

**IV YEAR**  
**II SEMESTER**

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY  
PRESTRESSED CONCRETE**

**(PROFESSIONAL ELECIIVE V)**

**Course Code:GR20A4083**

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

**IV Year II Semester**

**Pre-Requisites:** Structural Analysis, Design of Reinforced Concrete Structures

**Course Objectives:**

1. To describe the various types of prestress technology, their advantages and disadvantages, and their applications;
2. To explain the behaviors of prestressed concrete elements under different limit states
3. To explain fundamentals of prestressed concrete design using advanced construction materials
4. To understand the applications of precast prestressed components in civil infrastructure
5. Attain the overall knowledge of pre-stressed concrete structures.

**Course Outcome:**

1. Examine the transfer and development length as well as pre-stress losses.
2. Demonstrate the design calculations to predict service behaviour of pre-stressed concrete structures, accounting for the time-dependent effects of concrete creep and shrinkage.
3. Design for ultimate strength of pre-stressed concrete structures.
4. Illustrate the pre-stressed concrete structures to satisfy relevant Design Standards.
5. Evaluate the pre-stressed concrete fabrication and construction process.

**UNIT I**

**Introduction:** Historic development – General principles of prestressing, pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics. I.S.Code provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System, Freyssinet system and Gifford – Udall System.

**UNIT II**

**Losses of prestress:** Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses. Analysis of sections for flexure; Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

### UNIT III

**Design of sections for flexure and shear:** Allowable stress, Design criteria as per I.S. Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses – design for shear in beams – Kern – lines, cable profile. Analysis of end blocks: by Guyon’s method and Mugnel method, Anchorage zone stresses – Approximate method of design – Anchorage zone reinforcement – Transfer of pretensioned members.

### UNIT IV

**Composite section:** Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

### UNIT V

**Deflections of prestressed concrete beams:** Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members, prediction of long-term deflections, requirements of IS: 1343 - 2012

#### TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw Hill Publications, 6<sup>th</sup> edition (2018)
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications, 2<sup>nd</sup> edition (2005)

#### REFERENCES:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons, 3<sup>rd</sup> edition (2010).
2. Prestressed concrete – A fundamental approach, Nawy Edward G., Prentice Hall, Englewood Cliffs (1989)
3. NPTEL Web and Video Courses on “Prestressed Concrete”

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY  
PAVEMENT DESIGN**

**(PROFESSIONAL ELECIIVE V)**

**Course Code:GR20A4084**

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

**IV Year II Semester**

**Pre-Requisites:** Transportation Engineering.

**Course Objectives:**

1. To give a detailed notion of methods of highway design and controlling factors
2. To provide the idea of design standards and traffic data collection for flexible and rigid pavements
3. To give the knowledge of predictability about material constraints and optimal utilization
4. To introduce the vital traffic parameters and the methods of their estimation.
5. To provide the knowledge of major failures in pavements, causes and preventive measures

**Course Outcomes:**

1. Illustrate highway design methods, constraints and controlling factors.
2. Apply the design standards in designing principal elements of the highway.
3. Predict the resource constraints and utilize the available materials in a sustainable way.
4. Examine the basic parameter of traffic engineering and the methods which help to estimate those parameters.
5. Recognize the major failure modes of flexible and rigid pavement and helps in maintaining them properly.

**UNIT I**

**Introduction to pavement design:** Types of Pavements-Functions of individual layers, Variables considered in Pavement Design- Factors affecting Pavement Design: Wheel loads, Tire Pressure, Contact Pressure, ESWL & ESAL concepts

**UNIT II**

**Material characteristics:** Tests on sub-grade, Tests on aggregates-Aggregate properties and their importance-Tests on Bitumen-Requirements of design mix-Marshall method of mix design.

**UNIT III**

**Stresses in flexible and rigid pavements:** Stresses in Flexible Pavements-Layered systems concept-One layer system-Boussinesq two layer system-Burmister theory of Pavement design. Stresses in Rigid pavements -Importance of Joints in rigid Pavements-Types of joints-use of tie bars and dowel bars-Relative Stiffness-Modulus of Subgrade Reaction-Stresses due to warping Stresses due to loads-Stresses due to friction.

#### **UNIT IV**

**Flexible and rigid pavement design:** Flexible Pavement Design concepts-CBR method of Flexible Pavement design-IRC method of design-Asphalt Institute method and AASTHO methods. Rigid Pavement design concepts-IRC method of Rigid pavement design-PCA method-Design of tie bars and dowel bars.

#### **UNIT V**

**Highway construction and maintenance:** Construction: Construction of Bituminous Pavements, construction of Cement Concrete Roads. Highway maintenance –Pavement failures: failures in flexible Pavements, Rigid Pavement failures, Pavement evaluation-Overlay design by Benkelman Beam method.

