:** 03-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 1   **Duration of Lesson:** 1 hr

Lesson Title: Introduction to ANMSE

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand introduction, basic, prerequisites, mathematics of ANMSE

TEACHING AIDS **:** White Board, Marker, Scientific Calculator

TEACHING POINTS **:**

Introduction, Basic, Prerequisites, Mathematics

Assignment / Questions:

Signature of faculty

LESSON PLAN

Academic Year : 2022-23 **Date:** 04-11-2022

Name of the Program : M.Tech. **Year :** I **Semester:** I

Course/Subject: ANMSE **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:2 **Duration of Lesson:** 1 hr

Lesson Title: Applications of Numerical Methods in Structural Engineering

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to know about applications of numerical methods in Structural Engineering

TEACHING AIDS : White Board, Marker, Scientific Calculator

TEACHING POINTS :

Applications of Numerical Methods in Structural Engineering

Assignment / Questions:

Signature of faculty

Academic Year   : 2022-23   **Date:** 08-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:3   **Duration of Lesson:** 1 hr

Lesson Title: Error Analysis

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand error analysis, decimal point

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

Error Analysis, decimal point

Assignment / Questions:

1.Represent 625.12546 in normalized floating-point representation COb1, CO1

Signature of faculty

LESSON PLAN

Academic Year : 2022-23   **Date:** 10-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:4   **Duration of Lesson:** 1 hr

Lesson Title: Floating-Point Approximation of a Number

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand floating-point approximation of a number, roundoff & cutoff

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Floating-Point Approximation of a Number, roundoff & Cutoff

Assignment / Questions:

1. Write about floating point form of anumber COb1, CO1

Signature of faculty

LESSON PLAN

Academic Year : 2022-23 **Date:** 10-11-2022

Name of the Program : M.Tech. **Year :** I **Semester:** I

Course/Subject: ANMSE **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:5 **Duration of Lesson:** 1 hr

Lesson Title: Loss of Significance and Error Propagation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand loss of significance and error propagation

TEACHING AIDS : White Board, Marker, Scientific Calculator

TEACHING POINTS :

Loss of Significance and Error Propagation

Assignment / Questions:

1. Explain about Error Prapagation COb1, CO1

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23 **Date:** 11-11-2022

Name of the Program : M.Tech. **Year :** I **Semester:** I

Course/Subject: ANMSE **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:6 **Duration of Lesson:** 1 hr

Lesson Title: Stability in Numerical Computation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand stability in numerical computation, max error

TEACHING AIDS : White Board, Marker, Scientific Calculator

TEACHING POINTS :

Stability in Numerical Computation, Max Error

Assignment / Questions:

1. Write about stability of a number COb1, CO1

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 15-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:7   **Duration of Lesson:** 1 hr

Lesson Title: Solution of Nonlinear Algebraic and Transcendental Equations

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to find solution of nonlinear algebraic and transcendental equations

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Solution of Nonlinear Algebraic and Transcendental Equations

Assignment / Questions:

1. Problems on nonlinear algebraic and transcendental equations COb1, CO1

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   : 2022-23   **Date:** 17-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:8   **Duration of Lesson:** 1 hr

Lesson Title: Bisection Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve bisection method and convergence

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

Bisection Method and Convergence

Assignment / Questions:

1. Problems on bisection method COb1, CO1

Signature of faculty

Academic Year   : 2022-23   **Date:** 17-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:9   **Duration of Lesson:** 1 hr

Lesson Title: Fixed-Point Iteration Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve fixed-point iteration method and convergence

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

Fixed-Point Iteration Method and Convergence

Assignment / Questions:

1. Problems on method COb1, CO1

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 18-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 10   **Duration of Lesson:** 1 hr

Lesson Title: Secant Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve secant method and convergence

TEACHING AIDS : White Board, Marker, Scientific Calculator

TEACHING POINTS :

Secant Method and Convergence

Assignment / Questions:

1. Problems on secant method COb1, CO1

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 22-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:11   **Duration of Lesson:** 1 hr

Lesson Title: Newton Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve newton method and convergence

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Newton Method and Convergence

Assignment / Questions:

1. Problems on newton method COb1, CO1

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 24-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 12   **Duration of Lesson:** 1 hr

Lesson Title: Regula Falsi Methods

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve regula falsi methods and convergence

TEACHING AIDS : White Board, Marker, Scientific Calculator

TEACHING POINTS :

Regula Falsi Methods and Convergence

Assignment / Questions:

1. Problems on Regula Falsi methods COb1, CO1

Signature of faculty

Academic Year : 2022-23   **Date:** 24-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:13   **Duration of Lesson:** 1 hr

