Syllabus
IV-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ESTIMATING AND COSTING

Course Code: GR18A4001	**L**	**T**	**P**	**C**
IV Year. I Semester	**3**	**1**	**0**	**4**

Course Objectives: The objectives of this course is to make the student to

1. Understanding the process of quantity survey.
2. Estimating the quantities of materials for buildings and roads.
3. Calculate rate per unit of any item.
4. Provide knowledge on Contracts and tendering process.
5. Assessing the value of a property

Course Outcomes: After completion of this course, students will be able to

1. Calculate the quantities of different items in a building and different types of roads and structures.
2. Handle the tendering process for executing any civil engineering work.
3. Assess the value of any property.
4. Recognize the process and importance of cost estimation, cost budgeting and cost control.
5. Estimate the rate per unit of any item of work.

UNIT I

General items of work in building: Standard Units, Principles of working out quantities for detailed and abstract estimates, approximate methods of Estimating. Detailed Estimates of Buildings –center line method, long wall short wall method.

UNIT II

Earthwork for roads hill roads (two level sections only) and canals. Quantities of materials for different types of roads.

UNIT III

Rate Analysis –Working out data for various items of work over head and contingent charges. Reinforcement bar bending and bar requirement schedules.

UNIT IV

Contracts: Types of contracts – contract Documents – Conditions of contract, contract procedures, Tendering process, Rights and responsibilities of parties to contracts

UNIT V

Valuation of buildings: Purpose and principles of valuation, Depreciation, methods of calculating depreciation, methods of valuation, Rental method, development method, profit based method

TEXT BOOKS:

1. Estimating & Costing by B.N.Dutta, UBS publishers
2. Estimating & Costing by G.S.Birdie.
3. Valuation of real properties by S.C. Rangawala, Charotar publishing house.

REFERENCE BOOKS:

1. Estimating, Costing & Specifications by M.Chakraborthi, Laxmi publications.
2. Standard schedule of rates and standard Data Book by Public works department.
3. SP:27, Handbook of method of measurement of building works, Bureau of Indian Standards.
4. IS:1200, Methods of measurements

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROJECT MANAGEMENT & ENTERPRENEURESHIP

Course Code: GR18A4002	**L T P C**
IV Year I Semester	**3 0 0 3**

Course Objectives: The objectives of this course is to make the student to

1. Attain knowledge of Project Planning and development of Schedules
2. Monitor the Projects through Critical Path in Networks like CPM and PERT
3. Understand sequence of Construction Activities, Learn Project Quality Planning and Identify Inspection and Testing Plans of Project Works
4. Know and get acquainted with various Construction Equipment and their Management; to identify different Tests for Soils and Concrete.
5. Study the Concept of Entrepreneurship, Main Characteristics of Entrepreneurship and Entrepreneurs; to know the Social Entrepreneurship and Challenges of Social Entrepreneurship.

Course Outcomes: After completion of this course, students will be able to

1. Do Project Planning and develop Project Schedules
2. Identify Critical Path in CPM &PERT Networks; Compute Floats and Slacks for Activities & Events respectively to Progress and Complete the Project in Time.
3. Familiar with Method Statements of various Activities and their ITPs with the Knowledge of Project Quality Plans
4. Construction Equipment requirement is known and deploys in best possible manner for better productivity; Conducts Field Tests for Soils at specified frequency.
5. Broaden the Concept of Entrepreneurship & Social Entrepreneurship; Becomes an Entrepreneur being familiar with Characteristics of Entrepreneurship & Entrepreneurs

UNIT - I

Construction project planning- Stages of project planning: Steps involved in Project Planning pre-tender planning, Scheduling, Steps involved in Scheduling, Process of development of Schedules, Gantt Chart, Milestone Chart,

UNIT - II

Construction Project Monitoring CPM and PERT Networks, basic terminology, types of precedence relationships Preparation of CPM Networks for Construction Activities, Critical Path, Float-Types of Float, computation of Float values, work break-down structure, Three-Time Estimate, PERT-Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion.

