III YEAR

I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
GEOTECHNICAL ENGINEERING

Course Code:GR20A3001 **L/T/P/C:2/0/0/2**
III Year I Semester

Prerequisites: Engineering Geology

Course Objectives:
1. Explain basic engineering properties of soil.
2. Assess various aspects in permeability and effective stresses.
3. Find details about compaction and stress distribution.
4. Identify the nature and behavior of soil during consolidation process.
5. Relate the properties of shear strength of soils.

Course Outcomes:
1. Identify basic Engineering properties of soil and classify the soil.
2. Evaluate coefficient of permeability and effective stresses of soil.
3. Assess the mechanism of stress distribution and compaction in soils.
4. Analyse the behaviour of soil during consolidation process.
5. Evaluate the performance of shear strength of soil mass.

UNIT I
Introduction - Types of soils and their formation, Scope of soil mechanics, Basic definitions and relationships, Soil mass as two and three-phase system, Specific gravity, Consistency limits, Consistency indices, Grain size analysis, Indian standard soil classification system and Plasticity chart.

UNIT II
Permeability of Soil – Capillary rise, Darcy's law, determination of coefficient of permeability by constant-head method and falling-head method. Field methods by pumping-out test. Permeability of stratified soils and factors affecting permeability of soil.
Seepage Analysis - characteristics of flow nets, total stress, neutral stress and effective stress. Principle of effective stress, effect of water table and fluctuations in effective stress, quicksand condition.

UNIT III
Stresses in soils – Introduction, Pressure bulb and Isobars, Boussinesq's equation for the vertical stress due to point load, line load, strip load, uniformly loaded circular area. Representation of stress along the vertical plane and horizontal plane. Westergaard's equation, Theory of Newmark's Influence Chart. Appropriate stress distribution methods - equivalent point load method and two to one method.
Compaction of Soil – Mechanism of compaction, laboratory tests, factors affecting compaction, effects of compaction on soil properties, Field compaction and quality control.

UNIT IV

Consolidation of Soil – stress history of clay, primary consolidation and secondary consolidation settlement, Terzaghi's theory of consolidation, interpretation of consolidation test results, determination of pre-consolidation pressure.

UNIT V

Shear Strength - Mohr circle and its characteristics, Mohr-Coulomb theory. Types of laboratory shear tests – direct shear test, tri-axial compression test, unconfined compression test and vane shear test. Shear strength of clays and sands.

TEXT BOOKS

1. Gopal Ranjan and ASR Rao, Basic and Applied Soil Mechanics, New Age International Pvt. Ltd, New Delhi, 3rd edition (2016).
2. K.R. Arora, Soil Mechanics and Foundation Engineering, Standard Publishers Distributors, Delhi, 5th edition (2000), Reprint (2020).

REFERENCES

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Soil Mechanics and Foundations, Laxmi publications Pvt. Ltd., New Delhi, 16th edition, Reprint (2017).
2. C. Venkataramiah, Geotechnical Engineering, New age International publishers (2002),5th edition (2017).
3. Dr. P. Purushotham Raj, Soil Mechanics and Foundation Engineering, Pearson Education India (2008).
4. S. K.Gulhati & Manoj Datta, Geotechnical Engineering, Mc.Graw Hill Education Pvt Ltd., New Delhi (2005), Reprint (2017).
5. Braja M. Das, Advanced Soil Mechanics, Taylor and Francis, 4th edition (2013).
6. Soil Mechanics by Craig R.F., Chapman & Hall, 8th edition 2012, CRC Press.
7. Soil Mechanics in Engineering Practice by Karl Terzaghi, Ralph B. Peck, and Gholamreza Mesri- Wiley Inter science, 3rd edition- 1996.
8. Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering (Civil and Environmental Engineering) by V.N.S.Murthy, Publishers: Marcel Dekker, 2010.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CONCRETE TECHNOLOGY

Course Code:GR20A3002 **L/T/P/C:2/0/0/2**
III Year I Semester

Prerequisites: Building Materials and Construction Planning

Course Objectives:

1. Identify the physical and chemical properties of concrete ingredients and able to conduct tests on cement and aggregates.
2. Comprehend the workability of concrete, manufacturing processes of concrete and the behaviour of fresh, hardened concrete.
3. Gain the knowledge about NDT methods, quality control of concrete and how to conduct the tests on hardened concrete.
4. Identify the properties like elasticity, creep, shrinkage; special concretes and their applications in the diverse construction field.
5. Acquire the practical knowledge on mix design principles, concepts and methods

Course Outcomes:

1. Explain the physical and chemical properties of concrete ingredients and able to conduct tests on cement and aggregates.
2. Illustrate workability of fresh concrete and also explain the properties of fresh and hardened concrete
3. Demonstrate different tests such as compression and tension on hardened concrete and also summarize the quality control of concrete under different conditions.
4. Estimate the creep and shrinkage of concrete and also distinguish the special concretes
5. Design the mix proportions for the specific work for required strength and workability with available materials at workplace.

UNIT I

Concrete Ingredients and its Properties:

Cements & Admixtures: Portland cement – Chemical composition – Hydration, setting of cement – Structure of hydrated cement – Tests on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum size of aggregate.

UNIT II

Fresh Concrete: Production of concrete, mixing, compaction curing, Properties of fresh concrete. Workability – Factors affecting workability – Measurement of workability by different tests–Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding.

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel Space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength -Curing.

UNIT III

Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – Codal provisions for NDT.

Quality control of Concrete: Behavior of concrete in extreme environment; temperature problem in concreting, hot weather, cold weather and under water conditions, Resistance to freezing, sulphate and acid attack, efflorescence, fire resistance; Inspection and testing of concrete-Concrete cracking, types of cracks, causes and remedies.

UNIT IV

Elasticity, Creep & Shrinkage: Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – Types of shrinkage.

Special concretes: Lightweight aggregate concrete – Cellular concrete– No-fines concrete – High density concrete – Fibre Reinforced concrete – Different types of fibres– Factors affecting properties & Applications of F.R.C – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete & Applications – High performance concrete – Self-consolidating concrete – SIFCON.

UNIT V

Mix Design: Factors in the choice of mix proportions – Durability of concrete– Statistical methods – Acceptance criteria – Proportioning of concrete mixes by BIS method of mix design.

TEXT BOOKS:

1. Concrete Technology by M. S. Shetty– S. Chand & Co. ;2006
2. Concrete Technology by M.L. Gambhir – Tata Mc. Graw Hill Publishers,5th edition 2017 New Delhi.

REFERENCES:

1. Properties of Concrete by A. M. Neville – Pearson Education – 2nd edition 2019.
2. Concrete Technology by A.R. Santha Kumar, Oxford University Press, NewDelhi-2006.
3. Concrete: Microstructure, Properties and materials by P Kumar Mehta, P J M Monteiro, MC Graw Hill Education Publisher, New Delhi- 4th edition-2017.
4. IS 10262 :2019, Concrete Mix Proportioning- Guidelines (Second Revision).

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HYDROLOGY AND WATER RESOURCES ENGINEERING

Course Code:GR20A3003 **L/T/P/C:3/0/0/3**
III Year I Semester

Pre-Requisites: Introduction to Fluid Mechanics

Course Objectives:

1. Analyze the applications of Hydrology for Rainfall Measurement and Analysis, Runoff measurement and analysis & measurement and estimation Evaporation, Evapotranspiration and infiltration
2. Apply the Hydrographic Analysis of Runoff
3. Assess the processes of groundwater occurrence
4. Design the types and methods of application of irrigation water and Standards for quality and to analyze the soil-water–plant relationship.
5. Design of irrigation canals and design discharge over a catchment.

Course Outcomes:

1. Measure, estimate and process rainfall data, runoff data, evaporation data, Evapotranspiration data and infiltration data.
2. Design a model in a region for direct run off hydrograph, unit hydrograph, S-Curve hydrograph and Synthetic unit hydrograph.
3. Calculate the discharge of radial flow to wells in a region of confined and unconfined aquifers by determining the aquifer parameters by field tests and pumping tests.
4. Design a suitable irrigation method depending on soil, water and plant conditions on the field & Prepare irrigation schedules and irrigation efficiencies for farmers on the field
5. Design irrigation canals and estimate discharge by SCS Curve Number Method, analyze the regional flood frequency, discuss the methods of stream gauging and evaluate the forces acting on gravity dam.