Lesson Title: Rate of Convergences

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve rate of convergences and identifying best method

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

> Rate of Convergences and identifying best method

Assignment / Questions:

1. Problems on convergences COb1, CO1

Signature of faculty

LESSON PLAN

Academic Year : 2022-23   **Date:** 25-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 14   **Duration of Lesson:** 1 hr

Lesson Title: Unconstrained Optimization

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve unconstrained optimization

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Unconstrained Optimization

Assignment / Questions:

1. Problems on unconstrained optimization COb1, CO1

Signature of faculty

Academic Year : 2022-23   **Date:** 29-11-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:15   **Duration of Lesson:** 1 hr

Lesson Title: Solutions of Linear Equations - Direct Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to find solutions of linear equations using direct method

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Solutions of Linear Equations - Direct Method

Assignment / Questions:

1. Problems on linear equations - direct method COb2, CO2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   : 2022-23   **Date:** 01-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:16   **Duration of Lesson:** 1 hr

Lesson Title: Cramer's Rule

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve cramer's rule, no of unknowns, determinants

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Cramer's Rule, No of Unknowns, determinants

Assignment / Questions:

1. Problems on cramer's rule COb2, CO2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   : 2022-23   **Date:** 01-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:17   **Duration of Lesson:** 1 hr

Lesson Title: Gauss - Elimination Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve gauss - elimination method, LDU--> U

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Gauss - Elimination Method, LDU--> U

Assignment / Questions:

1. Problems on elimination method COb2, CO2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering
LESSON PLAN

Academic Year : 2022-23   **Date:** 02-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 18   **Duration of Lesson:** 1 hr

Lesson Title: Gauss - Jordan Elimination

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve gauss - jordan elimination, LDU--> D

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

> Gauss - Jordan Elimination, LDU--> D

Assignment / Questions:

1. Problems on jordan elimination COb2, CO2

Signature of faculty

LESSON PLAN

Academic Year : 2022-23 **Date:** 06-12-2022

Name of the Program : M.Tech. **Year :** I **Semester:** I

Course/Subject: ANMSE **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:19 **Duration of Lesson:** 1 hr

Lesson Title: LU Decomposition Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve LU decomposition method

TEACHING AIDS : White Board, Marker, Scientific Calculator

TEACHING POINTS :

LU Decomposition Method

Assignment / Questions:

1. Problems on lu decomposition method COb2, CO2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   : 2022-23   **Date:** 08-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 20   **Duration of Lesson:** 1 hr

Lesson Title: Iterative Methods - Jacobi Iteration method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve iterative methods - jacobi iteration method, iterations

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

> Iterative Methods - Jacobi Iteration method, iterations

Assignment / Questions:

1. Problems on jacobi iteration method COb2, CO2

Signature of faculty

LESSON PLAN

Academic Year : 2022-23   **Date:** 08-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 21   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Gauss - Siedel Iteration

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve gauss - siedel iteration, iterations

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Gauss - Siedel Iteration, iterations

Assignment / Questions:

1. Problems on gauss - siedel iteration COb2, CO2

Signature of faculty

Academic Year : 2022-23   **Date:** 09-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:22   **Duration of Lesson:** 1 hr

Lesson Title: Introduction to Eigen Values & Eigen Vectors

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand introduction to eigen values & eigen vectors and its applications

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Introduction to Eigen Values & Eigen Vectors and its applications

Assignment / Questions:

1. Problems on eigen values & eigen vectors COb2, CO2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 13-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:23   **Duration of Lesson:** 1 hr

Lesson Title: Jacobi method for symmetric matrices

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve jacobi method for symmetric matrices, matrix properties

TEACHING AIDS : White Board, Marker, Scientific Calculator

TEACHING POINTS :

Jacobi method for symmetric matrices, Matrix Properties

Assignment / Questions:

1. Problems using symmetric matrices COb2, CO2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 15-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 24   **Duration of Lesson:** 1 hr

Lesson Title: Power Method, Inverse Power Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve power method, inverse power method and understand its uses

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

> Power Method, Inverse Power Method Uses

Assignment / Questions:

1. Problems on inverse power method COb2, CO2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering
LESSON PLAN

Academic Year   **:** 2022-23   **Date:** 15-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:25   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Nearest Eigen Value by Power Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve nearest eigen value by power method

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Nearest Eigen Value by Power Method

Assignment / Questions:

1. Problems on value by power method COb2, CO2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering
LESSON PLAN

Academic Year   : 2022-23   **Date:** 16-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:26   **Duration of Lesson:** 1 hr

Lesson Title: Solving Unit - II Problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve all linear equations using various methods