#### **TEXT BOOKS:**

1. Pavement Design by R Srinivasa Kumar, University Press (India) Pvt Ltd, 2013
2. Highway Engineering-S.K. Khanna & C.E.G. Justo, Nemchand & Bros.9<sup>th</sup> edition 2011.
3. Highway and traffic Engineering-Subash Saxena (2015)

#### **REFERENCES:**

1. Principles of traffic and highway engineering- Garber & Hoel, 5<sup>th</sup> edition, 2014.
2. Pavement Analysis and Design – Yang H. Huang, 2<sup>nd</sup> edition
3. Principles of Pavement Design – E. J. Yoder, M. W. Witczak, 2<sup>nd</sup> edition, 1991.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**DESIGN OF HYDRAULIC STRUCTURES**  
**(PROFESSIONAL ELECTIVE V)**

**Course Code: GR20A4085**

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

**IV Year II Semester**

**Pre-Requisites:** Hydraulics and Water Resource Engineering

**Course Objectives:**

1. Apply the principles of reservoir planning and principles of design of irrigation channels
2. Evaluate the forces and stability of gravity dams
3. Design suitable earthen dams and Ogee spillways
4. Design various diversion head works
5. Design canal falls, canal regulator works and cross drainage works and discuss the components of hydroelectric schemes.

**Course Outcomes:**

1. Plan and assess the capacity of reservoir by mass curve method and design different types of irrigation channels
2. Evaluate the forces acting on gravity dams and analyze the stability of the gravity dam.
3. Apply the principles of design of the earthen dams and Ogee spillways
4. Design various diversion head works by using Bligh's and Khosla's theory.
5. Design of various hydraulic structures like canal falls, canal regulator works and cross drainage works along with their suitability & explain the components of hydroelectric schemes.

**UNIT I**

**Reservoir Planning and Canals design:** Estimation of crop water requirement; Fixing the capacities of reservoirs by mass curves of inflow and outflow. Analysis for surface and sub-surface flow at hydraulic structures, Cross section of channels, Silt control methods in canals. Estimation of channel losses. Design of unlined channels by Lacey's method - Relevant three IS codes-Names and Numbers only.

**UNIT II**

**Gravity dams:** Forces acting on a gravity dam, causes of failure of a gravity dam, elementary, common profile and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of Safety - stability Analysis, Foundation for a Gravity Dam, drainage and inspection galleries and their impact, stress analysis of a gravity dam. Relevant three IS codes- Names and Numbers only.

**Spillways:** types of spillways, Design principles of Ogee spillways – Spillway gates- Relevant three IS codes- Names and Numbers only.

**UNIT III**

**Earth dams:** Types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage through embankments and foundations.

#### **UNIT IV**

**Diversion Head works:** Types of Diversion head works- weirs and barrages, layout of diversion head work - components. causes and failure of weirs and Barrages on permeable foundations, Silt Ejectors and Silt Excluders weirs on Permeable Foundations - creep Theories - Bligh's, Lanet and Khosla's theories, Determination of uplift pressure- Various Correction Factors - Design principles of weirs on permeable foundations using creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron – Relevant three IS codes- Names and Numbers only.

#### **UNIT V**

**Canal falls:** Types of falls and their location, design principles of Notch fall and sarada type fall. Canal regulation works, principles of design of distributor and head regulators, canal cross regulators-canal outlets, types of canal modules, proportionality, sensitivity and flexibility. Cross drainage works types: selection of site, design principles of aqueduct siphon aqueduct and super passage. Components of Hydroelectric schemes and selection of turbines - Relevant three IS codes- Names and Numbers only.

#### **TEXT BOOKS:**

1. Irrigation Engineering and Hydraulic Structures. S.K.Garg 2014- Khanna Publishers' 19th edition.

#### **REFERENCES:**

1. Irrigation and water power engineering. B.C.Punmia, Pande B.B.Lal, Ashok kumar jain, Arun kumar Jain- Laxmi publications 16th edition 2009.
2. Irrigation Engineering and Hydraulic structures. S.R.Sahasrabudhe, 2013 S.K.Kataria & sons
3. Theory and Design of Irrigation Structures-Volume II – R.S. Varshney, S.C.Gupta and R.L.Gupta 2014
4. Water Power Engineering by M.M.Dandekar and K.N.Sharma, 2<sup>nd</sup> edition 2013.
5. IS Code 6512: Criteria for Design of Solid Gravity Dams, 1984.
6. IS Code 7894: Code of Practice for Stability Analysis of Earth Dams, 1975.
7. IS Code 8826: Guidelines for Design of Large Earth and Rockfill Dams, 1978.
8. IS Code 6966: Part 1: 1989 Guidelines for hydraulic design of barrages and weirs: Part 1 Alluvial Reaches
9. IS Code 7720: 1991 Criteria for Investigation, Planning and Layout for Barrages and Weirs
10. IS code: 7112-2002 Criteria for design of cross section for Unlined canals in Alluvial Soils
11. IS code: 10430 :2000 Criteria for Design of Lined Canals and Guidance for selection of type of lining.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY  
CONSTRUCTION PROJECT PLANNING AND SYSTEMS**