UNIT I

Introduction to Engineering Hydrology and its applications: Hydrologic Cycle, types and forms of precipitation, rainfall measurement, types of Rain gauges, computation of average rainfall over a basin, processing of rainfall data- adjustment of record-Rainfall Double Mass Curve. Runoff-Factors affecting Runoff over a Catchment-Empirical and Rational Formulae.

Abstraction from rainfall: Evaporation, factors effecting Evaporation, Measurement of evaporation– Evapotranspiration-Penman and Blaney & Criddle Methods -Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices'. Important aspects of National Water Policy 2012.

UNIT II

Distribution of Runoff: Hydrograph Analysis; Flood Hydrograph – Effective Rainfall - Base Flow- Base Flow Separation - Direct Runoff Hydrograph– Unit Hydrograph, definition and limitations of application of Unit hydrograph, Derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa S- Curve hydrograph, Synthetic Unit Hydrograph

UNIT III

Ground water Occurrence: Types of aquifers, aquifer parameters,' porosity' Specific yield, permeability, transmissivity and storage coefficient, Darcy's law, radial flow to wells in confined and unconfined aquifers, Types of wells, Well Construction - Well Development.

UNIT IV

Necessity and importance of irrigation: Advantages and ill-effects of irrigation, Types of irrigation, Methods of application of irrigation water, Indian Agriculture soils, Methods of improving soil fertility-Crop rotation, preparation land for irrigation, Standards of quality for irrigation water.

Soil-water-plant relationship: Vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors Affecting duty- design discharge for a water course. The depth and frequency of Irrigation, Irrigation efficiencies- Water Logging.

UNIT V

Classification of canals: Design of Irrigation canals by Kennedy's and Laceys theories, balancing depth of cutting, IS standards for canal design canal lining.

Design discharge over a catchment: computation of design discharge–Rational formula, SCS curve number method, flood frequency analysis introductory part only. Stream gauging-measurement and estimation of stream flow.

Dams: Types of Reservoirs, Dams and Spillways. Stability Analysis on Gravity Dams and Earthen Dams. Very Basic Concepts only in Water Data visualization and extraction from India- WRIS (Water Resources Information Systems) and BHUVAN-Names and Numbers of ten important IS codes in Water Resources Engineering- Listing only

Software Applications to WRE- Listing only

TEXT BOOKS

1. A Text book of Hydrology by P. Jaya Rami Reddy,3rd Edition, Laxmi publications, 2016.
2. Engineering Hydrology by K.Subramanya, Fourth Edition, McGraw Hill Education,2017.
3. Irrigation and Water Power Engineering- B.C.Punmia, Pande B.B.Lal, Ashok Kumar Jain,Arun Kumar Jain-Laxmi Publications, 17th edition- 2021.
4. Irrigation Engineering & Hydraulic Structures- Santosh Kumar Garg,first edition 2006.

REFERENCES

1. Elementary Hydrology by V.P.Singh, PHI publications, Fascimile edition-1991
2. Irrigation and Water Resources &Water Power by P. N. Modi, Standard Book House, 11th edition 2019.
3. Irrigation Water Management by D.K. Majumdar, Prentice Hall of India., 2nd edition-2013.
4. Applied Hydrologyby Ven Te Chow, David R Maidment, Larry WMays, Tata Mc Graw Hill Education, first edition 2017.
5. Introduction to Hydrology by Warren Viessman, Jr. Garyl Lewis- Pearson, 5th edition 2003.
6. NPTEL Web and Video Courses.
7. HEC-HMS (hec.usace.army.mil/software/hec-hms/features.aspx)
8. MODFLOW (usgs.gov/mission-areas/water-resources)
9. SWAT (swat.tamu.edu)
10. India –WRIS (www.indiawris.gov.in)
11. BHUVAN (bhuvan.nrsc.gov.in)
12. Handbook of Hydrology – Edited by David R. Maidment, mc Graw Hill Education,1992.
13. Handbook of Applied Hydrology -Edited by V.T.Chow, Mc Graw Hill education, 1964.
14. Groundwater Hydrology – David K. Todd and Larry W. Mays Wiley 3rd edition-2005.