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

All Methods of solving and Doubts clearing

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year **:** 2022-23 **Date:** 20-12-2022

Name of the Program : M.Tech. **Year :** I **Semester:** I

Course/Subject: ANMSE **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:27 **Duration of Lesson:** 1 hr

Lesson Title: Introduction to Interpolation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand introduction to interpolation, joining a curve

TEACHING AIDS **:** White Board, Marker, Scientific Calculator

TEACHING POINTS **:**

Introduction to Interpolation, Joining a curve

Assignment / Questions:

1. Problems on interpolation COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 22-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:28   **Duration of Lesson:** 1 hr

Lesson Title: Linear & Higher Order Interpolation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve linear & higher order interpolation and errors

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Linear & Higher Order Interpolation and errors

Assignment / Questions:

1. Problems on higher order interpolation COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 22-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:29   **Duration of Lesson:** 1 hr

Lesson Title: Lagrange Interpolation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve higher order interpolation and errors

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Higher order Interpolation and errors

Assignment / Questions:

1. Problems on interpolation COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   **:** 2022-23   **Date:** 30-12-2022

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 30   **Duration of Lesson:** 1 hr

Lesson Title: Hermite Interpolation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve lagrange interpolation and errors

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Lagrange Interpolation and errors

Assignment / Questions:

1. Problems on lagrange interpolation COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   **:** 2022-23   **Date:** 03-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:31   **Duration of Lesson:** 1 hr

Lesson Title: Piecewise and Spline Interpolation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve hermite interpolation and errors

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Hermite Interpolation and errors

Assignment / Questions:

1. Problems on hermite interpolation COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering
LESSON PLAN

Academic Year : 2022-23   **Date:** 05-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:32   **Duration of Lesson:** 1 hr

Lesson Title: Interpolating polynomials using finite differences

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve piecewise and spline interpolation and errors

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Piecewise and Spline Interpolation and errors

Assignment / Questions:

1. Problems on spline interpolation COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 05-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:33   **Duration of Lesson:** 1 hr

Lesson Title: Newtons Divided Difference Interpolation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve interpolating polynomials using finite differences and errors

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Interpolating polynomials using finite differences and errors

Assignment / Questions:

1. Problems using finite differences COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 06-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 34   **Duration of Lesson:** 1 hr

Lesson Title: Fitting a straight-line by method of least squares

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve newtons divided difference interpolation and errors

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Newtons Divided Difference Interpolation and errors

Assignment / Questions:

1. Problems on finite difference interpolation COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering
LESSON PLAN

Academic Year **:** 2022-23   **Date:** 10-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:35   **Duration of Lesson:** 1 hr

Lesson Title: Second-degree curve, power curve by method of least squares.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve richardson's extrapolation and errors

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Second-degree curve, power curve by method of least squares.

Assignment / Questions:

1. Problems on least squares approximation method COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   : 2022-23   **Date:** 12-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:36   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Exponential curve by method of least squares.

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be able to

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Exponential curve by method of least squares.

Assignment / Questions:

1. Problems on least squares approximation method COb1, CO3

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 12-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:37   **Duration of Lesson:** 1 hr

Lesson Title: Numerical Solution of Ordinary differential equations

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve numerical solution of ordinary differential equations

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Numerical Solution of Ordinary differential equations

Assignment / Questions:

1. Problems on ordinary differential equations COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 17-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:38   **Duration of Lesson:** 1 hr

Lesson Title: Numerical Integration

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve numerical integration, area under the curve

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Numerical Integration, Area under the Curve

Assignment / Questions:

1. Problems on integration COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year **:** 2022-23   **Date:** 19-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:39   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Double integration using Trapezoidal method.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve double integration using trapezoidal method, approximations

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Double integration using Trapezoidal method, approximations

Assignment / Questions:

1. integral Problems using trapezoidal method. COb3, CO4

Signature of faculty

Academic Year **:** 2022-23 **Date:** 20-01-2023

Name of the Program : M.Tech. **Year :** I **Semester:** I

Course/Subject: ANMSE **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:40 **Duration of Lesson:** 1 hr

Lesson Title: Double integration using Simpson's method.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve double integration using simpson's method, errors

TEACHING AIDS **:** White Board, Marker, Scientific Calculator

TEACHING POINTS **:**

Double integration using Simpson's method, errors

Assignment / Questions:

1. integral Problems simpson's method. COb3, CO4

Signature of faculty

LESSON PLAN

Academic Year : 2022-23   **Date:** 24-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:41   **Duration of Lesson:** 1 hr

Lesson Title: Integration Methods Problem Solving

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve integration methods and their accuracy

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Integration Methods and their accuracy

