I YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

FEM IN STRUCTURAL ENGINEERING

Course Code: GR24D5012 **L/T/P/C: 3/0/0/3**

I Year II Semester

Prerequisites: Engineering Mechanics, Strength of Materials, Matrix methods in Structural Analysis

Course Outcomes:

1. Apply minimum potential energy principle and weighted residual methods in Finite Element Method.
2. Analyse one dimensional elements like beam and truss element using FEM approach.
3. Evaluation of stress and strains in 2D CST and axisymmetric elements.
4. Formulation of rectangular using Isoparametric formulation, Three dimensional element and estimate the error using numerical methods
5. Differentiate various types of non-linear analysis

UNIT I

Introduction: History and Applications. Spring and Bar Elements, Minimum Potential Energy Principle, Direct Stiffness Method, and Nodal Equilibrium equations, Assembly of Global Stiffness Matrix, Element Strain and Stress.

Method of Weighted Residuals: Galerkin Finite Element Method, Application to Structural Elements, Interpolation Functions, Compatibility and Completeness Requirements, polynomial Forms, Applications.

UNIT II

Beam and Truss Elements: Flexure and axial Elements, Element Stiffness Matrix, Element Load Vector and Element stress Vector.

UNIT III

Types: Triangular Elements, Axi-Symmetric Elements.

UNIT IV

Isoparametric Formulation, Rectangular Elements, Three-Dimensional Elements, Numerical Integration, Gaussian Quadrature.

UNIT V

Introduction to non – linear analysis, various methods and their limitations.

Text Books:

1. G.S.Krishna Murthy, Finite Element Analysis, theory and programming, 3rd edition, MsGraw Hilll India publications, 2nd edition, 2013.
2. Finite Element Methods in Engineering, Belegundu A.D., Chandrupatla, T.R., PrenticeHall India, 3rd edition,2002.
3. Finite Element Analysis, Seshu P., Prentice-Hall of India, 2003.

Reference Books:

1. Concepts and Applications of Finite Element Analysis, Cook R. D., Wiley J., New York, 4th edition,2001.
2. Fundamentals of Finite Element Analysis, Hutton David, Mc- Graw Hill, 2017.
3. Finite Element Analysis, Buchanan G.R., McGraw Hill Publications, New York, 2005.
4. Finite Element Method, Zienkiewicz O.C. & Taylor R.L. Vol. I, II & III, Elsevier,7th edition,2013.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
STRUCTURAL DYNAMICS

Course Code: GR24D5013 **L/T/P/C: 3/0/0/3**
I Year II Semester

Course Prerequisites: Physics and Mathematics

Course Outcomes:
1. Comprehend and model the systems subjected to vibrations and dynamic loads
2. Analyse and obtain dynamics response of single degree freedom system using fundamental Theory and equations of motion.
3. Analyse and obtain dynamics response of Multi degree of freedom system idealized as lumped mass systems. Analyse and obtain dynamics response of Multi degree of freedom system idealized as distributed mass systems.
4. Obtain dynamics response of systems using numerical methods.
5. Describe the dynamic effects of Wind Loads, Moving Loads and Vibrations caused by Traffic, Blasting and Pile Driving.

UNIT I
Introduction: Objectives, Importance of Vibration Analysis, Nature of Exciting Forces, Mathematical Modeling of Dynamic Systems. Elements of vibratory system - Degrees of Freedom - Continuous System - Lumped mass idealization - Oscillatory motion - Simple Harmonic motion - Vectorial representation of S.H.M. - Free and forced vibrations - undamped and damped vibrations - critical damping - Logarithmic decrement– Phase angle.