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

Course Code:GR20A3004 **L/T/P/C: 2/1/0/3**
III Year I Semester

Prerequisite: Solid Mechanics, Structural Analysis, Building Materials and Construction Planning and Engineering Graphics.

Course Objectives:
1. Classify Working Stress and Limit State method in design of reinforced concrete structures.
2. Analyze and design of beams.
3. Design of slabs, staircase and canopy.
4. Design of columns.
5. Design of footings, beams and slabs for limit state of serviceability.

Course Outcomes:
1. Classify Working Stress and Limit State method in design of reinforced concrete structures.
2. Analyze and design of beams.
3. Design of slabs, staircase and canopy.
4. Design of columns.
5. Design of footings, beams and slabs for limit state of serviceability.

UNIT-I
Concepts of R.C Design: Study of the strength, behavior, and design of indeterminate reinforced concrete structures. Loads and stresses, load combinations. Working stress method and limit state approach as per IS-456-2000.

UNIT-II
Analysis and Design of Beams: Analysis and design of singly and doubly reinforced rectangular, T and L-sections using limit state method. Design for shear, torsion and bond using limit state concept. Mechanism of shear and bond failure. Development length of bars; I.S. code provisions-design examples in simply supported and continuous beams with detailing.

UNIT-III
Design of Slabs: Design of two-way slab and one way slab using I S coefficients. Placement of reinforcement in slabs. Design of flat slab – Direct method
Design of Stair case and Canopy: Design of staircase and canopy(portico).

UNIT-IV
Design of Columns: Design of Short columns, columns with uni-axial and bi-axial bending. Design of long columns, use of design charts - I S code provisions.

UNIT-V

Design of Foundation: Wall footing, Isolated and combined footing for columns. Limit state design of serviceability for deflection, cracking and codal provisions

TEXT BOOKS:

1. Fundamentals of reinforced concrete design by M.L.Gambhir, Prentice Hall of India Private Ltd.,2010, New Delhi.
2. Reinforced concrete structural elements-behavior, analysis and design by Purushotam, Tata Mc.Graw Hill, New Delhi, 1984.
3. Limit State design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jai, Laxmi publication Pvt. Ltd., New Delhi, 2016.

REFERENCES:

1. IS 456-2000; Indian Standard Code of Practice for Plain and Reinforced Concrete.
2. SP 16: Design Aids for Reinforced Concrete

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
STRUCTURAL ANALYSIS-II
(PROFESSIONAL ELECTIVE-I)

Course Code:GR20A3005 **L/T/P/C: 3/0/0/3**
III Year I Semester

Pre-requisites: Solid Mechanics, Structural Analysis -I

Course Objectives:
1. Analyze the building frames using Slope deflection and Moment distribution method
2. Analyze the building frames using Kani's methods.
3. Demonstrate the Approximate analysis of multi-storey frames using portal, cantilever and substitute frame methods.
4. Analyze the simple beams and frames using stiffness matrix and flexibility matrix methods
5. Evaluate the collapse load and plastic moment carrying capacity of beams and frames.

Course Outcomes:
1. Analyze various types of frames with and without sway using Slope deflection and Moment distribution methods
2. Analyze various types of frames using Kani's methods of Analysis
3. Evaluate the shear forces, bending moments and axial forces in beams, columns and at joints of multi-storey frames using approximate methods of analysis
4. Analyze the simple beams and frames using stiffness matrix and flexibility matrix methods of analysis.
5. Apply the principles of virtual work to estimate the collapse load and plastic moment carryingcapacity of simple beams and frames.

UNIT I
Analysis of building frames- Slope deflection and Moment Distribution Methods of analysis to simple portal frames without and with sway - frames with inclined legs.

UNIT II
Analysis of building frames- Kani's Method for analysis of continuous beams and Portal frames (up to single bay two storeys).