Assignment / Questions:

COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   :   2022-23   **Date:** 27-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:42   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Numerical Solution of Partial differential equations

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be able to solve numerical solution of partial differential equations

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Numerical Solution of Partial differential equations

Assignment / Questions:

1. Problems on of partial differential equations COb3, CO4

Signature of faculty

Academic Year : 2022-23   **Date:** 31-01-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:43   **Duration of Lesson:** 1 hr

Lesson Title: Euler's method – Backward Euler method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve euler's method – backward euler method

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Euler's method – Backward Euler method

Assignment / Questions:

1. Problems on backward euler method COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 02-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No: 44   **Duration of Lesson:** 1 hr

Lesson Title: Midpoint method – single step method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve midpoint method – single step method

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Midpoint method – single step method

Assignment / Questions:

1. Problems on single step method COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering
LESSON PLAN

Academic Year : 2022-23   **Date:** 02-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:45   **Duration of Lesson:** 1 hr

Lesson Title: Euler's Method Problem Solving

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve euler's method and its accuracy

TEACHING AIDS   : White Board, Marker, Scientific Calculator
TEACHING POINTS   :

Euler's Method and its accuracy

Assignment / Questions:

 COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 07-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:46   **Duration of Lesson:** 1 hr

Lesson Title: Taylor's series method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve taylor's series method

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

> Taylor's series method

Assignment / Questions:

1. Problems on taylor's series method COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 09-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:47   **Duration of Lesson:** 1 hr

Lesson Title: Taylor's series method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve taylor's series method problems

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Taylor's series method problems

Assignment / Questions:

1. Problems on taylor's series method COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   : 2022-23   **Date:** 09-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:48   **Duration of Lesson:** 1 hr

Lesson Title: R-K Methods

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve R-K methods ist order and 2nd order

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

R-K Methods Ist order and 2nd Order

Assignment / Questions:

1. Problems on R-K methods COb3, CO4

Signature of faculty

LESSON PLAN

Academic Year : 2022-23   **Date:** 10-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:49   **Duration of Lesson:** 1 hr

Lesson Title: R-K Methods

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve R-K methods 3rd order and 4th order

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

R-K Methods 3rd Order and 4th Order

Assignment / Questions:

1. Problems on R-K methods COb3, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year   **:** 2022-23   **Date:** 14-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:50   **Duration of Lesson:** 1 hr

Lesson Title: Boundary value problems by finite difference method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve boundary value problems by finite difference method

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Boundary value problems by finite difference method

Assignment / Questions:

1. Problems on Problems by finite difference method COb4, CO4

Signature of faculty

Academic Year   : 2022-23   **Date:** 16-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:51   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Boundary value problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to solve boundary value problems

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

> Problem Solving

Assignment / Questions:

1. boundary value Problems COb4, CO4

Signature of faculty

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Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 16-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:52   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Finite Difference schemes

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand finite difference schemes methods

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

<div style="border:1px solid black; padding:10px;">

    Finite Difference schemes methods

</div>

Assignment / Questions:

1. Problems on finite difference schemes COb4, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering
LESSON PLAN

Academic Year : 2022-23   **Date:** 17-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:53   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Introduction Algorithms

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand implicit scheme, uses

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

> Implicit scheme, uses

Assignment / Questions:

1. Problems on implicit scheme COb4, CO4

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering
LESSON PLAN

Academic Year : 2022-23   **Date:** 21-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:54   **Duration of Lesson:** <u>1 hr</u>

Lesson Title: Pseudo Codes

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand explicit scheme, uses

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

Explicit scheme, uses

Assignment / Questions:

1. Problems on explicit scheme COb4, CO4

Signature of faculty

Academic Year   : 2022-23   **Date:** 23-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:55   **Duration of Lesson:** 1 hr

Lesson Title: Computer Algorithms

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand computer algorithms, writing basic mathematical programs

TEACHING AIDS   : White Board, Marker, Scientific Calculator

TEACHING POINTS   :

Computer Algorithms, writing basic mathematical programs

Assignment / Questions:

1. write an algorithm to find the highest number of three COb5, CO5

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 23-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:56   **Duration of Lesson:** 1 hr

Lesson Title: Numerical Solutions for Different Structural Problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand numerical solutions for different structural problems

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

Numerical Solutions for Different Structural Problems

Assignment / Questions:

1. Explain about numerical solutions for different structural Problems COb5, CO5

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-23   **Date:** 24-02-2023

Name of the Program : M.Tech.   **Year :** I   **Semester:** I

Course/Subject: ANMSE   **Course Code:** GR22D5006

Name of the Faculty: Mr. V Naresh Kumar Varma

Department: Structural Engineering (CIVIL)