**(PROFESSIONAL ELECIVE V)**

**Course Code: GR20A4086**

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

**IV Year II Semester**

**Pre-Requisites:** Estimation and Costing

**Course Objectives:**

1. Attain knowledge in Primary Construction and Project Planning
2. Identify various construction methods and equipment's and associate them with different works in the construction site
3. Ability to define fundamentals of planning and organizing in a day to day construction practices
4. Develop construction cost accounting and resource optimization techniques using knowledge acquired through Scheduling
5. Identify the career potential of individuals through applied learning experiences in construction, management and technology.

**Course Outcomes:**

1. Understand how structures are built and projects are developed on the field
2. Analyze good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and project economics
3. Interpret Plan, control and monitor construction projects with respect to time and cost, and also to Optimize construction projects based on costs
4. Remember how construction projects are administered with respect to contract structures and issues.
5. Summarize ideas and understandings to others with effective communication processes

**UNIT 1**

**Construction Planning and Scheduling:** Definition of Projects -Stages of project planning- Process of development of plans and schedules, work break-down structure - Techniques of planning- Bar charts - Gantt Charts. Networks representation - CPM networks - Computation of float values, critical and semi critical paths, calendaring networks.

**PERT Analysis** - Determining three-time estimates, analysis, slack computations, calculation of probability of completion. Allocation of Resources - resource levelling and optimal schedules; Project organization, documentation and reporting systems.

**UNIT II**

**Construction Methods and Contract Management:** Control & monitoring; Temporary Structures in Construction; Construction Methods for various types of Structures; Major Construction equipment; Automation & Robotics in Construction; Modern Project management Systems; Advent of Lean Construction; Importance of Contracts Management; Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation;



### UNIT III

**Construction Materials and Resource Leveling:** Materials: concepts of planning, procurement and inventory control; Equipment: basic concepts of planning and organizing; Funds: cash flow, sources of funds; Histograms and S- Curves. Earned Value; Resource Scheduling- Bar chart, line of balance technique, resource constraints and conflicts; resource aggregation, allocation, smoothing and levelling. Common Good Practices in Construction;

### UNIT IV

**Project Monitoring & Control:** Project Monitoring & Control- Supervision, record keeping, periodic progress reports, periodical progress meetings. Updating of plans: purpose, frequency and methods of updating. Common causes of time and cost overruns and corrective measures. Basics of Modern Project management systems such as Lean Construction; Use of Building Information Modelling (BIM) in project management;

### UNIT V

**Quality Control and Quality Assurance:** Quality control: concept of quality, quality of constructed structure, use of manuals and checklists for quality control, role of inspection, basics of statistical quality control. Safety, Health and Environment on project sites: accidents; their causes, effects and preventive measures, costs of accidents, occupational health problems in construction, organizing for safety and health.

### TEXT BOOKS:

1. Varghese, P.C., "Building Construction", Prentice Hall India, 2007.
2. National Building Code, Bureau of Indian Standards, New Delhi, 2017.
3. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

### REFERENCES:

1. Chudley, R., Construction Technology, ELBS Publishers, 2007.
2. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
3. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
4. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY  
EARTHQUAKE ENGINEERING**

**(PROFESSIONAL ELECTIVE VI)**

**Course Code: GR20A4087**

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

**IV Year II Semester**

**Pre-Requisites:** Engineering Geology, Design of Reinforced Concrete Structures

**Course Objectives:**

1. Explain movements of Tectonic Plates, and Effects of Earthquakes
2. Describe movements of Tectonic Plates, and Effects of Earthquakes
3. Analyze Dynamic Behavior of simple structural systems
4. Analyze Structural dynamics of simple systems subject to harmonic and random earthquake loading
5. Apply scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy

**Course Outcomes:**

1. Identify movements of tectonic plates, and characterize earthquake ground shaking
2. Estimate the magnitude & intensity of earthquake
3. Utilize the principles behind earthquake resistant design of structures
4. Formulate earthquake analysis of multi storeyed buildings
5. Design earthquake resistant design and ductile detailing of frame members

**UNIT I**

Earth and its interior, circulations, plate tectonics, faults, seismic waves, strong ground motions, characteristics of strong ground motions, Magnitude (and Richter Scale), Intensity (and Modified Mercalli Scale)

**UNIT II**

**Earthquake Resistant Design Philosophy for Normal Buildings:** Four Virtues of Earthquake Resistant Buildings – Structural Configuration, Lateral Stiffness, Lateral Strength and Ductility; Seismic Zones in India; IS Codes for Earthquake Resistant Design and Construction of Buildings; geotechnical Design Considerations and Selection of Sites

