



II YEAR I SEMESTER



GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BUILDING MATERIALS AND CONSTRUCTION PLANNING

Course Code: GR22A2010
II Year I Semester

L/T/P/C: 2/0/0/2

Course Outcomes:

1. Distinguish between various types of building stones, bricks and tiles and their structural requirements.
2. Recognize the need and process of manufacture of cement and lime.
3. Identify the function of various materials like wood, glass, paints and building components.
4. Find the importance of masonry, finishing and form works.
5. Assess various building services and principles of building planning.

UNIT I

Building Stones, Bricks and Tiles

Stone- Building stones, classification of building stones, quarrying procedures, characteristics of good building stone, dressing, and tools for dressing of stones.

Bricks -Composition of brick earth, manufacturing of brick, characteristics of good brick, field, and lab test. Tiles - Types of tiles, manufacturing of tiles, structural requirements of tiles.

UNIT II

Cement, Lime, Admixtures

Ingredients of cement, manufacturing of cement.

Lime -Various ingredients of lime, constituents of limestone, classification of lime, manufacturing of lime.

Admixtures - physical admixtures, chemical admixtures.

UNIT III

Wood, Glass, Paints

Wood- structure, types of wood, properties of wood, seasoning, defects, alternative material for wood.

Glass-types of glasses, manufacturing of glass. Paints -Constituents of paints, types of paints. Introduction to Building Components -Lintel, arches, staircase, floors, roofs, foundation, Doors, windows.

UNIT IV

Masonry and Finishing, Form Works

Brick Masonry- Types and bonds. Stone Masonry- Types.

Finishing- plastering, pointing and cladding- Types of ACP (Aluminum composite panel). Form Works - requirements, standards, Scaffolding, shoring, underpinning.

UNIT V

Building Services and Building Planning

Building Services- Water distribution, Sanitary lines and fittings, Plumbing services, ventilators, air conditioning. Characteristics- Absorption, fire safety, fire resistance materials.

Building Planning - Principles of building planning, classification of building and building by laws as per National Building code.



Text Books

1. SK Duggal, Building Materials, New Age Publications 5th Edition, April, 2019.
2. B C Punmia, Ashok Kumar Jain and Arun Kumar Jain, Building Construction, Laxmi Publications (P) Ltd., New Delhi, 11th Edition, 2019.
3. P C Varghese, Building Construction, Prentice Hall of India Private Ltd., New Delhi, 2nd Edition, 2017.

Reference Books

1. Roy Chudley “Construction Technology” Vol. – 1 & 2, 2nd Edition, Longman, UK, 2014.
2. Rangwala, Building Construction, Charotar Publishing House Pvt. Ltd.; 33rd Edition, 2016.



GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING GEOLOGY

Course Code: GR22A2011
II Year I Semester

L/T/P/C: 2/0/0/2

Course Outcomes:

1. Identify the weathering effects and various deposits.
2. Recognize minerals and its importance from civil engineering point of view.
3. Distinguish features of igneous, sedimentary, and metamorphic rocks.
4. Recognize various geological structures and the failures of dams, reservoirs, and tunnels due to geological reasons.
5. Relate water table and the failures of earthquake and landslides.

UNIT I

Physical Geology: Branches of geology useful to civil engineering, Scope of geological studies in various Civil Engineering projects. Weathering, Erosion and Denudation. Factors affecting weathering and product of weathering. Engineering consideration. Development of river, River meandering, Alluvial cones and fans, Placer Deposits, Delta deposits and natural levees.

UNIT II

Mineralogy: Mineral, Origin and composition. Physical properties of minerals, Role of study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Megascopic identification of common primary & secondary minerals.

UNIT III

Petrology: Rock forming processes. Specific gravity of rocks. Field Classification chart. Igneous rocks - Various forms of rocks, Structures and Classification of Igneous rocks on the basis of Chemical composition. Texture and its types. Detailed study of Igneous rocks like Granite, Pegmatite, Dolerite and Basalt. Sedimentary rocks - mode of formation, Structures and Textures. Detailed study of Conglomerate, Sandstone, Shale and Limestone. Metamorphic rocks - structures and textures in metamorphic rocks. Important distinguishing features of rocks as Lineation and Foliation. Detailed study of Gneiss, Schist, Slate.