Designation: Assistant Professor

Lesson No:57   **Duration of Lesson:** 1 hr

Lesson Title: Fuzzy Logic Neural Network.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to understand Fuzzy Logic, Neural Network and their Applications in CIVIL & Structural Engineering

TEACHING AIDS   **:** White Board, Marker, Scientific Calculator

TEACHING POINTS   **:**

> Fuzzy Logic, Neural Network and their Applications in CIVIL & Structural Engineering

Assignment / Questions:

1. Write about fuzzy logic, neural networks and their applications COb5, CO5

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject : ANMSE   **Course Code** : GR22D5006

Name of the Faculty :   V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

Assignment – 1 Questions

1. Calculate the maximum absolute error by performing four iterations of the Gauss-Seidel method for solving the system of given equations by comparing it with the exact solution.   **CO2, BL3**

$$4x+2z = 6$$

$$5y +2z = -3$$

$$5x+4y +10z=11$$

2) Solve the system of equations by Gauss Elimination Method. **CO2, BL3**

$$x+y +z=6$$

$$3x+3y +4z=20$$

$$2x+y +3z=13$$

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Assignment – 2 Questions

1) Estimate the population for the year 1995 from the following data using Newton's forward difference interpolation and Newton's backward difference interpolation.
   CO1, BL4

Year	1921	1931	1941	1951	1961
Population(in thousands)	46	66	81	98	101

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Assignment – 3 Questions

2) Derive the formulas for the first derivative of $y = f(x)$ of $O(h^2)$ using forward difference approximations and backward difference approximations. Using these estimate $f'(\frac{\pi}{4})$, with h = $\frac{\pi}{12}$, when f(x) = sin x . Obtain the bounds in truncation error and compare with exact solution.   **CO3, BL4**

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Assignment – 4 Questions

1. Explain the procedure to evaluate any given function using Simpson's (⅓)rd rule and also evaluate $\int_0^1 \frac{1}{1+X} dx$ using Simpson's 3/8 rule.   **CO4, BL3**

2. Give du/dt=$t^2 + u^2$, and u(0)=1,obtain Taylor Series for u(t) obtained from first two non-zero terms and hence Compute u(1).

                                                                 CO4, BL3

                                                        Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Assignment – 5 Questions

1. Solve the initial value problem u'= -2tu^2 with u(0)=1 and h=0.2 on the interval [0, 0.4]. Use fourth order classical Runge Kutta method. Compare with exact solution.   **CO4, BL4**

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject : ANMSE   **Course Code** : GR22D5006

Name of the Faculty :   V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

Tutorial – 1 Questions

1. Determine the largest Eigen value in modulus and corresponding Eigen vectors of matrix

CO2, BL3

$$A = \begin{pmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{pmatrix}$$

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Tutorial – 2 Questions

1. Using Lagrange's method, find the polynomial f(x) and hence find f(2).   **CO1, BL3**

x	1	3	4
y	-3	0	30

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject : ANMSE   **Course Code** : GR22D5006

Name of the Faculty :   V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

Tutorial – 3 Questions

1. Give $du/dt = t^2 + u^2$, and $u(0)=1$, obtain Taylor Series for $u(t)$ obtained from first two non-zero terms and hence Compute $u(1)$.   **CO4, BL4**

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject : ANMSE   **Course Code** : GR22D5006

Name of the Faculty : V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

Tutorial – 4 Questions

1. Find the Jacobian matrix for the system of equations **CO3, BL3**

$F_1(x, y) = x^2 + y^2 – x = 0$

$F_2(x, y) = x^2 - y^2 – x = 0$

2. Evaluate $\int_0^{\pi/2} \cos(x)dx$ by using trapezoidal rule taking 6 intervals.

CO4, BL3

Signature of faculty

ASSIGNMENTS / TUTORIALS

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** I

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Tutorial – 5 Questions

1. Solve the initial value problem $u' = -2tu^2$ with $u(0)=1$ and $h=0.2$ on the interval $[0, 0.4]$ using Backward Euler Method   **CO4, BL3**

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Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering

EVALUATION STRATEGY

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** II

Course/Subject   :   ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

1. TARGET:
 a) Percentage for pass: 100%
 b) Percentage of class: 100%

First class with distinction	19
First class	19
Pass class	-
Total strength	19

2. **COURSE PLAN & CONTENT DELIVERY**
   - 60 to 75 practice classes held for detailed demonstration of Syllabus and for analyzing real time problems in the class.