UNIT II
Single Degree of Freedom System: Formulation of equations of motion by different methods , Free and Forced Vibration with and without Damping, Response to Harmonic Loading, Response to General Dynamic Loading using Duhamel's Integral, Fourier Analysis for Periodic Loading

UNIT III
Multiple Degree of Freedom System (Lumped parameter): Selection of the degrees of Freedom - Evaluation of structural property matrices - Formulation of the MDOF equations of motion - Undamped free vibrations - Solutions of Eigen value problem for determination of natural frequencies and mode shapes - Inverse Iteration Method for Determination of Natural Frequencies and Mode Shapes, Dynamic Response by Modal Superposition Method, Direct Integration of Equation of Motion.

UNIT IV
Numerical Solution to Response using Stodola method, Holzer method, Newmark Method and Wilson Methods.
Continuous systems: Flexural vibrations of beams - Elementary case – Derivation of governing differential equation of motion - Analysis of undamped free vibrations of beams in flexure - Natural frequencies and mode-shapes of simple beams with different end conditions.

UNIT V

Special Topics in Structural Dynamics (Concepts only): Dynamic Effects of Wind Loading, Moving Loads, Vibrations caused by Traffic, Blasting and Pile Driving, Foundations for Industrial Machinery, Excitation by rigid base translation.

Text Books:

1. Dynamics of Structures, Clough R. W. and Penzien J., McGraw-Hill Education / Asia; 2nd edition 2003.
2. Dynamics of Structures: Theory and Applications to Earthquake Engineering, Anil K. Chopra, Prentice Hall international series, Pearson, 2017.
3. Structural Dynamics - Theory and Computation, Paz Mario, CBS Publication, 2nd Edition, 2006

Reference Books:

1. Basics of Structural Dynamics and Aseismic Design, Prentice Hall India Learning Private Limited; 5th Edition, 2009.
2. Vibration of Structures - Application in Civil Engineering Design, Smith J. W., Chapman and Hall, London,1988.
3. Dynamics of Structures, Humar J. L., CRC Press; 2nd edition, 2012.
4. Structural Dynamics for Structural Engineers, Gary C. Hart, John Wiley & Sons, 2000.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED STEEL DESIGN
(Professional Elective III)

Course Code: GR24D5014 **L/T/P/C: 3/0/0/3**
I Year II Semester

Prerequisites: Strength of materials, Structural Analysis and Design of steel Structures.

Course Outcomes:
1. Design Plate girders.
2. Design Gantry girders.
3. The design of steel truss girder, loads on trusses, analysis and design of purlins and truss members
4. The design of steel bridges.
5. Design of steel bunkers and silos

UNIT I
Design of Plate Girder: Introduction, Types of sections, elements of plate girder, general considerations, proportioning of web, proportioning of flanges, flexural strength, shear strength of web, shear buckling design methods, end panel design, stiffeners and curtailment of flanges.

UNIT II
Design of Gantry Girder: Introduction, Loads, fatigue effects, specifications and design procedure.

UNIT III
Analysis and Design of Industrial Buildings: Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs,stanchions and design of bracings.

UNIT IV
Design of Steel Truss Girder Bridges: Types of truss bridges, component parts of a truss bridge, economic proportions of trusses, self-weight of truss girders, design of bridge compression members, tension members; wind load on truss girder bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing.

UNIT V
Design of Steel Bunkers and Silos: Introduction – Janseen's Theory – Airy's Theory – Designof Parameters – Design Criteria – Analysis of Bins – Hopper Bottom –Design of Bins.

Text Books:

1. S.K. Duggal, Limit State Design of Steel Structures, Mc Graw Hill Education Private Ltd. New Delhi, 3rd Edition, 2019.
2. N. Subramanian, Design of steel structures, Oxford University Press,2nd edition, 2016.
3. P. Dayaratnam, Design of Steel Structures, Publisher: S. Chand, first edition 2012.