UNIT IV

Structural Geology: Outcrop and width of outcrop. Fold - Types and nomenclature, Criteria for their recognition in field. Faults: Classification, recognition in field. Types of Joints & Unconformities. Geological structures - Required geological consideration for selecting dam, reservoir and tunnel site.

UNIT V

Earthquake and Landslides: Pervious & impervious rocks and ground water. Earthquake - Magnitude and intensity of earthquake. Seismic zone in India. Consequences of failure due to Land sliding and Earthquake.

Text Books

1. N. Chennakesavulu, Mc-Millan, Text book of Engineering Geology, India Ltd., 2nd edition, 2013
2. K.V.G.K. Gokhale, Principles of Engineering Geology, B.S publications, kindle edition, 2019
3. P. C. Varghes, Engineering Geology for Civil Engineers, PHI learning, New Delhi, 2012



Reference Books

- 1.F.G. Bell, Fundamental of Engineering Geology, Butter worth Heinemann Publications London, NewDelhi, 2016.
- 2.Krynine & Judd, Principles of Engineering Geology & Geotechnics, McGraw Hill New York, CBS publications,2005.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOLID MECHANICS – I**Course Code:GR22A2012****L/T/P/C: 2/1/0/3****II Year I Semester****Prerequisite:** Mathematics, Engineering Mechanics.**Course Outcomes:**

1. Summarize the stresses, strains, elastic constants and also to determine the strain energy for various types of loading.
2. Analyze the shear force, bending moment diagrams and identify the point of contraflexure for different types of beams such as cantilever, simple supports and fixed beams with different loading.
3. Evaluate the bending equation and shear equation to calculate the bending stresses and shear stresses for different sections of the structural members.
4. Solve the principal stresses and strains in different planes by using analytical and graphical methods
5. Evaluate the slope and deflection of different beams for different end conditions and loads by using double integration, Macaulay's and Moment area methods.

UNIT I

Simple Stresses and Strains: Concept of stress and strain, St.Venant's principle, elasticity and plasticity - types of stresses and strains, Hooke's law - stress - strain diagram for mild steel - Working stress - Factor of safety- Elastic constants (E , K , G , μ) and the relationship between them - Bars of varying section - composite bars - Temperature stresses. Strain Energy - Resilience-gradual, sudden, impact and shock loadings - simple applications.

UNIT II

Shear Force and Bending Moment Diagrams: Shear force and Bending moment diagrams for cantilevers, simply supported and overhanging beams. Calculation of maximum SF, BM and the point of contra flexure under concentrated load, uniformly distributed load over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of moments. Relationship between SF, BM and rate of loading at a section of beam.

UNIT III

Flexural Stresses: Theory of simple bending - assumptions - derivation of bending equation: $M/I = f/y = E/R$ - neutral axis - determination of bending stresses -section modulus of rectangular and circular sections (Solid and Hollow), I, T, angle and channel sections - design of simple beam sections.

Shear Stresses - Derivation of formula - Shear stress distribution across various beam sections like rectangular, circular, triangular and angle sections.

UNIT IV

Compound Stresses and Strains: Two- dimensional system, stress at a point on an inclined plane under axial loading-Normal and Tangential stresses on an inclined plane for biaxial stresses-two perpendicular normal stresses accompanied by a state of simple shear.

Principal Stresses and Strains

Analytical and graphical solutions- Mohr's circle of stresses - various theories of failures- maximum principal stress theory-maximum shear stress theory- maximum strain energy theory- maximum shear strain energy theory.



UNIT V

Slope and Deflection: Relationship between moment, slope and deflection, Double integration method, Moment area method, Macaulay's method. Use of these methods to calculate slope and deflection for determinate beams.