UNIT - III

Construction Methods basics: Types of foundations and construction methods; Basics of Formwork and Striping of Formwork; Common building construction methods conventional walls and slabs; conventional framed structure with block work walls; Precast concrete construction methods; Project Quality Plan (PQP), Method Statements, Inspection and Test Plans (ITPs), Quality Control Vis-à-vis Quality Assurance. Acceptance Criteria of Concrete, Core Cutting of Concrete Members. Load Test for Flexural Members

UNIT - IV

Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of Mechanized methods; Equipment for Excavation-Excavators, Front End Loaders and Earthmoving-Tippers, Compaction of Soils, OMC, Dozers, Motor graders, Rollers-Static and Vibratory

(Tandem), Field Tests to Test Density of Soils-Core Cutting, Sand Replacement and Nuclear Density Gauge. Concrete Mix-Nominal and Design Mix. Concrete mixing – Batching Plants, transporting (Transit Mixers) and placing - Concrete Pumping and Boom Placers, Cranes, Tower Crane.

UNIT – V

Entrepreneurship:

Concept of Entrepreneurship – entrepreneurs; Types of Entrepreneurship, Importance of Entrepreneurship, Main Characteristics of Entrepreneurship, Purpose of Entrepreneurship, Nature of Entrepreneurship, 10 characteristics of Entrepreneurs, Examples of Entrepreneurship, How do you start Entrepreneurship, Benefits of Entrepreneurship, Difference between Entrepreneurship and Business, Risks of Entrepreneurship, 7 Practical Tips to Become an Entrepreneur with No Money, Social Entrepreneurship, Challenges of Social Entrepreneurship.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDUSTRIAL STRUCTURES

(PROFESSIONAL ELECTIVE-3)

Course Code: GR18A4003	**L**	**T**	**P**	**C**
IV Year I Semester	**3**	**0**	**0**	**3**

Course Objectives: The objectives of this course is to make the student to

1. Understand different industrial steel buildings
2. Understand design concept of transmission and communication towers, chimney
3. Understand d design of Silos and Bunkers
4. Analyze and design folded plates and cylindrical shell
5. Understand the concept of machine foundations

Course Outcomes: After completion of this course, students will be able to

1. Analysis and design of different industrial steel buildings.
2. Carryout analysis and design of transmission and communication towers
3. Carryout analysis and design of silos and bunkers
4. Carryout analysis and design of concrete shell structures
5. Carryout analysis and design of machine foundation

UNIT-I

Industrial steel building frames: Types of frames, bracing, crane girders and columns, workshop sheds

UNIT-II

Transmission and Communication towers: Types and configuration, Analysis and design; Chimneys; Loads and stresses in chimney shaft, Earthquake and wind effect, Stresses due to temperature difference, combined effect of loads and temperature, temperature. Design of chimney;

UNIT-III

Silos and Bunkers; Jassen's theory, Airy's theory, Shallow and deep bins, Rectangular bunkers with slopping bottom, Rectangular bunkers with high side walls;

UNIT-IV

Concrete Shell Structures: Folded plate and cylindrical shell structures; Introduction, structural behaviour of long and short shells, beam and arch action, analysis and design of cylindrical shell structures, Analysis and design of folded plates;

UNIT-V

Machine foundations; introduction, machine vibration, structural design of foundation to rotary machines, impact machines, vibration characteristics, design consideration of foundation to impact machine, grillage, pile and raft foundation.

TEXT BOOKS:

1. Subramanian, N. (2008), Design of Steel Structures-Limit State Design, Oxford Universitypress, India.
2. Dunham, (2002), Planning of industrial structures, Tata McGraw Hill
3. Transmission Line Structures - S S Murthy, A R Shanthakumar, Tata McGraw Hill

4. Design of Reinforced Concrete Shells and Folded Plates, P.C. Verghese, PHI

REFERENCES:

1. Krammer., “Earthquake Geotechnical Engineering”.
2. Bowles, J. E., “Foundation Analysis & Design”, McGraw Hill, 5th Edition, 1996.
3. Ghali, A, “Circular Storage Tanks and Silos”, E & F N Spon, London. 1979.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

GEOMETRIC DESIGN OF HIGHWAYS

(PROFESSIONAL ELECTIVE-3)

Course Code: GR18A4004	**L**	**T**	**P**	**C**
IV Year I Semester	**3**	**0**	**0**	**3**

Course Objectives: The objectives of this course is to make the student to

1. Gain a solid understanding of the principles of highway engineering and traffic analysis
2. Develop and interpret design standards for horizontal and vertical geometry.
3. Have a strong analytical and practical knowledge of Planning, Designing and solving transportation problems by signal phasing and timing plan
4. Understand the type of conflicts that occur at intersection and design the intersection accordingly
5. Gain the knowledge of pedestrian facilities on urban roads.