Reference Books:

1. Dr. Ramachandra &Vivendra, Design Steel Structures Volume – II, Gehlot Scientific Publishes Journals Department, 19th edition, 2016.
2. Galyord & Gaylord, Design of Steel Structures, Publisher; Tata Mc Graw Hill, Education. Edition ,2012.
3. Indian Standard Code – IS: 800-2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN OF FORMWORK
(Professional Elective III)

Course Code: GR24D5015 **L/T/P/C: 3/0/0/3**
I Year II Semester

Prerequisites: Engineering Mechanics, Solid Mechanics, Structural Analysis.
Course Outcomes:
1. Identify the necessity and types of form work for various structures of civil Engineering and select proper type of form work, accessories and materials required.
2. Examine the form work for various structural elements like beam, slab, column, wall and foundation.
3. Distinguish the form work for special structures like shells, retaining walls, bridges, Sylos, bunkers & water tank.
4. Assess the working of flying form work like tunnel forms, slip forms and table forms.
5. Evaluate the form work failures from case studies.

UNIT I

Introduction to formwork: Requirements and Selection of Formwork, Formwork Materials-Timber, Plywood, Steel, Aluminium, Plastic, and Accessories. Form work selection

UNIT II

Formwork Design: Concepts, Formwork Systems and Design for Foundations, Walls, Columns, Slab and Beams.

UNIT III

Formwork Design for Special Structures: Shells, Traditional Indian construction utilising formwork techniques in Domes, Folded Plates, Overhead Water Tanks, Natural Draft Cooling Tower and Bridges.

UNIT IV

Flying Formwork: Table Form, Tunnel Form, Slip Form, Formwork for Precast Concrete, Formwork Management Issues –Pre- and Post-Award.

UNIT V

Formwork Failures: Causes and Case studies in Formwork Failure, Formwork Issues in Multistorey Building Construction.

Text Books:
1. Formwork for Concrete structures by Robert L Peurify and Gerold D Oberlender, Fourth edition,2010.
2. Formwork for Concrete Structures, Kumar Neerajha, Tata McGraw Hill Education,2017.
3. Formwork for Concrete Structures, Peurify, McGraw Hill India, 2015.

Reference Books:
1. IS 14687: 1999, False work for Concrete Structures – Guidelines; BIS, New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRINCIPLES OF BRIDGE ENGINEERING
(Professional Elective III)

Course Code: GR24D5016 **L/T/P/C: 3/0/0/3**
I Year II Semester

Course Prerequisites: Design of Steel and Reinforced Concrete Structures

Course Outcomes:
1. Identify the load transfer mechanism of different types of bridge sand loads acting on the super and sub structure
2. Analyze and design of solid slab bridges and Box culvers
3. Analyze and design of T Beam bridges
4. Analyze and design of Plate girder bridges and understand the design concepts of various other types of bridges.
5. Analyse and design of piers, abutments and bearings. Also able to apply various types of inspections and maintenance techniques.

UNIT I
Road Bridges - History– Components – types of bridges and their load transfer mechanisms and suitability- Planning, Site selection, Soil Exploration investigations- Hydraulic factors in Bridge Design - IRC loadings - Economic span length –General Design requirements for super structures and sub structures.

UNIT II
Analysis and Design of Solid slab bridges: General design features, Effective width method. Simply supported and cantilever Slab Bridge, Design of Kerb; Analysis and Design of Box Culverts.

UNIT III
Analysis and design of T-Beam bridges (up to three girder only) Components – Design of interior slab panel. Pigeaud's method, Calculation of longitudinal moment using Courbon's theory, Design of Longitudinal girders and Cross girders beams.

UNIT IV
Plate Girder Bridges-Elements of plate girder and their design-web- flange- intermediate stiffener-vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.
Introduction to Prestressed Concrete Bridges – Steel trussed bridges –Balanced Cantilever bridges – Continuous bridges- Cable stayed bridges (No detailed designs, only conceptual design principles)

UNIT V
Substructures: Analysis and design concepts of Abutments and pier-detailing; Bridge bearings: types, selection, forces on bearings and design concepts of elastomeric bearings; Bridge foundations (Only Design Concepts), Bridge Foundations- Types and design principles Inspection and Maintenance and Rehabilitation of Bridges: Procedures and methods for inspection – Testing

of bridges- Maintenance of Sub Structures and Superstructures- Maintenance of bearings- Repairs and Rehabilitation methods on any ancient bridges- Case studies.