Text Books

1. Dr. R.K. Bansal, Strength of material, Laxmi Publications, New Delhi, 6th edition, 2018.
2. S. Ramamrutham, Strength of material- Dhanpat Rai Publishing Company, New Delhi, 18th Edition, 2014.
3. R K Rajput, Strength of materials, S Chand Publications, 6th edition, 2015.

Reference Books

1. Dr. B.C. Punmia, Mechanics of Materials, Laxmi publications, 11th edition, 2017.
2. B. S. Basavarajaiah, Strength of Materials, University Press, Hyderabad, 3rd Edition, 2010.
4. Ferdinand Beer and others, Mechanics of Solid, Tata Mc. Graw Hill publications, 7th Edition, 2014.
3. A.R. Basu, Strength of materials, Dhanpat Rai & Co, Nai Sarah, New Delhi, 2nd edition, 2012.
4. S S Bhavikatti, Strength of materials, New Age Publications, 4th edition, 2021.
5. R. Subramanian, Strength of materials, Oxford University Press, New Delhi, 3rd edition, 2016.
- R.S. Khurmi, Strength of material-S. Chand & Company Ltd., New Delhi, 2010 Re-print.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTATIONAL MATHEMATICS FOR ENGINEERS****Course code:GR22A2009****L/T/P/C: 3/0/0/3****II Year I Semester****Course Outcomes:**

1. Apply well known techniques to find real roots of an equation and linear algebraic systems by iterative methods.
2. Apply interpolation and numerical differentiation techniques for univariate data.
3. Solve problems related to numerical integration and least squares approximations of a function.
4. Choose appropriate numerical techniques to solve IVP and BVP in ODE
5. Distinguish between various numerical methods to solve PDE arising in the context of heat conduction.

UNIT I**Root finding and Numerical solution of linear algebraic systems**

Finding the real root of algebraic and transcendental equations by Regula-Falsi and Newton Raphson methods -Gauss Jacobi and Gauss Seidel iterative methods to solve a linear algebraic system with error analysis.

UNIT II**Interpolation - Cubic spline- Differentiation**

Interpolation with non-uniform data: Newton divided differences formula, operational calculus, Interpolation with uniform data- Newton and Gauss formulas, Fitting natural cubic spline to data
Numerical differentiation for uniform and non-uniform data

UNIT III**Numerical integration and Curve approximations**

Numerical integration by Trapezoidal rule, Simpson's 1/3rd and 3/8th rules – The Principle of least squares, Fitting a straight line, parabola, exponential and power curve, Simple and Multiple linear regression with 2 independent variables.

UNIT IV**Numerical solution of initial and boundary value problems in ODE**

Taylor's series method, Picard's method, Euler method, Modified Euler method and R-K fourth order methods to solve initial value problems in ODE - Finite differences method to solve boundary value problems in ODE.

UNIT-V**Numerical solution initial and boundary value problems in PDE**

Solution of Laplace's equation by Jacobi, Gauss-Seidel method and Successive over relaxation (SOR) methods, Solution of Heat equation by the finite difference method.

Text Books

- 1.M.K.Jain, S.R.K. Iyengar, R.K.Jain-.Numerical methods for scientific and engineering computation- New Age International publishers-Fourth edition-2—3
2. Robert J.Schilling and Sandra L.Harries- Applied numerical methods for engineers using MATLAB and C-Thomson Brooks/Cole-2002



Reference Books

1. S.S.Sastry- Introductory methods of numerical analysis- Prentice Hall (India)- Fourth edition- 2010.



GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTRODUCTION TO FLUID MECHANICS

Course Code: GR22A2013

L/T/P/C: 3/0/0/3

II Year I Semester

Prerequisite: Mathematics, Physics.

Course Outcomes:

1. Comprehend the various fluid properties and fluid statics.
2. Understand the broad principles of hydrostatic forces on submerged planes.
3. Analyzing fluid dynamics and kinematics.
4. classify concept of boundary layer and predict the laminar and turbulent flows.
5. Predict the losses in pipes flows and able to calculate discharge measurement.