**UNIT III**

**Special aspects in Multi- Storey Buildings** -Open Ground Storeys, P-delta effect, Soil-Structure Interaction, Drift Limitation, Short Column Effect

**UNIT IV**

Introduction to IS 1893 (Part 1) - 2016, Design Base Shear, Earthquake Analysis of Buildings by Equivalent Static Method

## **UNIT V**

Introduction to IS 13920 - 2016, design strategy, capacity design of RC frame members, Structural Walls and Beam-Column joints, ductile detailing in RC Beams and Columns

### **TEXT BOOKS:**

1. Pankaj Agrawal and Manish Shrikhande, Earthquake resistant Design of Structures, 3<sup>rd</sup> Edition, Prentice Hall of India Pvt, Ltd. Publications, 2006

### **REFERENCES:**

1. S. K. Duggal, Earthquake Resistant Design of Structures, 1<sup>st</sup> Edition, Oxford University Press Publications, 2<sup>nd</sup> edition 2013

2. Dowrick, D. L., Earthquake Resistance Design for Engineers and Architects, 2<sup>nd</sup> Edition, John Wiley & Sons, 1987

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**URBAN TRANSPORTATION AND PLANNING**  
**(PROFESSIONAL ELECIIVE VI)**

**Course Code: GR20A4088**

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

**IV Year II Semester**

**Pre-requisites:** Transportation Engineering

**Course Objectives:**

1. Explain about urban planning, assignment and their attributes
2. Explain the various surveys involved in the planning process
3. Analyse the planning variables required for planning process
4. Design the trip generation, distribution and mode choice characteristics
5. Describe the master plans and mass transit systems

**Course Outcomes:**

1. Comprehend the urban travel demand and independent variables
2. Analyze the traffic surveys and trip generations modules
3. Assess, analyze and study the trip distribution factors and mode choice analysis
4. Evaluate the traffic assignment methods and plans
5. Illustrate device short term and long-term plans

**UNIT-I**

**Urban Travel Demand**-Urban development - Urban transport problems - Urban travel characteristics - Need for planning urban travel demand - Trends - Overall planning Process-Components of travel demand

**Independent Variables**-Travel Attributes- Assumptions in demand estimation - Sequential travel demand modeling -Simultaneous travel demand modeling - Study area - Cordon lines Screen lines -Zoning.

**UNIT-II**

**Travel Demand Surveys**-Sampling methods - Home interview surveys - Road side interview surveys - Terminal surveys -Cordon surveys - Taxisurveys - Onboard surveys - Economic surveys - Data checking.

**Trip Generation**-Trip characteristics - factors influencing Trip productions and attractions - Trip rates - Zonal regression models -Category analysis - Personal trip generation models.

**UNIT-III**

**Trip Distribution**-Factors influencing trip distribution - Growth factor methods - Trip length frequency diagram Growth models - LP method - Opportunity models - Gravity opportunity model

**Mode Choice Analysis**

Factors influencing passenger mode choice- Zonal regression models- Utility maximization- Discrete choice situation - Binary and Multinomial Logit models - Probability curves - Probit and nested Logit models.

## **UNIT – IV**

**Traffic Assignment**-Need for Assignment - Objectives - Diversion curves - Shortest path Algorithms - All or nothing Assignment technique - Capacity Restraint Assignment technique - Multi path Assignment technique - Link flows - Sufficiency and Deficiency analysis.

## **UNIT- V**

**Plan Preparation and Evaluation**-Types of plans- conceptual plan, Master plan - Short term planning vs Long term planning -Corridor Identification and Evaluation - Plan preparation- Application of RS&GIS in Corridor Identification.

### **TEXT BOOKS:**

1. Kadiyali L.R - Traffic Engineering and Transportation Planning -Khanna Publishers, New Delhi- 2011.
2. Papacostas C.S. - Fundamentals of Transportation Engineering Prentice Hall of India Pvt.Ltd; NewDelhi, 3<sup>rd</sup> edition 2002.
3. John KhistyC - Transportation Engineering - An Introduction, Prentice Hall, Engle wood Cliffs, New Jersey, 3<sup>rd</sup> edition 2002.
4. Nicholas J. Garber, A. Hoel, Raju Sarkar, Cengage learning, Principles of Traffic and Highway Engineering, 1<sup>st</sup> edition 2010.