Text Books:

1. Krishna Raju N., "Design of Bridges", Oxford and IBH Publishing Co., Ltd.,5th edition 2019.
2. Ponnu Swamy, "Bridge Engineering", McGraw-Hill Publication,3rd edition,2017.
3. Vazirani, Ratvani & Aswani, "Design of Concrete Bridges", Khanna Publishers, 5th Edition, 2006.

Reference Books:

1. M A. Jagadeesh and T R. Jayaram, "Design of Bridge Structures," Prentice-Hall of India, New Delhi, 2nd edition, 2009.
2. Johnson victor D, "Essentials of Bridge Engineering", Oxford, IBH publishing Co., Ltd, 7th Edition, 2019.
3. Wai-Fah Chen LianDuan, "Bridge Engineering Handbook", CRC Press, USA, 2nd edition, 2014.
4. R.M. Barker and J.A. Puckett, "Design of Highway Bridges", John Wiley& Sons, New York, 4th edition,2021.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN OF ADVANCED CONCRETE STRUCTURES

(Professional Elective IV)

Course Code: GR24D5017 **L/T/P/C: 3/0/0/3**
I Year II Semester

Prerequisites: Design of Reinforced concrete structures, Structural analysis, Bridge Engineering

Course Outcomes:
1. Structural design of flat slab including direct design method.
2. Design and detailing of pile foundations with pile caps and simply supported and continuous deep beams.
3. Design and detailing of plain concrete walls, shear walls.
4. Design and detailing of Intze type Over Head Tank, understand stability requirements of retaining walls.
5. Knowledge of IRC loading and design of Deck Slab Bridge.

UNIT I
Ribbed slabs: Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, Arrangement of Reinforcements.
Flat slabs: Direct design method – Distribution of moments in column strips and middle strips moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way and two way shears-Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip sketch showing reinforcement details.

UNIT II
Design of Deep Beams: Deep beam action, reinforcement requirements, design of simply supported and continuous deep beams and detailing. Reinforcement requirements of pile foundations, design of pile foundation and design of pile cap for a group of piles.

UNIT III
Design of Walls: Plain concrete walls – Braced and unbraced walls, slenderness ratio and design of plain concrete walls. Shear Walls – Classification of shear walls, loads in shear walls and design of shear walls. Retaining Walls – Types of retaining walls, stability requirements of retaining wall and design of counterfort retaining wall.

UNIT IV
Design of Intze Tank: Intze type overhead tank parts and approximation of dimensions of various parts, equation for tank capacity, design and detailing of Intze type OHT. Design of staging for Intze type overhead tank.

UNIT V
Design of Bridges: IRC loadings- class A, B, C and AA (70R), economic span, effective width, design of Deck Slab Bridge and T Beam bridge.

Text Books:

1. Illustrated Reinforced Concrete Design, Dr. V.L. Shah & Dr. S. R. Karve, Structures Publications, 6th edition,2010.
2. Reinforced Concrete Design, S. Unnikrishna Pillai and Devdas Menon D., Tata McGraw-Hill, 3rd Ed, 2017.
3. Reinforced Concrete Structures, Park R. and Paulay T., John Wiley & Sons, Reprint 2022.

Reference Books:

1. Advanced Reinforced Concrete Design, Varghese P. C., Prentice Hall of India, New Delhi,2nd edition, 2005.
2. Limit State design by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jai, Laxmi publication Pvt. Ltd., New Delhi, first edition,2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED DESIGN OF FOUNDATIONS
(Professional Elective IV)

Course Code: GR24D5018 **L/T/P/C: 3/0/0/3**

I Year II Semester

Prerequisites: Geotechnical Engineering, Foundation engineering, Ground Improvement Techniques

Course Outcomes:

1. Assess the suitability of soil strata for different projects.
2. Evaluate the bearing capacity and settlement of shallow foundations.
3. Analyze and design pile foundations and requirements of well foundation.
4. Distinguish about bracing and deep cuts and compute pressure around tunnels.
5. Analyze and design coffer dams and recognize soil structure interaction.