Course Outcomes: After completion of this course, students will be able to

1. Analyze the factors influencing road vehicle performance, characteristics and design.
2. Compute the geometric features of road like horizontal and vertical alignment
3. Organize the basic traffic signal phasing and timing plan
4. Carry out traffic studies and implement traffic regulation and control measures and intersection design
5. Demonstrate the systematic approach where the interaction of humans and the vehicles and their impact on the society and transportation

UNIT-I

Highway Cross Section Elements and Geometric Design Of Highways: Functional Classification of Highway System; Design Controls – Topography, Driver characteristics, Vehicle Characteristics, Traffic, Capacity and Level of Service, Design Speed. Objectives of Geometric Design. Carriageway, Shoulders, Formation, Right of way; Kerbs, foot paths, Medians- design specifications; Pavement Surface characteristics – Skid Resistance, factors affecting Skid resistance, Measurement of Skid Resistance; Road Roughness, measurement of Road roughness; Camber, Objectives of Camber, design standards.

UNIT-II

Horizontal and Vertical Alignment: Objective of horizontal curves; Super elevation – Need for Super elevation; Method of computing super elevation; Minimum Radius of Curve; Methods of attainment of super elevation; Extra widening on Curves; Transition Curves – Objective and Design. Gradients – Types of Gradients, Design Standards; Vertical Curves – Summit Curves, Valley Curves and Design criteria for Vertical Curves; Combination of Vertical and Horizontal Curves – Grade Compensation; Sight Distances – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance; Importance of Sight Distances for Horizontal and Vertical Curves.

UNIT-III

Intersection Design: Types of Intersections; Design Principles for Intersections; Design of At-grade Intersections – Channelization, Objective; Traffic Islands and Design standards; Rotary Intersection – Concept and Design, Advantages and Disadvantages; Grade separated Interchanges – Types, warrants and Design standards.

UNIT-IV

Traffic Signs and Road Markings: Types of Road Signs; Guidelines for the provision of Road Signs; Cautionary Signs, Regulatory Signs, Information Signs – Design standards; Road markings – Objective of Road Markings; Types of Road Markings; Role of Road markings in Road Safety and Traffic Regulation; Specification for Road Markings. Highway Appurtenances – Delineators, Traffic Impact Attenuators, Safety Barriers

UNIT-V

Miscellaneous Elements: Requirements of Pedestrians; Pedestrian facilities on Urban Roads; Cycle Tracks – Guidelines and Design standards; Bus bays – Types and Guide lines; Design of On-street and Off street Parking facilities – Guidelines for lay out Design.

TEXT/REFERENCE BOOKS:

1. Principles and Practice of Highway Engineering, L.R.Kadiyali and N.B.Lal, Khanna Publications
2. Traffic Engineering and Transportation Planning, L.R.Kadiyali, Khanna Publications
3. Highway Engineering, C.E.G.Justo and S.K.Khanna, Nem Chand and Brothers.
4. IRC Codes for Signs, Markings and Mixed Traffic Control in Urban Areas.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

SURFACE HYDROLOGY
(PROFESSIONAL ELECTIVE-3)

Course Code: GR18A4005	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

III Year II Semester

Course Objectives: The objectives of this course is to make the student to

1. Introduction to surface water hydrology
2. Skill of solving problems on infiltration and evaporation
3. Visualization and calculate stream flow and run off
4. Recognize calculate the type of hydrographs
5. Knowledge to forecast the flood estimation

Course Outcomes: After completion of this course, students will be able to

1. Express the different types of hydrology definitions
2. Evaluate the consumptive use , infiltration and evaporation
3. Compute the discharge in the streams
4. Apply the hydrographs for the computing rain fall and run off
5. Apply the knowledge of computing flood estimation by various methods

UNIT I

Introduction: Hydrology- definition, Surface and ground water hydrology, Hydrologic cycle- Precipitation, Evaporation, Infiltration, Rain-gauges, Mass rainfall curve, characteristics, Mean rainfall on a basin-Arithmetic, Theissen and Isohytol Methods, Intensity-duration analysis, Intensity-frequency-duration analysis, depth-area- duration curves, estimation of missing rainfall data, consistency of rainfall records- double mass curves, rain-gauge network analysis.