### **REFERENCES:**

1. Chari, S.R.UTP Lecture Notes-Regional Engg. College, Warangal.
2. Hutchinson, B.G. Introduction to Urban System Planning, Mc Graw Hil - 1974
3. Mayer M and Miller E, Urban Transportation Planning: A decision-oriented Approach, McGraw Hill. Bruton, Urban Transportation Planning.2<sup>nd</sup> edition 2001.
4. Dicky, Metropolitan Transportation Planning, DC Script Book Co., 2<sup>nd</sup> edition 1988.
5. Saxena, Traffic Planning and Design, Dhanpat Rai Publishers,2001, NewDelhi.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY  
GREEN BUILDING TECHNOLOGY**

**(PROFESSIONAL ELECIIVE VI)**

**Course Code: GR20A4089**

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

**IV Year II Semester**

**Prerequisite:** Environmental Science, Concrete Technology

**Course Objectives:**

1. Create awareness about the principles of green building technology and to have insight about the criteria for rating systems along with the established Indian codes and guidelines.
2. Explain various renewable and non-renewable sources of energy along with their carbon foot prints and also enumerate the process of performance testing including building modeling and energy analysis.
3. Discuss about the energy efficient green building materials and to have understanding on the cost-effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Describe the principles of sustainable development in green building design.
5. Explain the best green building practices adopted along with cost/benefit and life-cycle analysis of green buildings.

**Course Outcomes:**

1. Correlate the underlying principles, history, environmental and economic impacts of green building technology and to identify the criteria for rating systems along with the established Indian codes and guidelines.
2. Identify various Renewable and Non-renewable sources of energy along with their carbon foot prints and building modeling and energy analysis, monitoring and metering.
3. Recognize the energy efficient green building materials and the cost-effective Building Technologies and materials with low embodied energy and incorporate them into design.
4. Explain the application of design guidelines of Green Building considering the Energy Conservation Measures. Perform cost/benefit analysis and life-cycle analysis of green buildings.
5. Explain broad perspective in thinking for sustainable practices by utilizing the engineering knowledge and principles gained from this course.

**UNIT-I**

**Concept of Green Buildings:** Definition of Green Buildings, typical features of green buildings, Necessity, Initiatives, Green buildings in India, Green building Assessment- Green Building Rating Systems (BREEAM, USGBC, LEED, IGBC, TERI-GRIHA, GREEN STAR), Criteria for rating, Energy efficient criteria, environmental benefits economic benefits, health and social benefits, Major energy efficiency areas for building, Contribution of buildings towards Global Warming., Codes and Certification Programs.

## **UNIT-II**

**Sources of Energy:** Renewable and Non-renewable sources of energy ; Coal, Petroleum, Nuclear, Wind, Solar, Hydro, Geothermal sources; potential of these sources, hazards, pollution; Global scenario with reference to demand and supply in India, Global efforts to reduce carbon emissions, Building modeling , Energy analysis, Commissioning, Metering, Monitoring.

**Carbon emission:** Forecasting, Control of carbon emission, Air quality and its monitoring carbon foot print; Environmental issues, Minimizing carbon emission, Energy retrofits

## **UNIT-III**

**Green Building Materials:** Sustainably managed Materials, renewable and recyclable resources; energy efficient materials; Embodied Energy of Materials, Green cement, Biodegradable materials, Smart materials, Volatile Organic Compounds (VOC's), Natural Non-Petroleum Based Materials, Recycled materials, Renewable and Indigenous Building Materials, Engineering evaluation of these materials.

**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, Energy Conservation Measures in Buildings, Waste & Water management and Recycling in Sustainable Facilities, Heating, Ventilation and Air Conditioning, Passive Solar & Daylight

## **UNIT-IV**

**Design of Green Buildings;** Sustainable sites, Impact of building on environment, Life cycle assessment, Principles of sustainable development in Building Design, Design on Bioclimatic and solar passive architecture, Considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design, Advanced Green building technologies and innovations.

## **UNIT-V**

**Construction of Green Buildings:** Energy efficient construction, Practices for thermal efficiency and natural lighting. Eco- friendly water proofing; ECB codes building rating, Maintenance of green buildings, Cost and Performance Comparisons and Benchmarking, Green Project Management Methods and Best Practices, Cost/benefit analysis of green buildings, Life-cycle analysis of green buildings, Case studies of rated buildings (new and existing)

## **TEXTBOOKS:**

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkata Rama Reddy & K S Nanjunda Rao – New Age International Publishers (2014)
2. Integrated Life Cycle Design of Structures – By Asko Sarja – SPON Press, first edition 2019.
3. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers, 3<sup>rd</sup> edition 2017.
4. Sustainable Energy Systems Engineering: The Complete Green Building Design Resource (McGraw hill publication): by Gevorkian-2007

5. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider, W. W. Norton & Company Publisher, 2010.
6. Abe Kruger and Carl,” Green Building, Principles and practices in Residential Construction”, In 2012, Seville Publication
7. Ross Spiegel, Dru Meadows, “Green Building Materials: A Guide to product selection and Specification”, 3<sup>rd</sup> Edition, October 2010