UNIT III
Approximate method of Analysis: Frames with vertical loads using Substitute frame method – Frames with horizontal loads using Portal and Cantilever methods

UNIT IV
Matrix method of analysis: Static and Kinematic indeterminacies- different approaches to matrix methods- analysis using stiffness matrix methods for beams and frames (3 DOF) and flexibility matrix methods for beams and frames (2 DOF)

UNIT V

Plastic analysis: Concepts - Plastic hinges- mechanism- -Shape factors- upper and lower bound theorem- Plastic analysis for simple beam and simple portal frames

TEXT BOOKS:

1. Theory of structures - B.C.Punmia, Jain, Ashok Kumar Jain &Arun Kumar Jain, Laxmi publications, 13th edition-2017.
2. Indeterminate Structural Analysis - K.U. Muthu, H. Narendra, Maganti Janardhana, M. Vijayanand – I K International Publishing House Pvt. Ltd., 2014.
3. Structural Analysis 1 and II 4/e – S S Bhavikatti,Vikas Publishing House,4th edition, 2013.

REFERENCES:

1. Analysis of structures -T.S.Thandava Moorthy, Oxford University Press.
2. Structural Analysis –Devdas Menon -Alpha Science International Ltd., 2007.
3. Advanced Structural Analysis - Devdas Menon - Narosa Publishers, 2009.
4. Wang C.K.,"Indeterminate Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010
5. William Weaver Jr. & James M. Gere, "Matrix Analysis of Framed Structures", CBS Publishers and Distributors, Delhi, 2004.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
TRAFFIC ENGINEERING AND MANAGEMENT

(PROFESSIONAL ELECTIVE-I)

Course Code:GR20A3006 **L/T/P/C: 3/0/0/3**

III Year I Semester

Prerequisite: Surveying and Geomatics

Course Objectives:

1. Explain a solid understanding of the principles of highway engineering and traffic analysis.
2. Summarize traffic surveys and present the collected data.
3. Describe the type of conflicts that occur at intersection and design the intersection accordingly.
4. Discuss analytical and practical knowledge of Planning, Designing and solving transportation problems by signal phasing and timing plan.
5. Express the knowledge on traffic management systems.

Course Outcomes:

1. Analyze traffic problems and plan for traffic systems various uses
2. Explain traffic surveys and plan parking arrangements
3. Analyze traffic studies and implement traffic regulation and control measures and intersection design
4. Organize the basic traffic signal phasing and timing plan
5. Develop Traffic management Systems

UNIT I

Traffic Planning And Characteristics-Road Characteristics – Road user characteristics –PIEV theory – Vehicle –Performance characteristics – Fundamentals of Traffic Flow. Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency, Components of Traffic Engineering-Road, Traffic and Land Use Characteristics.

UNIT II

Traffic Surveys and Analysis-Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey– Accident analyses -Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting – Level of service – Concept, applications and significance as per Indian HCM (Highway Capacity Manual)

UNIT III

Geometric Design Of Intersections-Conflicts at Intersections, Classification of Intersections at Grade, Channelized and Un-channelized Intersection - Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Channelization and Rotary design, Grade Separators

UNIT IV

Traffic Control-Traffic signs, Road markings, Design of Traffic signals and Signal co- ordination, Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design.

UNIT V

Traffic Management-Traffic Management- Traffic System Management (TSM) and Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)

TEXT BOOKS

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 10th edition,2018.
2. Introduction to Traffic Engineering by R. Srinivasa Kumar, Universities Press
3. Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.

REFERENCES

1. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
2. Guidelines of Ministryof Road Transport and Highways, Government of India.
3. Subhash C. Saxena, A Course in Traffic Planning and Design, CBS, 2020.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
GROUNDWATER

(PROFESSIONAL ELECTIVE-I)

Course Code:GR20A3007 **L/T/P/C: 3/0/0/3**

III Year I Semester

Pre-Requisites: Introduction to Fluid Mechanics

Course objectives:

1. Describe the Ground water hydrological cycle, types of aquifers
2. Discuss the Ground the Water Movement and water contours
3. Classify the flow towards a well in confined and unconfined aquifers
4. Explain the Surface and Subsurface Investigation
5. Express well construction and seawater intrusion

Course outcomes:

1. Estimate the porosity and specific yield of aquifers
2. Apply ground water flow equation
3. Compute Dupuit's and Theim's equations
4. Apply the Surface methods and subsurface method of exploration.
5. Construct the Artificial recharge pits.

UNIT I

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

UNIT II

Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

UNIT III

Steady groundwater flow towards a well in confined and unconfined aquifers – Dupuit's and Theim's equations, Assumptions, Formation constants, yield of an open well Well interface and well tests – Recuperation Test.