3. **METHOD OF EVALUATION**

   3.1 ☐ Continuous Assessment Examinations (CAE-I, CAE-II)

   3.2 ☐ Assignments

   3.3 ☐ Projects

   3.4 ☐ Quiz

   3.5 ☐ Semester/End Examination

   3.6 ☐ Others

MAPPING

GR22D5006 / ANMSE	Course Outcomes				
Course Objectives	1	2	3	4	5
1	X				
2		X			
3			X		
4				X	
5					X

GR22D5006 / ANMSE	Course Outcomes				
Assessments	1	2	3	4	5
1	X				
2		X			
3			X		
4				X	
5					X

GR22D5006 / ANMSE	Course Objectives				
Assessments	1	2	3	4	5
1	X				
2		X			
3			X		
4				X	
5					X

GR22D5006 / ANMSE						
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**
1.	M	M	M	-	M	-
2.	M	-	M	-	M	-
3.	M	M	M	-	H	M
4.	M	-	M	-	H	M
5.	M	M	M	M	M	H

RUBRICS FOR COURSE

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** II

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

Dept.: Structural Engineering (Civil Engineering)

Name of the Student	Performance Criteria	Beginning	Developing	Reflecting Development	Accomplished	Exemplary	Score
		1	**2**	**3**	**4**	**5**	
22241A02001	Level of knowledge on illustrating the fundamental concepts of matrices and its properties	Low Level	Able to understand	Able to understand and explain	Full Knowledge	Analyzing and application of knowledge	5
	Level of knowledge on interpolation, differentiation and integration	Low Level	Able to understand	Able to understand and explain	Full Knowledge	Analyzing and application of knowledge	4
	Level of knowledge on initial value problems and boundary value problems	Low Level	Able to understand	Able to understand and explain	Full Knowledge	Analyzing and application of knowledge	3

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

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COURSE COMPLETION STATUS

Academic Year   : 2022-23

Name of the Program : M.Tech   **Year:** I Year   **Semester:** II

Course/Subject   : ANMSE   **Course Code**   : GR22D5006

Name of the Faculty   :   V Naresh Kumar Varma

 Dept.: Structural Engineering (Civil Engineering)

Actual Date of Completion & Remarks, if any

Units	Remarks	Objectives Achieved	Outcomes Achieved
Unit I	25-11-2022 Unit covered on time	1	1
Unit II	16-12-2022 Unit covered on time	2	2
Unit III	19-01-2023 Unit delayed by one week	3	3
Unit IV	16-02-2023 Unit covered on time	4	4
Unit V	24-02-2023 Unit covered on time	5	5

Signature of HOD   Signature of faculty

Note: After the completion of each unit mention the number of Objectives & Outcomes Achieved.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
Department of Civil Engineering (Structural Engineering)
ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING
[GR22D5006]

Exam: Mid-I.   Time: 15 minutes
Year & Sem: I M.Tech. I Sem.   Date: 23-12-2022

PART – A

TEN Multiple Choice Questions. Each Question carries ONE mark.   **10 x 1 = 10 marks**

1. Represent 0.0007456 in normalized floating-point representation.   **CO1, BL2, PI1.1.3**   [   ]
    - **A.** $(-1)^0$ x 0.7456 x 10^{-4}
    - **B.** $(-1)^0$ x 0.7456 x 10^{-3}
    - **C.** $(-1)^0$ x 0.07456 x 10^{-4}
    - **D.** $(-1)^0$ x 0.07456 x 10^{-3}

2. The exponent e is limited to a range   m < e < M then if some computed number has an exponent e > m, this can be termed as   **CO1, BL2, PI3.2.2**   [   ]
    - **A.** Memory Underflow
    - **B.** Memory Overflow
    - **C.** NaN
    - **D.** None of the mentioned

3. In Gauss Jordan method which of the following transformations are allowed? **CO1, BL2, PI3.3.3**
                                                                                      [   ]
    - **A.** Diagonal transformation
    - **B.** Column transformation
    - **C.** Row transformation
    - **D.** Square transformation

4. Which of the following method uses determinants to solve systems of equations that have the same number of equations as variables?   **CO2, BL2, PI3.4.2**   [   ]
    - **A.** Gauss Elimination Method
    - **B.** Gauss Jordan Elimination
    - **C.** Triangulation Method
    - **D.** Cramer's rule

5. Newton- Gregory Forward interpolation formula can be used   **CO1, BL2, PI5.1.2**   [   ]
    - **A.** only for equally spaced intervals
    - **B.** for both equally and unequally spaced intervals
    - **C.** only for unequally spaced intervals
    - **D.** for unequally intervals

6. Gauss Siedel iteration method is also known as method of _____displacements. **CO2, BL2, PI5.2.2**
                                                                                      [   ]
    - **A.** Successive
    - **B.** Consecutive
    - **C.** Simultaneous
    - **D.** None of the mentioned