UNIT I

Planning of soil Exploration for Different Projects, Methods of Subsurface Exploration and Methods of Borings along with Various Penetration Tests.

UNIT II

Shallow Foundations, Requirements for Satisfactory Performance of Foundations, Methods of Estimating Bearing Capacity, Settlements of Footings, Proportioning of Foundations using Field Test Data, Pressure - Settlement Characteristics.

UNIT III

Deep Foundations, Methods of Estimating Load Transfer of Piles, Settlements of Pile Foundations, Pile Group Capacity and Settlement, Laterally Loaded Piles, Pile Load Tests, Lateral and Uplift Capacity of Piles, Well Foundations, IS Code Provisions.

UNIT IV

Tunnels and Arching in Soils, Pressure Computations around Tunnels. Open Cuts, Sheeting and Bracing Systems in Shallow and Deep Open Cuts in Different Soil Types.

UNIT V

Coffer Dams, Various Types, Analysis and Design, Foundations under uplifting loads, Soil structure interaction

Text Books:

1. Braja M. Das, Principles of Foundation Engineering, Cengage Learning, New Delhi, 8th edition,2017.
2. Bowles, J.E., Foundation Analysis and Design, McGraw-Hill Publishing Company, New york, 5th edition, 2001.
3. Design of foundation system, N.P. Kurian, Narosa Publishing House,3rd edition,2005.

Reference Books:

1. Analysis and Design of Substructures, Swami Saran, Oxford and IBH Publishing Co. Pvt. Ltd,New Delhi,2nd edition,2018

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
EARTHQUAKE RESISTANT DESIGN OF BUILDINGS
(Professional Elective IV)

Course Code: GR24D5019 **L/T/P/C: 3/0/0/3**

I Year II Semester

Prerequisite: Engineering Mechanics, Engineering Geology, Strength of Materials, Structural Analysis, Design of Reinforced Concrete Structures and Design of Steel.

Course Outcome:

1. Acquire the fundamentals of earthquake engineering and seismicity conditions of the country and world.
2. Apply the Response Spectrum Analysis Method and static equivalent method for the determination of lateral loads on the buildings
3. Assess seismic performance of non-structural components and structural components and identify effective measures to mitigate potential damage.
4. Design the shear walls with an effect of earthquake forces.
5. Apply ductility requirements for the design of structural components.

UNIT I

Engineering Seismology: Earthquake phenomenon cause of earthquakes, Faults, Plate tectonics, Seismic waves, Terms associated with earthquakes Magnitude/Intensity of an earthquake scales, Energy released, Earthquake measuring instruments, Seismoscope, Seismograph, accelerograph, Characteristics of strong ground motions, Seismic zones of India.

Introduction of Functional planning, Continuous load path, overall form, simplicity and symmetry, elongated shapes, stiffness and strength. Seismic design requirements, regular and irregular configurations, basic assumptions.

UNIT II

Conceptual Design - Horizontal and Vertical Load Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures. Twisting of Buildings – Flexible Building and Rigid Building Systems. Strength and Stiffness – Ductility – Definition – Ductility Relationships– Choice of construction Materials – Unconfined Concrete & Confined Concrete – Traditional Indian construction in Masonry Masonry, Steel Structures. Design Earthquake Loads – Basic Load Combinations – Permissible Stresses.

Seismic Methods of Analysis – Static Method – Equivalent Lateral Force Method. Dynamic Analysis – Response Spectrum Method – Modal Analysis Torsion.