UNIT I

Basic Concepts and Definitions Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility. Fluid Statics - Fluid Pressure: Pressure at a point, Pascal law, pressure variation with temperature, density and altitude. Piezometer, U- Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micro manometer. pressure gauges.

UNIT II

Hydrostatic Law, Hydrostatic pressure, and force: horizontal, vertical, and inclined curved surfaces. Introduction explanatory to Buoyancy and meta center

Fluid Kinematics- Classification of fluid flow: steady and unsteady flow; uniform and non- uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one-, two- and three-dimensional flows, Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three - dimensional continuity equations in 3D-Cartesian coordinates

UNIT III

Fluid Dynamics- Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturi meter, Momentum principle; Forces exerted by fluid flow on pipe bend; **Measurement of Discharge and Velocity**: Flow over rectangular, triangular, and trapezoidal and Stepped notches. Venture meter, orifice meter and pitot tube.

UNIT IV

Flow through Pipes: Reynolds experiment- laminar, Transition and Turbulent flows, Loss of head through pipes, Darcy-Wiesbach equation, minor losses (explanatory), total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel.

UNIT V

Boundary Layer Analysis – Assumption and concept of boundary layer theory. Boundary- layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and control of boundary layer. Navier- Stokes equation explanatory- Laminar flow through straight circular pipes- Hagen- Poiseuille equation derivation.



Text Books

1. Modi and Seth, Fluid Mechanics, Standard book house, 23rd edition, 2019.
2. Dr. R.K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P)ltd., New Delhi, 10th Edition, 2019
3. S.K.Som & G.Biswas, Introduction to Fluid Machines, Tata Mc.Graw Hill publishers, Pvt.Ltd.,3rd Edition, 2017.

Reference Books

1. J.F.Douglas, J.M. Gaserek and J.A.Swaffird, Fluid Mechanics, 5th Edition,2005.
2. Frank.M. White, Fluid Mechanics, Tata Mc. Graw Hill Pvt. Ltd, 8th Edition, 2016.
3. A.K. Mohanty, Fluid Mehanics, Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition,1994.
4. Edward J. Shaughnessy, M. Katz and James P. Schaffer, Introduction to Fluid Machines, Oxford University Press, New Delhi, 1st Edition, 2005



GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code:GR22A2014

L/T/P/C: 3/0/0/3

II Year I Semester

Course Outcomes:

1. Apply the application of ohms law & Kirchhoff's laws.
2. Discuss fundamental principles of electrical machines.
3. Measure the fundamental electrical quantities using oscilloscope.
4. Illustrate the basic principles of semi conducting devices.
5. Analyze the different applications of a transistor and SCR.

UNIT I

Electrical Circuits: Basic definitions, Types of elements, Ohm's Law, , Kirchhoff's Laws, Faraday's Law, Resistive networks, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

UNIT II

DC Machines and AC Machines Principle of operation of DC Generator - emf equation - types–DC motor principle – types- torque equation– applications – three-point starter– Principle of operation of induction motor – slip – torque characteristics – applications- Principle of operation of an alternator.

UNIT III

Transformers and Instruments Principle of operation of single-phase transformers – EMF equation – losses – efficiency and regulation. Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments. Cathode Ray Oscilloscope Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

UNIT IV

Diode and its Characteristics P-N junction diode, symbol, V-I Characteristics, Diode Applications, and Rectifiers – Half wave, Full wave, and Bridge rectifiers (simple Problems).

UNIT V

Transistors P-N-P and N-P-N Junction transistors, Transistor as an amplifier, SCR, Symbol, V-I characteristics, and applications.

Text/Reference Books

- 1.V.K. Mehta, S. Chand & Co, Principles of Electrical and Electronics Engineering.
- 2.M.S Naidu and S. Kamakshaiah, Introduction to Electrical Engineering, TMH Publications.
- 3.Kothari and Nagarath, Basic Electrical Engineering, TMH Publications, 2nd Edition.



**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING GEOLOGY LAB**

Course Code: GR22A2015

L/T/P/C: 0/0/4/2

II Year I Semester

Course Outcomes:

1. Identify various minerals and their properties.
2. Identify various rocks and their properties.
3. Understand various rocks and minerals used in industries.
4. Prepare and interpret various sections of geological maps showing structures like faults, folds and Unconformities etc.
5. Resolve simple structural Geology problems.