7. In the Gauss Elimination method for solving a system of linear algebraic equations, triangularization leads to _____matrix   **CO2, BL2, PI5.1.1**   [   ]
    - **A.** Diagonal
    - **B.** Lower Triangular
    - **C.** Upper Triangular
    - **D.** Identity

8. The Bisection method is also known as   **CO3, BL2, PI1.1.2**   [   ]
    - **A.** Binary Chopping
    - **B.** Tri region Chopping
    - **C.** Quaternary Chopping
    - **D.** Hex region Chopping

9. If determinant of a matrix A is Zero than   **CO2, BL2, PI1.1.1**   [   ]
    - **A.** A is a non-Singular matrix
    - **B.** A is a Singular matrix
    - **C.** Can't say
    - **D.** None of the mentioned

10. The line is tangent to the parabola and intersects the parabola at exactly one point then the system has how many solution/s?   **CO3, BL2, PI6.2.2**   [   ]
    - **A.** One
    - **B.** Two
    - **C.** Three
    - **D.** Zero

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

Department of Civil Engineering (Structural Engineering)
ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING
[GR22D5006]

Exam: Mid-I.   Time: 105 minutes

Year & Sem: I M.Tech. I Sem.   Date: 23-12-2022

PART – B

Answer ANY FOUR Questions. Each Question carries FIVE marks   **4 x 5 = 20 marks**

1. **(a)** Explain about Floating Point Approximation and differentiate between binary and decimal point

    representation.   **CO1, BL2, PI1.1.1   3M**

    (b Explain about Chopping and Rounding of a number with examples.   **CO1, BL2, PI1.1.2   2M**

2. **(a)** Using Newton's Divided Difference method, find the polynomial f(x) and
    also find f(6).   **CO1, BL3, PI3.3.3   3M**

x	1	2	5	7	9
f	1	12	117	317	543

    (b) Find f(x) and compute f(0.3) for the data   **CO1, BL3, PI5.1.1   2M**

x	0	1	2
f	2	3	12

    using Lagrange's method.

3. Solve the following system by Gauss Seidel Iteration Method. Perform 5 iterations.

                                                                                 CO2, BL3, PI5.1.2   5M

$$X + Y + Z = 2$$

$$X + 2Y + 3Z = 5$$

$$2X + 3Y + 4Z = 11$$

4. Solve the following system by Gauss Jorden Elimination method.   **CO2, BL3, PI5.2.2   5M**

$$2x + 4y + 6z = 22$$

$$3x + 8y + 5z = 27$$

$$-x + y + 2z = 2$$

5. **(a)** Determine the approximate root of the equation   **CO3, BL4, PI3.4.2   3M**

$$x^3 - x - 1 = 0$$

in the interval [1, 2] after performing six iterations in the Bisection method.

(b) Determine the Piecewise Quadratic Interpolating Polynomial to find f(1.5) for the following data.
CO1, BL4, PI3.2.2   2M

x	-2	-1	0	1	2
f	17	12	7	23	46

6. **(a)** Determine the roots of the following equation using Newton – Raphson Iteration method after performing six iterations   **CO3, BL4, PI1.1.3   3M**
$$x^4 - x - 10 = 0$$

(b) Determine the largest eigenvalue and the corresponding eigenvector of the matrix
CO2, BL4, PI3.2.1   2M

$$A = \begin{bmatrix} 4 & 1 & 0 \\ 1 & 20 & 1 \\ 0 & 1 & 4 \end{bmatrix}$$

Correct to 3 decimal places using the power method.

*****

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
Department of Civil Engineering (Structural Engineering)
ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING
[GR22D5006]

Exam: Mid-II.   Time: 15 minutes
Year & Sem: I M.Tech. I Sem.   Date: 01-03-2023

PART – A
Five Multiple Choice Questions. Each Question carries ½ mark   **10 x ½ = 5 marks**

1. Interpolation is a method of   **CO3, BL2, PI 2.1.2**   [   ]
   - **A.** Interrelating   *C.* Integrating
   - **B.** Estimating   **D.** Combining

2. Which of the following methods has linear rate of convergence? **CO3, BL2, PI 3.3.3**   [   ]
   - **A.** Regular false   **C.** Newton-Raphson
   - **B.** Bisection   **D.** None

3. Interpolation provides a mean for estimating functions at the _____ **CO3, BL3, PI 5.1.1**   [   ]
   - **A.** beginning points   **C.** intermediate points
   - **B.** ending points   **D.** None of the mentioned