UNIT III

Introduction to Earthquake Resistant Design – Seismic Design Requirements and Methods. RC Buildings – IS Code based Method. - Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem - Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear – Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes – Behaviour of Unreinforced and Reinforced Masonry Walls – Behaviour of Walls Box Action and Bands – Behaviour of infill Walls - Non Structural Elements– Failure Mechanism of Nonstructural Elements – Effects of Nonstructural Elements on Structural System – Analysis – Prevention of Damage to Nonstructural Elements – Isolation of Non-Structures.

UNIT IV

Design of Shear walls: Classification according to Behavior, Loads in Shear walls, Design of Rectangular and Flanged Shear walls, Derivation of Formula for Moment of Resistance of Rectangular Shear walls – Coupled Shear Walls. Introduction to non-linear static Push Over Analysis.

UNIT V

Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920.Behavior of beams, columns and joints in RC buildings during earthquakes-Vulnerability of open ground storey and short columns during earthquake- Seismic Evaluation and Retrofitting.

Capacity Based Design: Introduction to Capacity Design, Capacity Design for Beams andColumns -Case studies.

Text books:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press,2nd edition,2013.
2. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press,2013.
3. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd, 2011.

Reference books:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons, first edition,1992.
2. Masonry and Timber structures including earthquake Resistant Design –Anand S. Arya, Nemchand & Bros, first edition,1964.
3. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press,1999.
4. C.V.R. Murty, Earthquake Tips – Learning Earthquake Design and Construction,2005.

Reference Codes:

1. IS: 1893 (Part-1) -2016 (Reaffirmed year 2021) “Criteria for Earthquake Resistant – Design of structures.” B.I.S., New Delhi.
2. IS:4326-1993, “Earthquake Resistant Design and Construction of Building”, Code of Practice B.I.S., New Delhi.
3. IS:13920-1993, “Ductile detailing of concrete structures subjected to seismic force” – Guidelines, B.I.S., New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED STRUCTURAL ENGINEERING LAB

Course Code: GR24D5020 **L/T/P/C: 0/0/4/2**

I Year II Semester

Prerequisites: Advanced Concrete Technology

Course Outcomes:

1. Assess the behavior of concrete in terms of strength and Permeability.
2. Interpret the mechanical properties of concrete and examine the effect of water absorption and sorpitivity.
3. Analyse the behaviour of concrete properties due to the effect of Thermal cycles.
4. Assess the quality of existing concrete members by Non-Destructive testing methods.
5. Analyze the behaviour and understanding reinforcement details and corrosion levels in existing RC structures.

List of Experiments:

1. Determination of water permeability of concrete
2. Determination of concrete compressive strength by accelerated curing test.
3. Assess the sorptivity of concrete.
4. Assessment of water absorption of concrete
5. Effect of elevated temperatures on properties of concrete.
6. Effect of thermal cycles on properties of concrete.
7. Assessment of location of rebar in existing RC structures.
8. Assessment of the level of corrosion in existing RC structures.
9. Assess the surface hardness of existing concrete members using rebound hammer test.
10. Assess the quality of existing concrete members using ultrasonic pulse velocity test.
11. Assessment of flexural behaviour of under reinforced RC Beam
12. Assessment of flexural behaviour of over reinforced RC Beam

References:

1. IS 3085-1965- Method of Test for Permeability of Cement mortar and Concrete.
2. IS 9013-1978- Accelerated Curing Test of concrete
3. IS 1124-1974- Method of Test for determination of Water Absorption, Apparent Specific gravity and Porosity of Natural Building stones.
4. IS 13311 -1992 part 1 & 2- Non-Destructive Testing of Concrete-Methods of Test

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

NUMERICAL ANALYSIS LAB

Course Code: GR24D5021 **L/T/P/C: 0/0/4/2**

I Year II Semester

Prerequisites: Numerical Methods, Mathematics, C programming

Course Outcomes: At the end of the course, students will be able to

1. Find Roots of non-linear equations by Bisection method and Newton's method.
2. Do curve fitting by least square approximations.
3. Solve the system of Linear Equations using Gauss - Elimination/ Gauss - Seidal Iteration/Gauss - Jorden Method.
4. Integrate Numerically Using Trapezoidal and Simpson's Rules.
5. Find Numerical Solution of Ordinary Differential Equations by Euler's Method & Runge-Kutta Method.