UNIT II.

Evaporation & Infiltration: Evaporation process, Factors affecting, estimation, measurement of Evaporation, Evaporation pans, Transpiration, Evapotranspiration, PET, Consumptive use Lysimeter, formulae for estimating PET. Infiltration process, factors affecting, measurement of infiltration, infiltrometers, infiltration capacity curve, Horton's Relation, Infiltration Indices.

UNIT III

Stream flow and Runoff: Measurement of stage, measurement of velocities-surface floats, velocity rods and current meter, measurement of discharge in a river, stage- discharge relation, extension of stage- discharge curves, selection of sito for stream- discharge gauging. Components of Runoff, factors affecting and estimation of runoff, basin yield, flow duration curves, mass curve of a runoff analysis, estimation of reservoir capacity for a given demand, estimation of safe yield from a reservoir of a given capacity.

UNIT IV

Hydrographs: Hydrograph-components, separation of hydrograph into base flow, and DRO methods, Unit Hydrograph-principles, derivation of UH of Isolated unit storms, UH for various durations, S-curve technique. Estimation of runoff from UH, limitations of UH theory, Synthetic UH, IUH.

UNIT V

Design Flood: Maximum flood and design flood, estimation of flood- different methods, flood frequency analysis- probability table, different plotting positions, Gumble's extreme value theory, Log Pearson type-III analysis, selection of design flood. Flood routing: Flood Routing through reservoirs- Puls method and modification puls method. Channel routing-Muskinghum method, derivation of routing equations, Goodrich method. Flood Control: Flood control measures, flood control through reservoirs, channel improvements, Bank protection measures, Flood fighting, flood proofing, flood forecasting and flood warning.

TEXT BOOKS:

1. Hydrology by Subramanya K
2. Hydrology by P. Jayaram Reddy

REFERENCE BOOKS:

1. Hydrology by, Rangaraju..
2. Engineering Hydrology by EM Wilson . The Mac million press limited
3. Hydrology H M Raghunath
4. Introduction to Hydrology by W.Viessman Jr. & G L Lewis

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING MATERIALS FOR SUSTAINABILITY

(PROFESSIONAL ELECTIVE-3)

Course Code: GR18A4006	**L**	**T**	**P**	**C**
IV Year I Semester	**3**	**0**	**0**	**3**

Course Objectives: The objectives of this course is to make the student to

1. Have an increased awareness among students on issues in area of sustainability
2. Establish a clear understanding 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. Get a clear understanding of 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. Know about Integrated Life cycle design of Materials and Structures

Course Outcomes: After completion of this course, students will be able to

1. Understand the different types of environmental factors effecting materials
2. Work in sustainability for research and education
3. Having a 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 cost and performance of building materials with recycled components, non-petroleum-based materials, materials with low volatile organic compounds, materials with low embodied energy and salvaged materials and incorporate them into design.

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

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

UNIT III

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; Embodied Energy of Materials

UNIT IV

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 V

Green Building Planning and Specifications**,** Environment friendly and cost effective Building Technologies, Integrated Life cycle design of Materials and Structures, Green Strategies for Building Systems, Alternative Construction Methods, 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

TEXT/REFERENCE BOOKS:

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkata Rama Reddy & K S Nanjunda Rao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPON Press
3. Non-conventional Energy Resources – By D S Chauhan and S K Srivastava – New Age International Publishers
4. Green Buildings (McGraw hill publication): by Gevorkian
5. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design
6. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider ,W. W. Norton & Company Publisher.
7. Understanding Green Building Materials, Traci Rose Rider, W. W. Norton & Company Publisher.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

EARTHQUAKE ENGINEERING

(PROFESSIONAL ELECTIVE-4)