4. If $y = -cos\ x$, then $y''' =$ **CO4, BL4, PI 3.4.2**   [   ]
   - **A.** $sin\ x$ **C.** $- cos\ x$
   - **B.** $- sin\ x$ **D.** $cos\ x$

5. if $f(x) = x^\pi$, then $f'(1) =$ **CO4, BL4, PI 5.2.2**   [   ]
   - **A.** $22/7$ **C.** $22/7\ x^{15/7}$
   - **B.** $7/22$ **D.** $7/22\ x^{15/7}$

6. Evaluate the integral of $dx\ /\ (x + 2)$ from -6 to -10.   **CO4, BL5, PI 5.1.2**   [   ]
   - **A.** $21/2$ **C.** $ln\ 3$
   - **B.** $1/2$ **D.** $ln\ 2$

7. Evaluate the integral of $sin^5\ x\ dx$ if the lower limit is 0 and the upper limit is $\pi/2$?   [   ]
   CO4, BL5, PI 5.3.1
   - **A.** 0.233 **C.** 0.333
   - **B.** 0.533 **D.** 0.433

8. When an algorithm is written in the form of a programming language, it becomes a   [   ]
   CO5, BL2, PI 6.1.2
   - **A.** Flowchart   **C.** Pseudo code
   - **B.** Program   **D.** Syntax

9. Algorithms can be represented as   **CO5, BL2, PI 6.2.1**   [   ]
   - **A.** pseudo codes   **C.** programs
   - **B.** flowcharts   **D.** all the above

10. Pseudocode is used for   **CO5, BL2, PI 6.2.2**   [   ]
    - **A.** To write program steps   **C.** Denoting program flow
    - **B.** For coding the program   **D.** None of the mentioned

*****

Department of Civil Engineering (Structural Engineering)
ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL
ENGINEERING [GR22D5006]

Exam: Mid-II.

Time: 105 minutes

Year & Sem: I M.Tech. I Sem.

Date: 01-03-2023

PART – B

**Internal Choice Three Questions. Each Question carries 5 marks   3
x 5 = 15 marks**

1) **(a)** Evaluate the double integral using the Trapezoidal rule with four subintervals.

$$\int_1^5 \left(\int_1^5 \frac{dx}{(x^2 + y^2)^{1/2}} \right) dy$$

   CO4, BL5, PI 3.3.3

   (b) Given the following values of $f(x) = x^4$. Determine $f'(0.8)$ using

   quadratic interpolation.

   CO4, BL4, PI 3.4.2

x	0.4	0.6	0.8
$f(x)$	0.0256	0.1296	0.4096

2) Solve the initial value problem $u' = -2tu^2$ with $u(0)=1$ and $h=0.2$ on the

   interval [0, 0.4]. Use fourth order classical Runge Kutta method. Compare with

   exact solution.   **CO4, BL5, PI 5.3.1**

3) Use the Finite Difference method to approximate the solution of the boundary
   value problem

   CO5,

BL4, PI 5.2.2

$$y''(x) - 2\,y(x) = 0, \quad y(0) = 1.2, \quad y(1.0) = 0.9, \qquad h = 0.25$$

4) Define Fuzzy Logic? What are the applications of fuzzy logic in civil engineering. **CO5, BL2, PI 6.1.2**

5) Determine the approximate quadratic polynomial for the given data using method of least squares.

x	0	1	2	3	4
f	2	3	12	28	52

CO3, BL4, PI 3.4.2

6) **(a)** Define Algorithm. Write an algorithm to find the largest of three numbers. **CO5, BL2, PI 6.1.1**

(b) Determine real root of the equation $f(x) = x^3 - 2x - 5 = 0$ by method of False position. Perform at least 3 iterations. **CO3, BL4, PI 5.2.2**

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ANMSE INTERNAL MARKS

Roll No	Mid-I	Mid-II	Avg	Assesment	Attendance	Total
22241D2001	17	23	20	5	5	30
22241D2002	16	15	16	5	5	26
22241D2003	18	12	15	5	5	25
22241D2004	27	25	26	5	5	36
22241D2005	14	18	16	5	5	26
22241D2006	17	17	17	5	5	27
22241D2007	25	20	23	5	5	33
22241D2008	17	18	18	5	5	28
22241D2009	13	18	16	5	5	26
22241D2010	17	20	19	5	5	29
22241D2011	12	15	14	5	5	24
22241D2012	21	21	21	5	5	31
22241D2013	17	20	19	5	5	29
22241D2014	11	15	13	5	5	23
22241D2015	22	23	23	5	5	33
22241D2016	26	24	25	5	5	35
22241D2017	13	17	15	5	5	25
22241D2018	30	28	29	5	5	39
22241D2019	9	9	9	3	4	16