**REFERENCES:**

1. IGBC reference guide
2. Free abridged versions of LEED reference guides
3. ECBC latest version
4. US GBC’s Reference Material:
5. <http://www.nrec.gov/pdfs/bicar/Greenbuilding.pdf>



# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

## PAVEMENT MATERIALS (PROFESSIONAL ELECTIVE VI)

Course Code: GR20A4090

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

IV Year II Semester

**Pre-Requisites:** Building Materials and Construction Planning

### Course Objectives:

1. Identify the nature, behavior and characteristics of soil.
2. Analyse the behavioral characteristics of aggregates under various tests and optimization by gradation
3. Explain Bitumen characteristics and gradation for mixes.
4. Design bituminous mixes and specifications
5. Explain the basics of Cement & Cement Concrete Mix characterization

### Course Outcomes:

1. Categorize the soil based on the geotechnical properties and justify the applicability.
2. Analyze the engineering properties of aggregates and customizing for application under various field situations
3. Categorize the bitumen based on the properties and justify the applicability.
4. Select appropriate asphalt binder for construction of a flexible pavement depending on the traffic and climatic conditions.
5. Analyze Cement & Cement Concrete Mix characterization and application in various pavements.

### UNIT I

**Subgrade Soil Characterization:** Different types of soils, Mechanical response of soil; Soil Classification; Index and other basic properties of soil; Properties of subgrade layers; Suitable lab and field test like Atterberg limits, CBR, Sieve analysis, Field Density; Suitability of different type of soil for the construction of highway embankments and pavement layers; Field compaction and control.

### UNIT II

**Aggregate Characterization:** Origin, Classification, Types of aggregates; Sampling of aggregates; Mechanical and shape properties of aggregates, Aggregate texture and skid resistance, polishing of aggregates - Proportioning and Blending of aggregates - Super pave gradation - Use of locally available materials in lieu of aggregates.

### UNIT III

**Bitumen Characterization:** Origin, preparation, properties and tests, constitution of bituminous road binders – requirements - Criterion for selection of different binders. Bituminous Emulsions and Cutbacks - Preparation, characteristics, uses and tests.

#### **UNIT IV**

**Bituminous Mixes:** Mechanical properties - Resilient modulus, dynamic modulus and fatigue characteristics of bituminous mixes - Weathering and Durability of Bituminous Materials and Mixes, bituminous mix design methods and Specifications. Performance based Bitumen Specifications; Introduction to Superpave mix design.

#### **UNIT V**

**Cement and Cement Concrete Mix Characterization:** Types of cements and basic cement properties, Special cements; Quality tests on cement; Tests on cement concrete including compressive strength, flexural strength, modulus of elasticity and fatigue properties; Flexible and Rigid Pavements, Joint fillers for Jointed Plain Cement Concrete Pavements and their characterization.

#### **TEXT BOOKS:**

1. Soil Mechanics and Foundation Engineering- K.R. Arora, Standard Publishers Distributors, Delhi,
2. Highway Engineering - S.K. Khanna & C.E.G. Justo, Nemchand & Bros, 9<sup>th</sup> edition 2011.
3. Highway and traffic Engineering - Subash Saxena, 2015.

#### **REFERENCES:**

1. Principles of Pavement Design – E. J. Yoder, M. W. Witczak, 2<sup>nd</sup> edition 2011.
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2006
3. Relevant IRC and IS codes.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY  
ENTERPRENEURSHIP AND PROJECT MANAGEMENT**

**Course Code: GR20A4091**

**L/T/P/C: 2/1/0/3**

**IV Year II Semester**

**Pre-Requisite:** Estimation and Costing

**Course Objectives:**

1. Explain principles of Project Planning and development of Schedules
2. Enhance the ability to Monitor the Projects through Critical Path in Networks like CPM and PERT
3. Analyse break down sequence of Construction Activities, Learn Project Quality Planning and Identify Inspection and Testing Plans of Project Works
4. Recognize and get acquainted with various Construction Equipment and their Management; to identify different Tests for Soils and Concrete.
5. Apply the Concepts of Entrepreneurship; Understand the Social entrepreneurship and Challenges of Social Entrepreneurship.

**Course Outcomes:**

1. Apply Project Planning techniques and develop Project Schedules in real time conditions.
2. Identify Critical path in CPM & PERT Networks; Evaluate Floats and Slacks for Activities & Events respectively to Progress and Complete the Project in Time.
3. Recall the Method Statements of various Activities and their ITPs with the Knowledge of Project Quality Plans.
4. Identify ideal Construction Equipment required and deploy in the best possible manner for better productivity; Conducts Field Tests for Soils at specified frequency.
5. Explore 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 blockwork 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.