List of Experiments (Tasks):

1. Find the Roots of Non-Linear Equation Using Bisection Method.
2. Find the Roots of Non-Linear Equation Using Newton's Method.
3. Curve Fitting by Least Square Approximations.
4. Solve the System of Linear Equations Using Gauss - Elimination Method.
5. Solve the System of Linear Equations Using Gauss - Seidal Iteration Method.
6. Solve the System of Linear Equations Using Gauss - Jorden Method.
7. Integrate numerically using Trapezoidal Rule.
8. Integrate numerically using Simpson's Rules.
9. Numerical Solution of Ordinary Differential Equations by Euler's Method.
10. Numerical Solution of Ordinary Differential Equations by Runge- Kutta Method.

Reference Books:

1. Numerical Methods for Scientific and Engineering Computations. M. K. Jain - S. R. K. Iyengar – R. K. Jain Willey Eastern Limited.
2. Applied numerical Analysis by – Curtis I. Gerala- Addission Wasley – published campus.
3. Numerical Methods for Engineers Stevan C. Chopra, Raymond P. Canal Mc. Graw Hill book company.
4. C Language and Numerical Methods by C. Xavier – New age international publisher.
5. Numerical methods using MATLAB by George Lindfield and John penny, Academic press

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MINI PROJECT

Course Code: GR24D5048 **L/T/P/C: 0/0/4/2**

I Year II Semester

Course Outcomes:

1. Choose the problem domain in the specialized area under computer scienceand engineering.
2. Acquire and categorize the solution paradigms with help of case studies
3. Design and code using selected hardware, software and tools.
4. Execute, Implement and demonstrate the problem statement by using theselected hardware, software and tools.
5. Document the thesis and publish the final work in a peer reviewed journal.

Syllabus Contents:

Mini Project will have mid semester presentation and end semester presentation. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available.

End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution. Continuous assessment of Mini Project at Mid Sem and End Sem will be monitored by the Departmental committee.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DISASTER MANAGEMENT
(AUDIT COURSE)

Course Code: GR24D5054 **L/T/P/C: 2/0/0/0**

Course Outcomes:
1. Differentiate the types of disasters, causes and their impact on environment and society
2. Assess vulnerability and various methods of risk reduction measures as well as mitigation
3. Draw the hazard and vulnerability profile of India, Scenarios in the Indian context
4. Apply disaster management preparedness techniques in reduction of impact.
5. Disaster damage assessment and management.

UNIT I

Introduction: Disaster: Definition, Factors and Significance; Difference Between Hazard And Disaster;Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

UNIT II

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human And Animal Life, Destruction Of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III

Disaster Prone Areas in India: Study of Seismic Zones; Areas Prone To Floods And Droughts, Landslides and Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

UNIT IV

Disaster Preparedness and Management: Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V

Risk Assessment: Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co- Operation in Risk Assessment and Warning, Participation in Risk Assessment. Strategies for Survival. Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Text Books:

1. R. Nishith, Singh AK, Management in India: Perspectives, issues and strategies Royal book Company, 2007.
2. Sahni, Pardeep Et.Al. Disaster Mitigation Experiences And Prentice Hall Of India, New Delhi, 2004.
3. Goel S. L., Administration And Management Text And Case Deep &Deep Publication Pvt. Ltd., New Delhi,2007.

Reference Books:

1. Manual on Natural Disaster Management in India, M C Gupta, NIDM, 2016
2. Disasters in India Studies of grim reality, Anu Kapur& others, Rawat Publishers, 2005
3. N. G. Dhawan, A. S. Khan, Disaster Management and Preparedness, 1st ed., CBS Publication, 2014.
4. P Kumar, Disaster Management, Oak Bridge Publications, First Edition, 2021