Course Code: GR18A4007	**L**	**T**	**P**	**C**
IV Year I Semester	**3**	**0**	**0**	**3**

Course Objectives: The objectives of this course is to make the student to

1. Introduce students to basics of seismology and basic of earthquake
2. Understand the concept of vibration, SDOF, MDOF
3. Understand the behaviour of structure to earthquake
4. Understand the importance of ductility in earthquake resistant structures
5. Understand the concept of Base Isolation Techniques

Course Outcomes: After completion of this course, students will be able to

1. Explain different types of Bridges with diagrams and Loading standards
2. Carryout analysis and design of Slab bridges and suggest structural detailing
3. Carryout analysis and design of T Beam bridges and suggest structural detailing
4. Carryout analysis and design of Plate girder bridges
5. Carryout analysis and design of substructure, piers and abutments

UNIT-I

Introduction– Elements of Seismology; Causes of Earthquake – Geological faults - Tectonic plate theory - Elastic rebound – Epicentre; Hypocentre - Primary, shear and Raleigh waves - Seismogram - Magnitude and intensity of earthquakes - Magnitude and Intensity scales - Spectral Acceleration - Information on some disastrous earthquakes

UNIT-II

Theory of Vibrations; Concept of inertia and damping - Types of Damping - Difference between static forces and dynamic excitation - Degrees of freedom - SDOF idealization - Equations of motion of SDOF system for mass as well as base excitation - Free vibration of SDOF system - Response to harmonic excitation - Impulse and response to unit impulse - Duhamel integral; Multiple Degree of Freedom System; Two degree of freedom system - Normal modes of vibration - Natural frequencies - Mode shapes - Introduction to MDOF systems - Decoupling of equations of motion - Concept of mode superposition;

UNIT-III

Response of Structures to Earthquake; Response and design spectra - Design earthquake - concept of peak acceleration - Site specific response spectrum - Effect of soil properties and damping - Liquefaction of soils

UNIT-IV

Importance of ductility - Methods of introducing ductility into RC structures Design Methodology IS 1893, IS 13920 and IS 4326 - Codal provisions -Design as per the codes

UNIT-V

Introduction of seismic protection system – Energy dissipating devices (Active, Passive, Semi active systems), Basic Isolation system - techniques - Vibration control measures – Important points in

mitigating effects of earthquake on structures

TEXT BOOKS:

1. Manish Shrikhande &Pankaj Agrawal ; Earthquake resistant design of structures, PHI Publication, New Delhi
2. S.K.Duggal; Earthquake resistance design of structures; Oxford University Press, New Delhi.

REFERENCES:

1. A.K.Chopra; Dynamics of structures , Pearson, New Delhi
2. Clough &Penzin; Dynamics of structures
3. Park &Pauly; Behaviour of RC structure
4. IS: 1893 (Part-I)- 2016, Criteria for Earthquake Resistant Design of structures
5. IS: 13920 - 2016, Ductile Design and Detailing of Reinforced Concrete Structures Subjected to Seismic Forces – Code of Practice

GOKARAJU RANGARAJU
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TRAFFIC ENGINEERING AND MANAGEMENT
(PROFESSIONAL ELECTIVE-4)

Course Code: GR18A4008	**L**	**T**	**P**	**C**
IV Year I Semester	**3**	**0**	**0**	**3**

Course Objectives: The objectives of this course is to make the student to

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

Course Outcomes: After completion of this course, students will be able to

1. Analyze traffic problems and plan for traffic systems various uses
2. Carryout traffic surveys and plan parking arrangements
3. Carry out 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 (Problems), 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.

UNIT III
GEOMETRIC DESIGN OF INTERSECTIONS
Conflicts at Intersections, Classification of Intersections at Grade, - Chanallised and Unchanallised Intersection - Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Chanallisation and Rotary design (Problems), Grade Separators.

UNIT IV
TRAFFIC CONTROL
Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), 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, 2001.
2. 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 Ministry of Road Transport and Highways, Government of India.
3. SubhashC.Saxena, A Course in Traffic Planning and Design, DhanpatRai Publications, New Delhi, 1989.