### **TEXTBOOKS:**

1. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015.
2. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

### **REFERENCES:**

1. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011.
2. National Building Code, Bureau of Indian Standards, New Delhi, 2017.
3. Chudley, R., Construction Technology, ELBS Publishers, 2007.
4. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY  
PROJECT WORK – PHASE II**

**Course Code: GR20A4130**

**L/T/P/C: 0/0/12/6**

**IV Year II Semester**

**Pre-Requisite:** Knowledge of all Civil Engineering subjects and Laboratories, communication skills

**Course Objectives:**

1. Improve the technical presentation skills of the students.
2. Train the students to do Survey and study of published literature on the assigned topic
3. Impart practical skills and knowledge in their project.
4. Learn different tools and techniques to solve problems
5. Prepare technical reports

**Course Outcomes:**

1. Interpret ideas and thoughts into practice in a project and work in a team
2. Analyze the gap between theoretical and practical knowledge and evaluate the available literature on the chosen problem
3. Compose technical presentation in the conference and to develop organizational skills and team work
4. Apply the principles, tools and techniques to solve the problem
5. Prepare and present project report

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**SOFT SKILLS AND INTERPERSONAL SKILLS**  
**(OPEN ELECTIVE)**

**Course Code: GR20A3136**

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

**Course Objectives:**

1. To know the importance of soft skills.
2. To identify good leadership skills /qualities.
3. To recognize the importance of interpersonal skills.
4. To demonstrate the significance of confidence building.
5. To define and differentiate between a report and a proposal.

**Course Outcomes:**

1. Develop soft skills communication skills, leadership skills etc.
2. Implement goalsetting techniques to build a promising career.
3. Design formal report and proposals with appropriate formal expressions.
4. Create healthy workplace environment by treating others with respect and dignity.
5. Evaluate the power of confidence building and self-esteem with examples.

**UNIT I: Soft Skills**

- Introduction to soft skills, Definition of Soft skills, Importance of soft skills
- Communication skills, Usage of English in Business/Corporate scenario
- Nonverbal communication - Proxemics
- Presentation skills

**UNIT II: Team Building & Leadership Qualities**

- Qualities of a good leader
- Problem solving and Decision Making
- Strategic management
- Crisis management

**UNIT III: Personality Development**

- Motivation
- Goal setting
- Self-esteem
- Teamskills

**UNIT IV: Developing Reports and Proposals**

- Understanding reports and proposals
- Planning reports and proposals
- Writing beginning, body and ending
- Formats of reports and proposals

**UNIT V: Interpersonal Skills**

- Understanding professional relationships
- Networking professionally
- Showing basic office courtesies
- Interview skills

**TEXT BOOKS:**

1. Soft Skills-Key to success in workplace and life Meenakshi Raman, Raman Upadhyay, CENAGE

**REFERENCES:**

1. Soft skills for Everyone - Jeff Butterfield, CENAGE Learning
2. Soft skills for Interpersonal Communication - S. Balasubramaniam (ORIENT BLACKSWAN)

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**HUMAN RESOURCE DEVELOPMENT AND ORGANIZATIONAL BEHAVIOUR**  
**(OPEN ELECTIVE)**

**Course Code:GR20A3137**

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

**Course Objectives:**

1. OB provides perspectives and skills that enhance understanding of our own behaviour and our ability to influence the behaviour of others in organizational settings
2. OB and HRM together can instill sustainability deep within an organizations' culture.
3. To equip them with behavioural skills in managing people at work.
4. To make student aware of the concepts, techniques and practices of human resource development.
5. This course is intended to make students capable of applying the principles and techniques as professionals for developing human resources in an organization.

**Course Outcomes:**

1. To acquaint the student with the determinants of intra -individual, inter-personnel and inter-group behaviour in organisational setting.
2. To Understand individual behavior in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making, and motivational theories and apply in the organizational context.
3. To assess the group behavior in organizations, including communication, leadership, power and politics, conflict, and negotiations in the framework of organization and to familiarize the concepts, techniques and practices of human resource development in the current organizational view.
4. To impart and apprise the capable of applying the principles and techniques as professionals for developing human resources in an organization.
5. To report the current trends and applications in HRD and Balanced Scorecard to measures the performance and to develop, implement, and evaluate organizational human resource development strategies aimed at promoting organizational effectiveness in different organizational environments.



## **UNIT I**

**Introduction to OB:** Organisational Behaviour- Concept and Emergence of OB Concept; Nature and Theoretical frameworks; Models of Organisational Behaviour, Challenges and Opportunities for Organisational Behavior;

## **UNIT II**

**Individual Behaviour:** Individual Behaviour: Personality, Learning, Values and Attitudes, Perception, Stress at work. Management's assumptions about people- McGregor's Theory X and Theory Y. Motivation - Maslow's Need Hierarchy, Herzberg's Two Factors Theory, Vroom's Expectancy Theory.

## **UNIT III**

**Inter-personal and Group Behaviour:** Interpersonal communication and Feedback; Transactional Analysis (TA); Johari Window. Group Behaviour: Group Dynamics, Cohesiveness and Productivity; Management of Dysfunctional groups; Group Decision Making. Leadership- Concept and Styles.