Exercises:

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Study of Geological map of India.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, Unconformities etc.
5. Study of Seismic zones of India.
6. Simple Structural Geology problems.

Lab Examination Pattern:

1. Description and identification of six minerals.
2. Description and identification of six rocks (including Igneous, Sedimentary and Metamorphic Rocks).
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Reference Books

1. N. Chennakesavulu, Mc-Millan, Text book of Engineering Geology, India Ltd., 2nd edition, 2013
2. P. C. Varghes, Engineering Geology for Civil Engineers, PHI learning, New Delhi, 2012



**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOLID MECHANICS LAB**

Course Code: GR22A2016
II Year I Semester

L/T/P/C:0/0/4/2

Prerequisites: Engineering Mechanics, Mathematics and Physics.

Course Outcomes:

1. Determine the important mechanical properties of materials.
2. Identify the stiffness of an elastic isotropic material.
3. Evaluate the Reciprocal theorem.
4. Measure any substance's resistance to uniform compression.
5. Resistance of various materials against abrasion and impact.

TASK- 1: Tension test on metals

TASK- 2: Torsion test on metals

TASK- 3: Hardness test on metals

TASK- 4: Spring test on metals

TASK-5: Compression test on wood or concrete or brick or block.

TASK-6: Impact test on metals.

TASK-7: Deflection test on cantilever beam.

TASK-8: Deflection test on simply supported beam.

TASK-9: Deflection test on continuous beam.

TASK-10: Verification of Maxwell's Reciprocal theorem

Reference Books

1. Dr. R.K. Bansal, Strength of Material, Laxmi Publications, New Delhi, 6th Edition, 2018.
2. S. Ramamrutham, Strength of material- Dhanpat Rai Publishing Company, New Delhi, 18th Edition, 2014.
3. R K Rajput, Strength of materials, S Chand Publications, 6th Edition, 2015.
4. Dr. B.C. Punmia, Mechanics of Materials, Laxmi publications, 11th edition, 2017.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
VALUE ETHICS AND GENDER CULTURE****Course Code: GR22A2002****L/T/P/C: 2/0/0/0****II Year I Semester****Course Outcomes**

1. To enable the student to understand the core values that shapes the ethical behaviour. And Student will be able to realize the significance of ethical human conduct and self- development
2. Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.
3. The students will learn the rights and responsibilities as an employee and a team member.
4. Students will attain a finger grasp of how gender discrimination works in our society and how to counter it.
5. Students will develop a better understanding on issues related to gender and Empowering students to understand and respond to gender violence.

UNIT I

Values and Self-Development –social values and individual attitudes, Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

❖ A Case study on values and self-development

UNIT II

Personality and Behaviour Development-positive thinking, punctuality, avoiding fault finding, Free from anger, Dignity of labor, religious tolerance, Aware of self-destructive habits.

❖ A Case study on Personality

UNIT III

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

❖ A Case study on professional ethics

UNIT IV

Introduction to Gender - Definition of Gender, Basic Gender Concepts and Terminology, Attitudes towards Gender, Social Construction of Gender.

❖ A Case study/ video discussion on attitudes towards gender

UNIT V

Gender-based Violence -The concept of violence, Types of Gender-based violence, the relationship between gender, development and violence, Gender-based violence from a human rights perspective.

❖ A Case study/ video discussion on gender-based violence in view of human rights

Text Books

1. Professional Ethics Includes Human Values (2nd Edition) By R Subramanian, Oxford University Press, 2017.
- 2.Ethics in Engineering Practice & Research, Caroline Whit beck, 2e, Cambridge University Press 2015.
- 3.A Bilingual Textbook on Gender” written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad, Telangana State in the year 2015.



Reference Books

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life...and Won." Available online at: <http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdul/>
3. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, MichaelJ Rabins, 4e , Cengage learning, 2015.
4. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008