Unsteady flow towards a well – Non equilibrium equations – Theis' solution – Jocob and Chow's simplifications, Leaky aquifers – Well Interference.

UNIT IV

Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT V

Well Construction – Drilling Equipment used for Well Construction–Bore log – Interpretation of Log Data.

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion. Groundwater Basin Management: Concepts of conjunction use, Case studies.

Listing of Case Studies using MODFLOW.

TEXT BOOKS:

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York, 3rd edition-2005.
2. Groundwater by H. M. Raghunath, New Age Publishers, 3rd edition-2007.
3. Ground Water Hydrology by D.K. Todd and L.R Mays John Willey, 3rd edition-2005.

REFERENCES:

1. Groundwater Hydrology by H.Bower, Mc Graw Hill Inc. US,2000.
2. Groundwater System Planning & Management – R. Willes & W. W. G. Yeh, Prentice Hall.,1987.
3. Applied Hydrogeology by C. W. Fetta, Pearson, 4th edition,2000.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IRRIGATION MANAGEMENT

(PROFESSIONAL ELECTIVE-I)

Course Code:GR20A3008 **L/T/P/C: 3/0/0/3**

III Year I Semester

Pre-Requisites: Hydrology and Water Resources Engineering

Course Objectives:

1. Educate the fundamentals of soils physical & chemical properties with respect to soil water plant relationship.
2. Estimate water requirement of various principal crops.
3. Design and development of various irrigation methods.
4. Identify conveyance of water through field channels and through underground pipe lines and land management.
5. Analyse irrigated areas and design of drainage systems

Course Outcomes:

1. Inculcate knowledge of soil physical & chemical properties with respect to soil water plant relationship.
2. Acquire the knowledge to estimate water requirement for various principal crops
3. Apply the various methods to design and development of irrigation structures
4. Design the conveyance of water through field channels through underground pipe lines.
5. Analyze irrigated areas and design drainage systems

UNIT I

Introduction: Necessity of irrigation and Scope, Benefits of Irrigation, Types of Irrigation, Physical and Chemical properties of soils, Field Capacity, Temporary and Permanent Wilting Points, Hydraulic Conductivity.

UNIT II

Water Requirement for Crops: Meteorological Parameters needed in estimating water requirement of crops, their measurements, Methods for estimating evapotranspiration of crops, Consumptive Use, Irrigation Requirement of Principal Crops, Duty, Delta and Base Period and Interrelationships, Factors Affecting the Duty, Cropping Patterns, Irrigation Efficiencies.

UNIT III

Methods of Irrigation: Surface Irrigation Methods, Border, Check, Furrow, Sub-irrigation Methods and their Relative Merits, Principles of Design of Surface Irrigation Methods, Micro-Irrigation, Sprinkler and Drip Irrigation Methods and their advantages and disadvantages.

UNIT IV

Planning of Irrigation Projects, Command Area Development Programmes, Classification of Irrigable Soils, soils Management, Texture and structure of Soils, Soil groups of India, Soil Water plant Relations in Irrigation, Measurement of Soil Moisture. Land Grading Survey and Design, Equipment of Land Grading, Field Layout suiting different crops. Conveyance of Irrigation Water, Field Channels, Different lining materials, Design of field channels, Drop structures, Conveyance of water through underground pipe lines.

UNIT V

Irrigation Management, Diagnostic Analysis of Irrigation System, Micro Irrigation, Water Logging, Reclamation, Water Quality for Irrigation, Participatory Irrigation Management, Strategies, Conflict Management, Legal aspects in water sharing and management.

Listing of Applications of Softwares in Irrigation Management

TEXT BOOKS:

1. Irrigation: Theoryand Practice by Michael. A.M, S. Chand,2nd Edition, 2009.
2. Land and Water Management Engineering by V.V.N. Murthy, Kalyani Publishers, 2013.
3. Irrigation –Theory and Practice" by Withers and Vipond, S, Cornell University Press, 1980.

REFERENCES:

1. Soil and Water Management Systems by Schwab G.O., Fangmeir, D.D. and Elliot W.J,John Wiley & Sons, 1996.
2. Irrigation, Drainage and Salinity by Hutchinson.
3. Irrigation and Water Resources Engineering by Asawa, G.L, New age Publishers,2005.
4. Irrigation Principles and Practice by Hansen, V.E., Israelson O.S. and Stringham G.C.John Wiley & Sons, N York, 4th edition, 1981.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING MATERIALS FOR SUSTAINABILITY

(OPEN ELECTIVE-I)

Course Code:GR20A3009 **L/T/P/C: 3/0/0/3**
III Year I Semester

Pre-requisites: Building materials and construction planning

Course Objectives:

1. Discover on awareness among students on issues in area of sustainability
2. Establish a clear idea of the role and impact of various aspects of engineering and engineering decisions on environmental and materials
3. Discuss about the energy efficient green building materials and to have understanding on the cost-effective Building Technologies
4. Differentiate various renewable and non-renewable sources of energy along with their carbon foot prints and enumerate the process of performance testing including building modelling and energy analysis
5. Correlate the Integrated Life cycle design of Materials and Structures

Course Outcomes:

1. Describe the different types of environmental factors effecting materials
2. Analyze the work in sustainability for research and education
3. Illustrating the broad perspective in thinking for sustainable practices by utilizing the engineering knowledge and principles gained from this course
4. Perform cost/benefit analysis and life-cycle analysis of green buildings.
5. Identify and compare Building Planning Specifications.

UNIT I

Sustainability – Introduction, Need and concept of sustainability, Social- environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols – Clean Development Mechanism (CDM), Environmental legislations in India – Water Act, Air Act

UNIT II

Green Building Materials, Basic concepts of sustainable habitat, green buildings, green materials for building construction, material selection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Sustainably managed Materials, Depleting natural resources of building materials; renewable and recyclable resources; energy efficient materials.

UNIT III

Green cement, Biodegradable materials, Smart materials, Manufactured Materials, Volatile Organic Compounds (VOC's), Natural Non-Petroleum Based Materials, Recycled materials, Renewable and Indigenous Building Materials, Engineering evaluation of these materials

UNIT IV

Green Building Planning and Specifications**,** Environment friendly and cost effective Building Technologies, Green Strategies for Building Systems, Energy Conservation Measures in Buildings, Waste &Water management and Recycling in Sustainable Facilities, Heating, Ventilation and Air Conditioning, Passive Solar & Daylight, Plumbing and its Effect on Energy Consumption.

UNIT V

Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) – Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA) – Procedures of EIA in India with reference to construction related projects.

TEXT BOOKS:

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkata Rama Reddy & K S Nanjunda Rao – New Age International Publishers, 2017.
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPON Press, 2007.
3. Non-conventional Energy Resources – By D S Chauhan and S K Srivastava – New Age International Publishers, 2012.

REFERENCES:

1. Green Buildings (McGraw hill publication): byGevorkian
2. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design
3. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider, W. W. Norton & Company Publisher.
4. Understanding Green Building Materials, Traci Rose Rider, W. W. Norton & Company Publisher.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

GEOTECHNICAL ENGINEERING LAB

Course Code: GR20A3010 **L/T/P/C: 0/0/4/2**

III Year I Semester

Pre-Requisites: Geotechnical Engineering.

Course Objectives:

1. Distinguish various soil properties and its behaviour.
2. Carryout firm foundation in testing various types of soils and their properties.
3. Experience with the measurement of geotechnical laboratory parameters.
4. Excel in experiment research and to succeed with real time projects.
5. Ability to design and conduct experiments as well as analyse and interpret data.

Course Outcomes:

1. Analyse soil behaviour and its mechanism.
2. Analyse basic properties of soil in simple and complex applications.
3. Develop a proficiency in handling experimental data.
4. Compute the results of a laboratory experiment.
5. Recommend extensive research in geotechnical properties.