## **UNIT IV**

**-Introduction to Human Resource Development:** Concept; Relationship between human resource management and human resource development; HRD mechanisms, processes and outcomes; HRD matrix; Roles and competencies of HRD professionals; Challenges in HRD, steps in HRD Process.

## **UNIT V**

**HRD Applications and Trends:** Coaching and mentoring; Career management and development; Competency mapping; Balanced Score Card. HRD in Organisations: Selected cases covering HRD practices in government organisations, manufacturing and service industries and MNCs.

### **TEXT BOOKS:**

1. Robbins, Stephen P. and Timothy A. Judge, Organisational Behaviour, Prentice -Hall, New Delhi.
2. Werner J. M., DeSimone, R.L., Human resource development, South Western.

**REFERENCES:**

1. Luthans, Fred, Organizational Behaviour, McGraw-Hill, New York.
2. Gregory, Moorhead and Ricky W. Griffin, Managing Organizational Behaviour, Thomson South Western Publication.
3. Pareek, Udai and V. Sisodia, "HRD in the New Millennium, Tata McGraw - Hill Publishing Co. Ltd., New Delhi, 1999.
4. Haldar, U. K., Human resource development, Oxford University Press India.
5. Rao, T.V., Future of HRD, Macmillan Publishers India.
6. Rao, T.V., HRD Score Card 2500: Based on HRD audit, Response Books, SAGE Publications.
7. Mankin, D., Human resource development, Oxford University Press India.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**CYBER LAW AND ETHICS  
(OPEN ELECTIVE)**

**Course Code:GR20A3138**

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

**Course Objectives:**

1. Provide the fundamental skill to understand cyber laws.
2. Understand the legal frameworks
3. Understand different cyber crimes
4. Provides overview on Intellectual Property, copyrights, patents rights etc.
5. Give rapid changes in technology and the corresponding changes in crime and the law

**Course Outcomes:**

1. Identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
2. Students locate and apply case law and common law to current legal dilemmas in the technology field.
3. Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
4. Students will be able understand cybercrime and ethical practices and the student will be able to know and learn web technologies and related issues.
5. Be in position to interface with various issues pertaining to Intellectual Property, copy rights, patents rights etc. and provide an overview of cybercrime and framework.

**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 Cyber space:** 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. Jonathan 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.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ECONOMIC POLICIES IN INDIA  
(OPEN ELECTIVE)**

**Course Code:GR20A3139**

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

**Course Objective:**

1. Analyse the overall business environment and evaluate its various components in business decision making.
2. Provide an analysis and examination of significant contemporary ethical issues and challenges.
3. Emphasizes the manager's social and environmental responsibilities to a wide variety of stakeholders.
4. Know the various Government policies governing industry.
5. Know economic terms and its scope.

**Course Outcomes:**

1. Familiarize with the nature of business environment and its components.
2. The students will be able to demonstrate and develop conceptual framework of business environment.
3. Understand the definition of ethics and the importance and role of ethical behaviour in the business world today.
4. Explain the effects of government policy on the economic environment.
5. Outline how an entity operates in a business environment.

**UNIT I:**

**Business environment**-factors effecting Business Environment-need for industrial policies, Overview of Indian Economy, Trends towards market economy, problems of underdevelopment –meaning, Main problems, reasons, of underdevelopment.

**UNIT II:**

**Factors and measure**, Meaning of Economic development, National income, Per capital income, Quality of life, Capital Formation – Savings, Investment.

**UNIT III:**

**NITI Aayog and Planning in India**, Niti Aayog and its function, how is Niti Aayog different from planning commission, Meaning, Importance, Main reasons of adopting, planning in India, Objectives of planning, Economic development, moderation, stability, self-sufficiency, employment etc, foreign aid, Employment. Allocation of Resources

#### **UNIT IV:**

**Private and Public Sector, Public Sector** – role and growth, Achievements of the public sector, Private Sector – Importance Problems, New foreign Trade Policy.

#### **UNIT V:**

**Present Economic Policy**, Main feature, Globalization, Expansion of Private sector, more market orient approach. Public distribution system, Industrial policies before and after 1991, Industrial Licensing, Monetary and Fiscal Policy, elements of Indian current GDP and review of current budget.

#### **TEXT BOOKS**

1. Francis Cherunilam: Business Environment: Text and Cases. 18/e. Himalaya. 2009.
2. Misra and Puri: Indian Economy, Himalaya, 2009.

#### **REFERENCES:**

1. Indian Economy- A. N. Agarwal
2. Indian Economy – Mishra &Puri
3. Indian Development and planning – M. L. Jhingan
4. Indian Economy – R. S. Rastogi Yozna and Kurukshetra Magazines