GOKARAJU RANGARAJU
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GROUNDWATER

(PROFESSIONAL ELECTIVE-4)

Course Code: GR18A4009	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

IV Year I Semester

Course Objectives: The objectives of this course is to make the student to

1. Explain the occurrence of groundwater in various aquifers and describe aquifer parameters
2. Describe the groundwater movement using the differential equation governing groundwater flow in three dimensions using Cartesian and polar coordinates
3. Explain the analysis of pumping test data for steady and unsteady ground water flow
4. Explain the surface and subsurface investigations of groundwater
5. Explain the artificial recharge of groundwater, saline water intrusion in aquifers and ground water basin management.

Course Outcomes: After completion of this course, students will be able to

1. Enumeratetheporosity,specificyieldandspecificretentionofaquifer&Calculate the storage coefficient and transmissivity of aquifers and to derive differential equation governing groundwater flow in three dimensions in Cartesian and Polar coordinates
2. Examine the pumping test data in steady and unsteady groundwater flow towards a well in confined and unconfined aquifers using Dupuit's and Theim's equations
3. Appraise surface and subsurface methods of exploration of investigation of ground water
4. Assess the methods of recharge of ground water using GIS and Remote sensing. Assess dynamics of saline water intrusion to manage the ground water basin.
5. Synthesize the overall concepts and procedures necessary for the development and management of ground water resources

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 waterflow equation in polar coordinate system. Ground water flow contours their applications

UNIT III

Analysis of Pumping Test Data–I: Steady flow ground water flow towards a well in confined and unconfined aquifers, Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests. Analysis of Pumping

Test Data–II: Unsteady flow towards a well, Non equilibrium equations, Thesis solution, Jocob and Chow'ss implifications, Leaky aquifers.

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 Sub surface Investigation.

UNIT V

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.

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. Groundwater Quality -Basic Solute Transport Equation – Methods of Groundwater Quality Improvement. Brief introduction to open source software's to Ground water-MODFLOW and FREEWAT.

TEXT BOOKS:

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Ground water by H.M.Raghunath, Wiley Eastern Ltd.

REFERENCE BOOKS

1. Groundwater Hydrology by Bower, John Wiley & son
2. Groundwater System Planning & Management – R. Wills & W. W. G. Yeh, Prentice Hall.
3. Applied Hydrogeology by C. W. Fetta, CBS Publishers & Distributers.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

GEOGRAPHIC INFORMATION SYSTEMS AND SCIENCE

(PROFESSIONAL ELECTIVE-4)

Course Code: GR18A4010	**L**	**T**	**P**	**C**
IV Year I Semester	**3**	**0**	**0**	**3**

Course Objectives: The objectives of this course is to make the student to

1. Analyze the basic components of GIS
2. Classify the maps, coordinate systems and projections
3. Process spatial and attribute data and prepare thematic maps
4. Identify and rectify mapping inaccuracies
5. Formulate and solve geospatial problems

Course Outcomes: After completion of this course, students will be able to

1. Describe the fundamental concepts of Geographic Information Science and Technology.
2. Understand map creation and design principles, including thematic map display, employment of map projections and cartographic design.
3. Analyze the creation and acquisition of spatial data.
4. Recognize the topo maps prepared by survey of India.
5. Overlay different maps in GIS.

UNIT I

Fundamentals of GIS – Information Systems, Modelling Real World Features Data , Data Formats, Applications of GIS, **–** Spatial and Non-spatial, Components, Data Collection and Input, Data Conversion, Database Management – Database Structures, Files; Standard Data Formats, Compression Techniques, Hardware – Computing, printing and scanning systems; Software – Standard Packages like Arc view, ArcGIS, Autocad Map, Map Info etc.

UNIT II

Topology – Types of Errors, Editing and Error Rectification, Types of Topology, Modeling topological Relationships, Tolerances.

UNIT III

Map – mapping concepts, analysis with paper based maps, limitations, Computer Automated Cartography – History and Developments, GIS- Definition, advantages of digital maps.