List of experiments:

1. Liquid limit and plastic limit
2. Grain size distribution by sieve analysis
3. Field density by core cutter method
4. Field density by sand replacement method
5. Relative density of sand
6. Standard and modified compaction test
7. Permeability of soil by constant and variable head test
8. California Bearing Ratio Test
9. Consolidation test
10. Unconfined compression test
11. Direct shear test
12. Vane shear test
13. Tri-axial test (Demonstration)

REFERENCES:

1. Bowles, J.E. (1979). Physical and Geotechnical Properties of Soils, McGraw Hill Publishers.
2. BS 1377 (Part 1 to 8). Methods of Test for Soils for Civil Engineering Purposes, British Standard Institute.
3. Head, K.H. (1982). Manual of Soil Laboratory Testing, Vol. 1,2, 3 Soil classification and compaction tests, Whittles Publishing, Scotland, UK.
4. IS 2720 (Various parts). Methods of Test for Soils, Bureau of Indian Standards.
5. Lambe (1951). Soil Testing in Engineering, Wiley & Sons.
6. Mandal, J.N. and Divshikar, D.G. (1994). Soil Testing in Civil Engineering, Oxford &IBH Publishing Company Pvt. Ltd., New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CONCRETE TECHNOLOGY LAB

Course Code: GR20A3011 **L/T/P/C: 0/0/4/2**

III Year I Semester

Pre-Requisites: Concrete Technology

Course Objectives:

1. Familiarize the students with physical and mechanical properties of cement concrete constituents
2. Provide practical knowledge and understanding towards the materials used for concrete.
3. Provide exposure about the fresh and hardened concrete
4. Acquire practical skills in the area of cement, fresh and hardened concrete testing.
5. Give good understanding about water to be added to cement for various purposes.

Course Outcomes:

1. Identify the suitable materials used for concrete for particular purpose
2. Gauge the quality control of Cement and concrete
3. Identify, describe and carry out the main laboratory tests relevant to the use of concrete on site
4. Design normal concrete mixes.
5. Interpret the properties in tern to design or invent the new materials

List of Experiments:

1. Normal Consistency test on cement
2. Initial Setting time and final setting time of cement
3. Fineness test of cement
4. Specific gravity of cement
5. Soundness test of cement
6. Compressive strength of cement
7. Sieve analysis of coarse and fine aggregate
8. Bulking of sand (Field test & Laboratory Test)
9. Workability test on concrete using slump Cone
10. Workability test on concrete by compaction factor test
11. Workability test on concrete by Vee-Bee Test
12. compressive strength of concrete
13. Split tensile strength test on concrete

REFERENCES

1. Concrete Technology Theory and Practice, Shetty M. S, S. CHAND, 8th edition, 2019.
2. Concrete Technology: Theory and Practice Gambhir Murari Lal, Mcgraw Hill, fifth edition., 2013.
3. IS 269:2013 – Ordinary Portland cement, 33 grade- Specification (Fifth Revision)
4. IS 383:2016 – coarse and fine aggregates for concrete- Specification (Third Revision)
5. IS 10262 :2019, Concrete Mix Proportioning- Guidelines (Second Revision).

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CONSTITUTION OF INDIA

Course Code:GR20A2003 **L/T/P/C: 2/0/0/2**
III Year I Semester

Course Objectives:

1. Create an awareness about the Constitution of India, Fundamental Rights and Duties, Directive Principles.
2. Learn the role of Prime Minister, President and the Council of Ministers and the State Legislature.
3. Learn the divisions of executive, legislative and judiciary and so on.
4. Know how a municipal office, panchayat office etc. works.
5. Understand the importance and role of Election Commission Functions.

Course Outcomes:

1. Know the importance of Constitution and Government.
2. Become Good Citizens and know their fundamental rights, duties and principles.
3. Learn about the role of PM, President, Council of Ministers and Local Administration.
4. Understand the importance of Election Commission.
5. Know about Secularism, Federalism, Democracy, Liberty, Freedom of Expression, Special Status of States etc.,

UNIT I

Introduction: 'Constitution' meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II

Union Government and its Administration: Structure of the Indian Union: Federalism, Centre - State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha.

UNIT III

State Government and its Administration: Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions.

UNIT IV

Local Administration: District's Administration head: Role and Importance Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT V

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT/REFERENCE BOOKS:

1.'Indian Polity' by Laxmikanth 5th Edition, McGraw Hill Edition. 2.Indian Constitution by Subhash C. Kashyap, Vision Books Publisher

3.'Introduction to Indian Constitution' by D.D. Basu, 21st Edition, LexisNexis Publisher4.'Indian Administration by avasthi and avasthi-by lakshminarain agarwal publication