UNIT IV

Spatial Analysis and Modeling – Proximity Analysis, Overlay Analysis, Buffer Analysis, Network Analysis, Spatial Auto Correlation, Gravity Modeling, DTM/DEM, Integration with Remote Sensing data

UNIT V

GIS Project Planning and Implementation – Under Standing the Requirements, Phases of Planning, Specifications, Data Procurement, Tendering, Human Resources, Back Up, Monitoring Progress

TEXTBOOKS:

1. Remote Sensing and its applications by LRA Narayana, University Press 1999.
2. Principals of Geo physical Information Systems – Peter ABurragh and Rachael A. McDonnell, Oxford Publishers 2004.
3. Remote sensing and image interpretation by Thomas Lillesand, 7th Edition, John Wiley &sons.

REFERENCE BOOKS:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S.Publications.
3. Remote sensing of the environment –An earth resource perspective by John R Jensen,Prentice Hall
4. GIS by Kang – tsungchang, TMH Publications & Co.,
5. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
6. Fundamental of GIS by Mechanical designs John Wiley & Sons.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER APPLICATIONS IN STRUCTURAL ENGINEERING (CASE) LAB

Course Code: GR18A4011	**L T P C**
IV Year I Semester	**0 0 4 2**

Course Objectives: The objectives of this course is to make the student to

1. Analyze and Design the RCC beams with different supports and loads.
2. Analyze and Design the RCC multi- storied buildings with different load combinations.
3. Analyze and Desigrounfgn the RCC water tanks of different shapes.
4. Analyze and Design the Steel beams of different sections with various load combinations.
5. Analyze and Design the trusses of different sections with various load combinations

Course Outcomes: After completion of this course, students will be able to

1. Analyze and Design the various types of Beams for the different loads.
2. Analyze and Design a 2D and 3D frame of Multi-Storied Building.
3. Analyze and Design a RCC Over Head tank.
4. Analyze and Design the different types of Steel Trusses and Industrial Steel Truss
5. Analyze and Design the various types of Steel Beams for the different loads.

List of experiments:

1. Introduction to STAAD Pro Software
2. Design of beams for various supports (SSB,OHB,CT and FX) with PL and UDL
3. Design of beams for various supports (SSB,OHB,CT and FX) with UVL and ML
4. Analysis and Design of multi-storied building (2D frame)
5. Analysis and Design of multi-storied building (3D frame) with DL and LL
6. Analysis and Design of multi-storied building (3D frame) with DL LL and WL
7. Analysis and Design of multi-storied building (3D frame) with DL LL and EL
8. Analysis and Design of multi-storied building (3D frame) with plates
9. Analysis and Design of multi-storied building (3D frame) and Result analysis
10. Analysis and Design of RCC Rectangular Over Head Tank
11. Analysis and Design of RCC Circular Over Head Tank
12. Analysis and Design of beams for various cross sections (I, C, T, L and composite sections)
13. Analysis and Design of various Steel Tubular Trusses
14. Analysis and Design of Industrial buildings with various Trusses
15. Analysis and Design of Steel Over Head Tank

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CYBER LAW AND ETHICS

(**Open Elective**)

Course Code: GR18A3119 **L/T/P/C: 3/0/0/3**

IV Year I Semester

Course Objectives

- To provide the fundamental skill on understanding cyber laws.
- Enables to understand the legal frameworks.
- Helps the student understand different cyber crimes.
- Provides overview on Intellectual Property, copy rights, patents rights etc.
- Discriminate rapid changes in technology and the corresponding changes in crime and the law.

Course Outcomes:

- Identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
- Locate and apply case law and common law to current legal dilemmas in the technology field.
- Apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
- Will be able understand cybercrime and ethical practices.
- The student will be in position to interface with various issues pertaining to Intellectual Property, copy rights, patents rights etc.

Unit I - The Legal System: Sources of Law and The Court Structure

Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law-Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers. (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court) Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration.

Unit II - Introduction cyber law

Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level.

Unit –III - Constitutional & Human Rights Issues in Cyberspace

Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace, Access to Internet, Right to Privacy, Right to Data Protection.

Unit –IV Cyber Crimes & Legal Framework

Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act.

Unit –V Intellectual Property Issues in Cyber Space

Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues.

Text books

1. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012)
3. Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)
4. Jonthan Rosenoer, Cyber Law, Springer, New York, (1997).
5. Sudhir Naib, The Information Technology Act, 2005: A Handbook.
6. S. R. Bhansali, Information Technology Act, 2000
7. University Book House Pvt. Ltd. Jaipur (2003).
8. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi.