



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

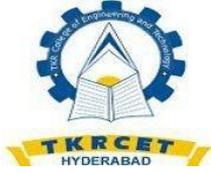
## B.TECH. CIVIL ENGINEERING -R18 COURSE STRUCTURE

### B. Tech - V Semester

Sl. No	Course Code	Course title	L	T	P	Credits
1	B15PC1	Structural Analysis-II	3	1	0	3
2	B15PC2	Design of Reinforced Cement Concrete Structures	3	1	0	3
3	B15PC3	Transportation Engineering	3	1	0	3
4	B15PE4	<b>Professional Elective-I</b> 1) Concrete Technology 2) Construction Equipment & Materials 3) Ground Improvement Techniques	3	1	0	3
5	B15HS5	Fundamentals of management	3	1	0	3
6	B15PC6	Highway Engineering & Concrete Technology Lab	0	0	3	1.5
7	B15PC7	Soil Mechanics Lab	0	0	3	1.5
9	BE23	Advanced Communication Skills LAB	0	0	3	1.5
Total Credits			15	5	9	19.5

### B. Tech - VI Semester

Sl. No	Course Code	Course title	L	T	P	Credits
1	B16PC1	Environmental Engineering	3	1	0	3
2	B16PC2	Foundation Engineering	3	1	0	3
3	B16PC3	Design of Steel Structures	3	1	0	3
4	B16PC4	Hydrology & Water Resource Engineering	3	1	0	3
5	B16PE5	<b>Professional Elective –II</b> 1) Prestressed Concrete 2) Advanced Structural Design 3) Structural Analysis by Matrix Methods	3	1	0	3
6		Open Elective-1	3	1	0	3
7	B16PC7	Environmental Engineering Lab	0	0	3	1.5
8	B16PC8	Hydraulic Machinery Lab	0	0	3	1.5
9	B16ES9	Computer Aided Civil Engineering Drawing	0	0	3	1.5
Total Credits			18	6	9	22.5



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### STRUCTURAL ANALYSIS-II -B15PC1

B.Tech. V Semester

L/T/P/C  
3/1/0/3

**PRE-REQUISITES:** Structural Analysis

### **COURSE OBJECTIVES:**

1. To study behavior of arches and their methods of analysis
2. To understand the methods of analysis of intermediate trusses for external loads, lack of fit and thermal effect.
3. To know the concept and analysis of continuous beams and frames.
4. To study the multi-storey frames subjected to gravity loads and lateral loads.
5. To understand the influence line concepts for indeterminate structures.

### **COURSE OUTCOMES:**

1. Apply the methods of indeterminate truss analysis.
2. Demonstrate the behavior of arches and their methods of analysis.
3. Analyze the frames by slope deflection and moment distribution methods.
4. Analyze multi-storey frames subjected to gravity loads and lateral loads.
5. Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames.

### **UNIT-I:**

**Analysis of Frames:** Castigliano's second theorem.

**Indeterminate Trusses:** Determination of static and kinematic indeterminacies - Analysis of trusses having single and two degrees of internal and external indeterminacies.

**Two Hinged Arches:** Introduction - Classification of Two hinged Arches - Analysis of two hinged parabolic arches - Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

### **UNIT-II:**

**Slope Deflection Method:** Analysis of Single Bay - single storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and bending moment diagrams. Elastic curve, Analysis of inclined frames. - Elastic Curve.

**Moment Distribution Method** - Analysis of Single Bay Single Storey Portal Frames including side sway Analysis of inclined frames.

### **UNIT-III:**

**Kani's Method:** Analysis of continuous beams including settlement of supports. Analysis of single bay single storey and single bay two Storey Frames by Kani's Method Including Side Sway, Shear force and bending moment diagrams-Elastic Curve.

### **UNIT-IV:**

**Matrix Methods of Analysis (System Approach):** Introduction - Static and Kinematic Indeterminacy - Analysis of continuous beams including settlement of supports, using stiffness method. Analysis of pin-jointed plane frames using stiffness method - Analysis of single bay single storey frames including side sway, using stiffness method. Analysis of continuous beams up to three degree of indeterminacy using flexibility method. Shear force and bending moment diagrams.

## **UNIT-V:**

**Approximate Methods of Analysis:** Introduction - Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method. Analysis of multi-storey frames for gravity (vertical) loads. Substitute Frame method.

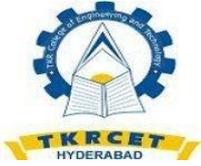
**Influence Lines for Indeterminate Beams:** Introduction - ILD for two span continuous beams with constant and variable moments of inertia. ILD for propped cantilever beams. Muller Breslau's principle.

## **TEXT BOOKS**

1. Analysis design and Details of Structures (vol 1) by VN. Vazirani, Dr MM. Ratwani and SK Duggal.
2. Structural Analysis by Pandit and Gupta, Tata Mc Graw Hill Publishers
3. Indeterminate Structural Analysis by K.U Muttu et al. IK Publiding.
4. Structural Analysis SI edition by Aslam Kassimali, Cengage Learning.

## **REFERENCES**

1. Matrix Analysis of Structures by Singh, Cengage Learning Pvt. Ltd.
2. Structural Analysis by R. C. Hibbeler Pearson Education.
3. Basic Structural Analysis by C. S. Reddy., Tata Mc-Graw Hill Publishers.
4. Advanced Structural Analysis by A. K. Jain, Nemchand & Bros.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING - R18

### DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES -B15PC2

B.Tech. V Semester

L/T/P/C

3/1/0/3

**PRE-REQUISITES:** Strength of Materials, Structural Analysis.

#### **COURSE OBJECTIVES:**

1. To study the stress strain behavior of reinforced steel and concrete.
2. To understand the concept of working stress and limit state methods.
3. To gain the knowledge of limit state design of various structural elements in flexure, compression, shear, bond and anchorage.
4. To understand the design concept of various structural elements and detailing of reinforcement.

#### **COURSE OUTCOMES:**

At the end of the course, the student will be able to:

1. Design the Reinforced Concrete L and T beam sections using limit state Design.
2. Design of Reinforced Concrete Canopy and simply supported, continuous beams.
3. Design the Reinforced Concrete Columns.
4. Design of One way, two way slab and continuous slab.
5. Design Footings isolated, square, rectangular and circular, combined.

#### **UNIT-I:**

Concepts of RC Design - Working Stress Method - Limit State method - Material Stress - Strain Curves - Safety factors - Characteristic Strength and load. Stress Block parameters - IS - 456 - 2000.

**Beams:** Limit State Analysis and Design of singly reinforced, doubly reinforced, T and L beam sections –Sketch Showing Reinforcement Details.

#### **UNIT-II:**

Limit State Analysis and Design of section for shear and torsion - concept of bond, anchorage and development length, I.S. Code provisions. Design examples in simply supported and continuous beams, detailing; Design of canopy–Sketch Showing Reinforcement Details.

#### **UNIT-III:**

Short and Long columns - under axial loads, uniaxial bending and biaxial bending - Interaction diagrams - IS Code provisions–Sketch Showing Reinforcement Details.

#### **UNIT-IV:**

Design of one way slab, two way slabs for different edge conditions and continuous slab Using

IS Coefficients - Limit State Design for serviceability for deflection, cracking - IS Code provision. Design of doglegged Staircase –Sketch Showing Reinforcement Details.

## **UNIT-V:**

**Footings:** Different types of footings - Design of isolated, square, rectangular, circular footings and combined footings - Design of pile cap–Sketch Showing Reinforcement Details.

## **TEXT BOOKS**

1. Reinforced Concrete Design by S. Unnikrishna Pillai & Devdas Menon, Tata Mc-Graw Hill, New Delhi.
2. Design Reinforced Concrete Design by N. Krishna Raju. CBS Publications
3. Limit state designed of reinforced concrete - P. C. Varghese, Prentice Hall of India, New Delhi.

## **REFERENCE BOOKS**

1. Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & Company.
2. Fundamentals of Reinforced Concrete by N.C. Sinha and S.K Roy, S. Chand publishers.
3. Design of Concrete Structures - Arthus H. Nilson, David Darwin, and Charles W. Dolar, Tata Mc-Graw Hill.
4. IS: 456-200– Plain and Reinforced Concrete Code of Practice.
5. SP: 16 – Design Aids for Reinforced Concrete Design to IS:456
6. SP: 34 – Hand Book on Concrete Reinforcement and Detailing.
7. Reinforced Concrete Structures by Robert Park, Thomas Paulay.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### TRANSPORTATION ENGINEERING –B15PC3

B.Tech: V Semester

L/T/P/C  
3/1/0/3

**PRE-REQUISITES:** None

#### **COURSE OBJECTIVES:**

To provide basic knowledge in transportation so that students can understand and be able to

1. Solve transportation related problems.
2. Understand and design various pavements in rural as well as highways.
3. Do geometric and pavement designs based on traffic volume studies.
4. Understand and design flexible and rigid pavements.

#### **COURSE OUTCOMES:**

On completion of the course, the students will be able to:

1. Carry out surveys involved in planning and highway alignment.
2. Design the geometric elements of highways and expressways.
3. Carry out traffic studies and implements traffic regulation and control measures and intersection design.
4. Characterize pavement materials.
5. Design flexible and rigid pavements as per IRC.

#### **UNIT-I:**

**Highway Development and Planning:** Highway development in India - Necessity for Highway Planning - Different Road Development Plans. Classification of Roads - Road Network Patterns - Highway Alignment - Factors affecting Alignment - Engineering Surveys - Drawings and Reports, Road Projects initiation need based planning.

#### **UNIT-II:**

**Highway Geometric Design:** Importance of Geometric Design - Design controls and Criteria - Highway Cross Section Elements - Sight Distance Elements - Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance - Design of Horizontal Alignment - Design of Super elevation and Extra widening - Design of Transition Curves - Design of Vertical alignment - Gradients - Vertical curves. Typical cross sections for different types of Roads- Problems.

#### **UNIT-III:**

**Traffic Engineering:** Basic Parameters of Traffic, Volume, Speed and Density Road Accidents, Causes and Preventive measures - Accident Data Recording - Condition Diagram and Collision Diagrams. Road Traffic Signs - Types and Specifications - Road markings - Types of Road Markings - Design of Traffic Signals - Webster Method - IRC Method, Intelligent Transportation Systems Typical architectures, Highway lighting.

#### **UNIT-IV:**

**Intersection Design:** Types of Intersections - Conflicts at Intersections - Types of grade Intersections.

**Channelization:** Objectives - Traffic Islands and Design criteria - Types of Grade Separated Intersections- Rotary Intersection - Concept of Rotary and Design Criteria - Impacts of Geometrics

on intersection with reference safety, Operational capacity.

### **UNIT-V:**

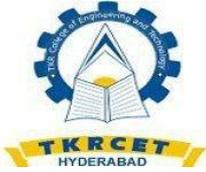
Introduction to Highway Materials- Design of Pavements: Introduction to Flexible Pavements, Rigid Pavement - Pavement Components and Functions - Design of Flexible Pavements, Rigid Pavements, CC pavements as per IRC - Stresses in Rigid & Flexible Pavements.

### **TEXT BOOKS**

1. Highway Engineering, S.K. Khanna & C.E.G. Justo, Nemchand & Bros.
2. Highway Engineering Design, L.R. Kadiyali and Dr. NB Lal, Khanna Publications.
3. Text Book of Highway Engineering, R. Srinivasa Kumar, Universities Press.

### **REFERENCE BOOKS**

1. Highway Engineering - S.P. Bindra, Dhanpat Rai & Sons.
2. Traffic Engineering & Transportation Planning - Dr.L.R. Kadyali, Khanna Publications.
3. Principles of Traffic Engineering - Garber & Hoel, Cengage Learning.
4. IRC 37 – 2012: Guide Lines for the Design of Flexible Pavements.
5. IRC 58 -2011: Guide lines for the Design of Rigid Pavement for Highways.
6. IRC 35 – 1997 Code of Practice for Road Markings
7. IRC 067 – 2012 Code of practice for Road Signs (3<sup>rd</sup> Revision)



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### CONCRETE TECHNOLOGY - B15PE4

**B.Tech: V Semester**

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

**PRE-REQUISITES:** Building Constructions

#### **COURSE OBJECTIVES:**

1. Any Civil Engineering student shall have the basic knowledge about the preparation of Concrete and the Technology involved in it as Concrete happens to be the widely used building Material.
2. The subject is designed to give the basic knowledge as well as latest developments in concrete technology.

#### **COURSE OUTCOMES:**

At the end of the course, the student will be able to:

1. Identify Quality Control tests on concrete making materials.
2. Understand the behavior of fresh and hardened concrete.
3. Design concrete mixes as per IS and ACI codes.
4. Understand the durability requirements of concrete.
5. Understand the need for special concretes

#### **UNIT-I:**

**Cement:** Portland cement - chemical composition - Hydration, Setting of cement - Structure of hydrate cement - Test on physical properties - Different grades of cement.

**Admixtures:** Types of admixtures - mineral and chemical admixtures.

#### **UNIT-II:**

**Aggregates:** Classification of aggregate - Particle shape & texture - 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 aggregate size.

#### **UNIT-III:**

**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 - Mixing and vibration of concrete - Steps in manufacture of concrete - Quality of mixing water.

#### **UNIT-IV:**

**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 compressive & tensile strength - Curing.  
**Testing Of Hardened Concrete:** Compression tests - Tension tests - Flexure tests -

Splitting tests - Pull-out test, Non-Destructive testing methods - Codal provisions for NDT. 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.

### **UNIT-V:**

**Mix Design:** Factors in the choice of mix proportions - Durability of concrete - Quality Control of concrete - Statistical methods - Acceptance criteria - Proportioning of concrete mixes by BIS method and ACI mix design.

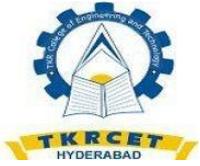
**Special Concretes:** Introduction to light weight concrete - Cellular concrete - No-fines concrete - High density concrete - Fibre reinforced concrete - Polymer concrete - High performance concrete - Self compacting concrete.

### **TEXT BOOKS**

1. Concrete Technology by M. S. Shetty, S. Chand & Co.
2. Concrete Technology by M.L. Gambhir, Tata Mc-Graw Hill Publishers.
3. Concrete Technology by AR. Shanta Kumar, Oxford Universitypress.

### **REFERENCE BOOKS**

1. Concrete: Micro structure, Properties and Materials, P.K. Mehta and J.M. Monteiro, Mc-Graw Hill Publishers
2. Concrete Technology by Job Thomas, Cengage learningIndia Pvt Ltd.
3. Properties of Concrete by A. M. Neville Pearson.
4. IS:10262-2009 Concrete Mix Proportioning Guide Lines
5. IS: 456–2000: Plain and Reinforced Concrete Code of Practice.



# **T K R COLLEGE OF ENGINEERING & TECHNOLOGY** **(Autonomous)**

## **B.TECH. CIVIL ENGINEERING -R18**

### **CONSTRUCTION EQUIPMENT & MATERIALS - B15PE4**

**B.Tech: V Semester**

**L/T/P/C**

**3/1/0/3**

#### **COURSE OBJECTIVES:**

1. To familiarize students about the characteristics of construction materials used in civil engineering.
2. To develop the skills for identification of suitable construction materials for civil engineering projects.
3. Ability to develop to select appropriate material for construction.

#### **COURSE OUTCOMES:**

At the end of the course, the student will be able to:

1. Manage the equipment, cost control and maintenance of a project.
2. Identify and understand the working principle of earthwork equipments.
3. Identify and understand the working of various equipments for different construction process.
4. Identify and understand the working principle of material handling equipment.
5. Understand the working of aggregate production and concrete equipments.

#### **UNIT-I:**

Large and heavy engineering projects - characteristics and complexities, methods statement for major activities like excavation, concreting, steel fabrication and erection for projects like earthen dams, hydropower projects, nuclear power plant, refineries and other industrial projects.

#### **UNIT-II:**

Excavation for heavy engineering projects - Excavation in various types of soils, selection of equipment, safety measures in excavation, drainage in excavation.

Concrete construction for heavy engineering projects - Selection of equipment for batching, mixing, transporting, placing and compacting for various types of jobs, safety measures during concreting, Special concretes and mortars - preplaced aggregate concrete, roller compacted concrete, grouting.

#### **UNIT-III:**

Prefabricated construction - Planning for pre-casting, selection of equipment for fabrication, transport and erection, quality measures, safety measures during erection.

Steel construction - Planning for field operations, selection of equipment and erection tools, tools and methods of welding, tools and methods of cutting and joining, bridge erection, quality measures, safety measures during fabrication and erection.

#### **UNIT-IV:**

Specific issues related to planning, site layouts, equipment selection and pre-project activities for large size construction projects like earthen dams, concrete dams, thermal power stations, nuclear power stations, light houses, airports and ports, bridges.

Information related to special equipments and their applications to off-shore construction, underground utility construction. New materials and equipment for construction; Case studies of heavy construction projects.

#### **TEXT BOOKS**

1. Construction Planning, Equipment and Methods by Robert Peurifoy, Mc Graw Hill.
2. Construction Equipment and management by SHA Sharma.
3. Erection of steel structures by Thomas Baron.

#### **REFERENCE BOOKS**

1. Handbook of heavy construction by Stubbs.
2. Journals of Civil Engineering and Construction Engineering.
3. Construction Equipment and Job Planning by Deodhar, Khanna Publication.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### GROUND IMPROVEMENT TECHNIQUES - B15PE4

B.Tech: V Semester

L/T/P/C  
3/1/0/3

#### **COURSE OBJECTIVES:**

1. Principles of treatment for granular and cohesive soils and various stabilization techniques.
2. Apply knowledge on ground improvement techniques such as reinforced earth, drainage and dewatering and grouting techniques on stabilization of expansive soils.
3. Impart knowledge of mechanical modification techniques such as deep compaction, blasting, vibro compaction, dynamic tamping and compaction piles.
4. Familiarize with different ground improvement techniques for cohesive and granular soil.
5. Understand the concept of reinforced earth, Geosynthetic and soil reinforcement in ground improvement.

#### **COURSE OUTCOMES:**

At the end of the course, the student will be able to:

1. Identify the type of problems in problematic soils and solve their problems using different ground improvement techniques.
2. Understand the importance of vibro-compaction and compaction piles on in-situ densification of soil.
3. Application of dewatering methods using well point system and electro-osmotic methods.
4. Application of physical and chemical ground improvement techniques using thermal modification, like grouting, Shotcreting and Guniting technology.
5. Design Ground improvement techniques such as ground anchors, rock bolting.

#### **UNIT-I:**

Introduction to Ground Modification: Need and Objectives, Identification of Soil types, In-situ and Laboratory tests to Characterize problematic soils; Mechanical, Hydraulic, Physico-Chemical, Electrical, Thermal Methods and their applications.

#### **UNIT-II:**

Mechanical Modification - Deep Compaction Techniques - Blasting Vibro compaction, dynamic tamping and Compaction piles.

#### **UNIT-III:**

Hydraulic Modification - Objectives and techniques, traditional dewatering methods and their choice, Design of Dewatering system, Electro - Osmosis, Electro - Kinetic dewatering. Filtration, Drainage and seepage control with Geosynthetic, Preloading and vertical drains. Physical and Chemical Modification - Modification by admixtures, Shotcreting and Guniting Technology, Modification at depth by Grouting, Crack grouting, Crack Grouting and Compaction grouting, Jet grouting, Thermal Grouting, Ground freezing.

## **UNIT-V:**

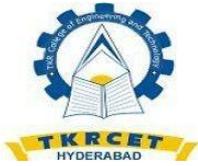
Modified by Inclusion and Confinement - Soil reinforcement, reinforcement with strip and Grid reinforcement soil. In-situ ground reinforcement, Ground anchors, rock bolting and soil nailing.

### **TEXT BOOKS**

1. Ground Improvement Techniques by P. Purushothama Raj, Laxmi Publications.
2. Engineering Principles of Ground Modifications, Hausmann, M.R (1990), Mc-Graw Hill publications.

### **REFERENCE BOOKS**

1. Design with Geosynthetic by Koerner R. M (1994), Prentice Hall, New Jersey.
2. Earth Reinforcement and Soil structures by Jones C. J. P (1985), Butterwirths, London.
3. Ground Control and Improvement by Petros P.Xianthakos, Lcc W Abramson, Donalda.Bruce.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING (R18)

### FUNDAMENTALS OF MANAGEMENT – B15HS5

B.Tech: V Semester

L/T/P/C  
3/1/0/3

#### **COURSE OBJECTIVE:**

The main objective of this course is to understand

1. Management Concepts,
2. Applications of Concepts in Practical aspects of business and development of Managerial Skills.

#### **COURSE OUTCOME:**

After completing the course the students able to

1. Understand the Significance of Management in their Profession.
2. Understand the Various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects.
3. Can explore the Management Practices in their domain area.

#### **UNIT-I:**

**Introduction to Management:** Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management - Classical Approach - Scientific and Administrative Management; The Behavioral approach.

#### **UNIT-II:**

**Planning and Decision Making:** General Framework for Planning - Planning Process, Types of Plans. Decision making and Problem solving - Programmed and Non-Programmed Decisions, Steps in Problem Solving and Decision Making.

#### **UNIT-III:**

**Organization and HRM:** Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization. Stress management and Counseling, Management of change.

**Human Resource Management & Business Strategy:** Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

#### **UNIT-IV:**

**Leading and Motivation:** Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during adversity and Crisis.

Motivation - Types of Motivation, Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

**UNIT-V:**

**Controlling:** Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non- Budgetary Controls. Characteristics of Effective Controls.

**TEXT BOOKS**

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education.
- 3.

**REFERENCES**

1. Essentials of Management, Koontz Kleihrich, Tata Mc-Graw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning.
3. Essentials of Management by Harold Koontz and Heinz Weihrich, Tata Mc-Graw Hill.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### HIGHWAY ENGINEERING & CONCRETE TECHNOLOGY LAB - B15PC6

B.Tech: V Semester

L/T/P /C  
0/0/3/ 1.5

#### PRE-REQUISITES:

Concrete Technology Theory, Transportation Engineering

#### COURSE OBJECTIVES:

The objectives of the course are:

1. To gain the practical knowledge on properties of Aggregate, Cement.
2. To know the properties of bitumen.

#### COURSE OUTCOMES:

The students will be able to

1. Assess the quality of various pavement materials and their suitability in highway construction,
2. Understand properties of concrete material,
3. Behavior of concrete & properties of fresh & hardened concrete.

#### LIST OF EXPERIMENTS

##### I. Tests on Cement

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement
4. Soundness of cement.
5. Compressive strength of cement.

##### II. Tests on Aggregate

1. Aggregate crushing value
2. Bulking of sand
3. Aggregate impact value
4. Attrition test
5. Abrasion test
6. Shape test

##### III. Bituminous material test

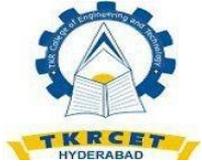
1. Penetration test
2. Ductility test
3. Softening point test
4. Flash and fire point test

## **TEXT BOOKS**

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons.

## **REFERENCES**

1. Concrete Technology by M.S. Shetty, S. Chand & Co.
2. MS-2 Manual (2015) Seventh edition, Asphalt Institute.
3. Highway Engineering by S. K. Khanna, C. E. G. Justo, A Veeraragavan, Khanna Publishers.
4. Highway Materials and Pavement testing by SK.Khanna ,SEG Justo and Veeraragavan, Nem chand Bros
5. IS: 2386 Part 1, 2, 6 Methods of test for Aggregate for Concrete.
6. IS: 10262-2009 Concrete Mix Proportioning Guide Lines.
7. IS: 4031-Physical Test on Cements.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### SOIL MECHANICS LAB - B15PC7

B.Tech: V Semester

L/T/P /C

0/0/3/ 1.5

#### PRE-REQUISITES:

A preliminary background in geotechnical engineering is desired.

#### COURSE OBJECTIVES:

The main objective of this course is

1. To impart knowledge of determination of index properties required for classification of soils.
2. To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests.
3. To teach how to determine permeability of soils and shear parameters of soil through different laboratory tests.

#### COURSE OUTCOMES:

Upon successful completion of this course, student will be able to

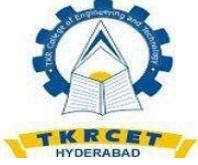
1. Determine the various properties of soils by using different lab tests.
2. Determine the index properties of soil and classify them.
3. Determine Compaction & Consolidation of soils.
4. Determine permeability and shear strength characteristics of soil

#### LIST OF EXPERIMENTS:

1. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
2. Field density by Core cutter method
3. Field density by Sand replacement method
4. Determination of Specific gravity of soil by Pycnometer
5. Grain size distribution by sieve analysis
6. Permeability of soil by constant and variable head test methods
7. Standard Proctor's Compaction Test
8. Determination of Coefficient of consolidation (square root time fitting method)
9. Unconfined compression test
10. Direct shear test
11. Vane shear test
12. Differential free swell index (DFSI) test

#### REFERENCE BOOKS:

1. Soil Testing Lab Manual by K. Ram Sastry.
2. IS2720
3. Geo Technical Engineering lab manual by William K KITCH Kendall Hunt dall



**T K R COLLEGE OF ENGINEERING & TECHNOLOGY  
(Autonomous)**

**B.TECH. CIVIL ENGINEERING - R18**

**ADVANCED COMMUNICATION SKILLS LAB - BE23**

**B.Tech: V Semester**

**L/T/P/ C  
0/0/3/1.5**

**COURSE OBJECTIVES:**

1. To improve students' fluency in spoken English.
2. To enable them to listen to English spoken at normal conversational speed.
3. To help students develop their vocabulary.
4. To read and comprehend texts in different contexts.
5. To communicate their ideas relevantly and coherently in writing.
6. To make students industry-ready.
7. To help students acquire behavioral skills for their personal and professional life.
8. To respond appropriately in different socio-cultural and professional contexts.
9. To sensitize the importance of Soft Skills and people skills.

**COURSE OUTCOMES:**

Students will be able to:

1. Acquire vocabulary and use it contextually.
2. Listen and speak effectively.
3. Develop proficiency in academic reading and writing.
4. Increase possibilities of job prospects.
5. Communicate confidently in formal and informal contexts.
6. Develop interpersonal communication skills.

The following course activities will be conducted as part of the Advanced English Communication Skills (AECS) Lab:

**UNIT-I:**

**Inter-personal Communication and Building Vocabulary** - Starting a Conversation - Responding Appropriately and Relevantly - Using Appropriate Body Language - Role Play in Different Situations - Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.

**UNIT-II:**

**Reading Skills and Group Discussion** - General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, Skimming, Scanning, Inferring Meaning and practice with different texts.

**UNIT-III:**

**Writing Skills** - Structure and Presentation of Different Types of Writing - Letter writing/ Resume Writing/ e-correspondence/ statement of purpose/ Technical Report Writing/ Styles, Types, Report in Manuscript format.

**UNIT-IV:**

**Group Discussion and Presentation Skills:** Group Discussions - Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation - Concepts and Process.

**Presentation Skills:** Oral Presentations (individual or group) through JAM Sessions/ Seminars/ PPTs and Written Presentations through Posters/ Projects/ Reports/ emails/ Assignment.

**UNIT-V:**

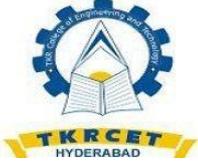
**Interview Skills:** Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-Conference & Video-Conference and Mock Interviews.

**TEXT BOOKS**

1. Oxford Advanced Learner's Compass.
2. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.

**REFERENCE BOOKS**

1. Effective Technical Communication by Rizvi, MAshraf, Mc-Graw Hill.
2. English for Effective Communication by Kumar, Sanjay and Pushpa Lata, OUP.
3. English Language Laboratories - A Comprehensive Manual by Konar, Nira, PHI Learning Pvt. Ltd.
4. You Can Win by Shiv Khera, Macmillan Books, New York.
5. Soft Skills for Everyone by Jeff Butterfield, CengageLearning.



**T K R COLLEGE OF ENGINEERING & TECHNOLOGY**  
**(Autonomous)**

**B.TECH. CIVIL ENGINEERING -R18**  
**ENVIRONMENTAL ENGINEERING - B16PC1**

**B.Tech: VI Semester**

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

**COURSE OBJECTIVES:**

1. To get knowledge of water sources, water treatment, design of distribution systems.
2. To understand various water & waste water treatments and their safe disposal methods.
3. To design various water and waste water treatment units.

**COURSE OUTCOMES:**

The students completing the course will

1. Assess characteristics of water and wastewater and their impacts.
2. To know about the layouts, principles of treatment units and filters
3. Estimate quantities of water and waste water and plan conveyance components.
4. Design components of water and waste water treatment plants.
5. Be conversant with issues of air pollution and control.

**UNIT-I:**

Introduction: Waterborne diseases - protected water supply - Population forecasts, design period - Types of water demand - factors affecting - fluctuations - fire demand - water quality and testing - drinking water standards: sources of water - Comparison from quality and quantity and other considerations - intakes - infiltration galleries.

SOURCES: Surface and subsurface sources - suitability with regard to quality and quantity.

**UNIT-II:**

Layout and general outline of water treatment units - sedimentation - principles - design factors - Coagulation - flocculation clarifier design - coagulants - feeding arrangements. Filtration - theory - working of slow and rapid gravity filters - multimedia filters - design of filters - troubles in operation - comparison of filters - disinfection - theory of chlorination, chlorine demand - other disinfection practices-Design of distribution systems - pipe appurtenances.

**UNIT-III:**

Characteristics of sewage -waste water collection-Estimation of waste water and storm water - decomposition of sewage, examination of sewage - B.O.D. Equation - C.O.D. Design of sewers-shapes and materials - sewer appurtenances, manholes - inverted siphon - catch basins - flushing tanks - ejectors, pumps and pump houses - house drainage - plumbing requirements - sanitary fittings-traps - one pipe and two pipe systems of plumbing - ultimate disposal of sewage - sewage farming - self-purification of rivers.

**UNIT-IV:**

Waste water treatment plant - Flow diagram - primary treatment Design of screens - grit chambers - skimming tanks - sedimentation tanks - principles of design - Biological treatment - trickling filters - ASP - Construction and design of oxidation ponds. Sludge digestion -

factors effecting - design of Digestion tank - Sludge disposal by drying - septic tanks working principles and design - soak pits.

### **UNIT-V:**

Air pollution - classification of air pollution - Effects air pollution - Global effects - Meteorological parameters affecting air pollution - Atmospheric stability - Plume behavior - Control of particulates - Gravity settlers, cyclone filters, ESPs - Control of gaseous pollutants - automobile pollution and control.

Effects of Air pollutants on man, material and vegetation; Global effects of air pollution - Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

### **TEXT BOOKS**

1. Water supply Engineering - S.K.Garg, Khanna Publishers.
2. Environmental Engineering I - B C Punmia and Ashok Jain.
3. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
4. Water Supply & Environmental Engineering by A.K. Chatterjee.

### **REFERENCES**

1. Environmental Engineering I and II by BC Punmia, Std. Publications.
2. Environmental Engineering I and II by SK Garg, Khanna Publications.
3. Environmental Pollution and Control Engineering CS Rao, Wiley Publications.
4. Water and Waste Water Technology by Steel, Wiley.
5. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr. Wiley.
6. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan.
7. Environmental Engineering by P. Venugopal Rao (PHI).
8. Environmental Engineering by H.S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt. Ltd.
9. Manual on Water supply and treatment - CPHEEO, Ministry of Urban Development, New Delhi.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING (R18)

### FOUNDATION ENGINEERING - B16PC2

B.Tech: V Semester

L/T/P/C

3/1/0/3

#### **PRE-REQUISITES:**

Geotechnical Engineering

#### **COURSE OBJECTIVES:**

The objective of this course is to,

1. Provide the knowledge about soil exploration.
2. Provide the knowledge on stability of slopes and earth pressure theories.
3. Provide the knowledge on various types of foundations.

#### **COURSE OUTCOMES:**

Upon completion of this course students will be able to,

1. Understand the concepts involved in soil investigations.
2. Analyse the stability of slopes by using different methods.
3. Analyse the earth pressure under different soil conditions.
4. Evaluate the SBC of shallow foundation.
5. Understand the concepts of pile and well foundations.

#### **UNIT-I:**

**Site Investigation and Soil Exploration:** Needs - Methods of soil exploration - Boring and Sampling methods - Penetration Tests - Plate load test - Pressure meter - planning of Programme and preparation of soil investigation report - Selection of foundation on soil conditions.

#### **UNIT-II:**

**Slope Stability:** Infinite and finite earth slopes - types of failures - factor of safety of infinite slopes - stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method - Taylor's Stability Number - Stability of slopes of earth dams under different conditions.

#### **UNIT-III:**

**Earth Pressure Theories:** Lateral earth pressures theories - Rankine's theory and Coulomb's theories - earth pressures different soils and layered soils - Culmann's graphical method - Trial Wedge methods.

**Retaining Walls:** Types of retaining walls - stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill.

#### **UNIT-IV:**

**Shallow Foundations - Strength Criteria:** Types - choice of foundation - Location of depth - Safe Bearing Capacity - Terzaghi, Meyerhof, Skempton and IS Methods.

**Shallow Foundations - Settlement Criteria** - Safe bearing pressure based on N-Value -

allowable bearing pressure; safe bearing capacity - allowable settlements of structures.

### **UNIT-V:**

**Pile Foundations:** Types of piles - Load carrying capacity of piles based on static pile formulae in different soils - Dynamic pile formulae - Pile load tests - Load carrying capacity of pile groups in sands and clays - settlement of pile groups - Negative skin friction.

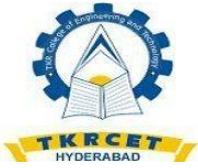
**Well Foundations:** Types - Different shapes of wells - Components of wells - Sinking of wells - Tilts and shifts.

### **TEXTBOOKS**

1. Soil Mechanics and Foundation by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi.
2. Basic Soil Mechanics and Foundations by Alamsingh CBS Publishing
3. Foundation Engineering by PC.Vaeghees, PHI Publications.
4. Soil Mechanics and Foundation Engineering by V.N.S Murthy, CBS Publishers and Distributors.

### **REFERENCE BOOKS**

1. Soil Mechanics and Foundation Engineering by K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Analysis and Design of Substructures - Swami Saran, Oxford & IBH publishing Company Pvt. Ltd.
3. Geotechnical Engineering by C. Venkataramiah, New Age International Pvt. Ltd, Publishers.
4. Geotechnical Engineering Principles and Practices by Cuduto, PHI.
5. Principles of Foundation Engineering by B.M. Das, 4th edition PWS Publishing, Singapore.
6. Foundation Analysis and Design by J.E. Bowles, 4th Edition, Mc-Graw Hill International.



# TKRC COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18 DESIGN OF STEEL STRUCTURES - B16PC3

**B.Tech: VI Semester**

**L/T/P / C**

**3/1/0/3**

### **PRE-REQUISITES:**

Strength of Materials, Structural Analysis.

### **COURSE OBJECTIVES:**

The objective of this course is,

1. To study the design of bolted and welded connections.
2. To learn IS 800-2007 code of practice for the design of compression and tension members.
3. To study the behaviour and design of Flexural members using simple and built-up sections.
4. To study the components of truss, loads on trusses, analysis and design of purlins and truss members.
5. To understand behaviour of plate girder members and the design of plate girder.

### **COURSE OUTCOMES:**

At the end of the course, the student will be able to

1. Design bolt and weld connections.
2. Design tension and compression members.
3. Design beams and built up sections.
4. Design of Roof Trusses.
5. Design of plate girders and Roof Trusses.

### **UNIT-I:**

Materials - Types of Structural Steel - Mechanical properties of steel - concept of plasticity - yield strength. Loads and combinations, local buckling behavior of steel. Concept of limit State Design - Limit States - Design Strengths - deflections limits - serviceability - stability check. Bolted connections - IS -800-2007 - specifications - Design strength - efficiency of joint - prying actions - welded connections - Types of welded joints - specifications - design requirements.

### **UNIT-II:**

Design of Tension members - Net area - Shear lag - Design procedure splice - lug angle. Design of compression members - Buckling class - Slenderness ratio/ strength design - laced - Battend columns - splices - column bases. Detailing of Structural Members.

### **UNIT-III:**

Flexural members - Plastic Theory - Theorems of plastic Analysis - classifications of beams as per IS 800-2007 - Design of beams - Plastic moment - Bending and shear strength/ buckling - Built up sections - laterally supported beams - Design of eccentric connections - Framed - stiffened/seated connections- Detailing of Structural Members.

**UNIT-IV:**

Roof Trusses - Components of a trussed roof - Types of roof trusses - Purlin design - wind ties, tie rods - loads on trusses - truss design, Design of joints and end bearing- Detailing of Structural Members.

**UNIT-V:**

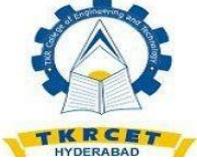
Design of plate girders - elements - economical depth - design of main sections - connections between web and flange - design of stiffness bearing - intermediate stiffeners - Design of web splices and Flange splices- Detailing of Structural Members.

**TEXT BOOKS**

1. Design of Steel Structures N. Subramanian, Oxford University Press-2009
2. Limit State Design of Steel Structures, S.K Duggal, Tata McGraw-Hill, 2010.
3. Design of Steel Structures by K.S. Sai Ram, Pearson Education, 2010.

**REFERENCE BOOKS**

1. Design of Steel Structures by S.S. Bhavikatti, IK International Publication House, New Delhi.
2. Design of Steel Structures by Edwin H. Gaylord, Jr. Charles N. Gaylord and James Stallmeyer, Tata Mc-Graw Hill Pvt. Ltd.
3. Fundamental of Structural Steel Design by M.L. Gambhir Mc-Graw Hill Pvt. Ltd.
4. IS:800-2007
5. Steel Tables in SI Units.



# TKRC COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### HYDROLOGY & WATER RESOURCE ENGINEERING - B16PC4

**B.Tech: VI Semester**

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

#### **PRE-REQUISITES:**

A preliminary background in Fluid Mechanics is desired.

#### **COURSE OBJECTIVES:**

The objective of this course is to,

1. Understand engineering hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.
2. Understand irrigation engineering structures - Water utilization for crop growth and their designs.

#### **CORSE OUTCOMES:**

At the end of the course, the student will be able to:

1. Analyze hydro-meteorological data.
2. Estimate abstractions from precipitation.
3. Compute yield from surface and subsurface basins.
4. Develop rainfall-runoff models.
5. Formulate and solve hydrologic flood routing models.
6. Estimate runoff, design discharge from catchment.

#### **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 - Runoff over a Catchment - Empirical and Rational Formulae.

Abstraction from rainfall - evaporation, factors affecting evaporation, measurement of evaporation - Evapotranspiration - Penman and Blaney & Criddle Methods - Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

#### **UNIT-II:**

Distribution of Runoff - Hydrograph Analysis Flood Hydrograph - Effective Rainfall - Base Flow - Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-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 agricultural soils, methods of improving soil fertility - Crop Rotation, preparation of 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. Depth and frequency of Irrigation, irrigation efficiencies - Water Logging.

### **UNIT-V:**

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

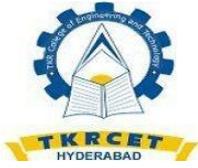
Design Discharge over a catchment, Computation of design discharge-rational formulae etc.

### **TEXT BOOKS**

1. Engineering Hydrology by K. Subramanya Mc-Graw Pvt. Ltd.
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications Pvt. Ltd., New Delhi.
3. Irrigation and Water Resources & Water Power by P. N. Modi, Standard Book House.

### **REFERENCE BOOKS**

1. Engineering Hydrology by CSP Ojha, R. Brendtsson and P. Bhunya, Oxford University Press.
2. Irrigation and Water Power Engineering by Punmia & Lal, Laxmi publications Pvt. Ltd., New Delhi.
3. Applied hydrology by V.T. Chow, D.R. Maidment and L.W. Mays, Mc-Graw Hill Pvt Ltd.
4. Hydrology in Practice by E. M. Shaw, K. J. Beven, CRC Press.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18 PRESTRESSED CONCRETE - B16PE5

B.Tech: VI Semester

L/T/P / C  
3/1/0/3

### PRE REQUISITES:

1. Reinforced Cement Concrete Structures - Analysis & Design.
2. IS 456 - 2000.
3. Analytical and Creative thinking.

### COURSE OBJECTIVES:

Prestressing is a technique in concrete structural elements in bridges, buildings and other mega infrastructure projects for longer spans and heavier loads.

1. The objective of this course is to provide:
2. The knowledge on concepts of Prestressing of concrete structural elements
3. The exposure on various prestressing methods and construction sequences
4. The knowledge on analysis and designing of prestressing concrete structural elements.

### COURSE OUTCOMES:

At the end of the course, the student will be able to:

1. Understand the concepts of prestressing in concrete structures and identify the materials for prestressing.
2. Understand the concept of transfer of prestress in prestressed concrete members and the methods and systems of prestressing.
3. Assess the loss of prestress in pre-tensioned and post tensioned members.
4. Analyse the prestressed concrete structural elements for flexure and shear.
5. Able to design the prestressed concrete structures.

### UNIT-I:

**Introduction:** Historic development - General principles of Prestressing - Pre-tensioning and Post-tensioning - Advantages and limitations of Prestressed concrete - Classification and types of prestressing - Materials - high strength concrete and high tensile steel and their characteristics.

**Methods and Systems of Prestressing:** Concept of transfer of prestress - Pre-tensioning and Post-tensioning methods and systems of prestressing like Hoyer system, Magnel-Blaton system, Freyssinet system and Gifford-Udall System and Lee McCall system.

### UNIT-II:

**Loss of Prestress:** Loss of prestress in pre-tensioned and post-tensioned members due to Elastic Shortening of concrete, Shrinkage of concrete, Creep of concrete, Relaxation of Stress in steel, Slip in anchorage and Frictional losses - Provisions for loss of pre stress in IS 1343- 2012 code.

### UNIT-III:

**Flexure:** Analysis of sections for flexure - beams prestressed with straight, concentric, eccentric, bent and parabolic tendons - stress diagrams - Elastic design of PSC slabs and beams of rectangular and I sections - Kern line - Cable profile and Cable layout.

**Shear:** General Considerations - Shear and Principal Stresses - Ultimate shear resistance of prestressed concrete members - Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables - Analysis of rectangular and I beams for shear - Design of shear reinforcement - IS 1343-2012 code provisions.

#### **UNIT-IV:**

**Transfer of Prestress in Pre-tensioned Members:** Transmission of prestressing force by bond - Transmission length - Flexural bond stresses, IS code provisions - Anchorage zone stresses in post tensioned members - Stress distribution in End block - Analysis by Guyon, Magnel, Zielinski and Rowe's methods - Anchorage zone reinforcement - IS 1343-2012 code provisions.

#### **UNIT-V:**

**Composite Beams:** Different Types - Propped and Un-propped - Stress distribution-Differential shrinkage - Analysis of composite beams - General design considerations.

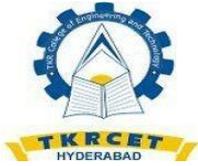
**Deflections:** Importance of control of deflections - Factors influencing deflections - Short term deflections of un-cracked beams - Prediction of long term deflections - IS 1343-2012 code requirements.

#### **TEXT BOOKS**

1. Prestressed Concrete by N. Krishna Raju, 6<sup>th</sup> Edition, Tata Mc-Graw Hill.
2. Prestressed Concrete by K U Muthu, Azmi Ibrahim, Maganti Janardhana and M. Vijayanand, PHI Learning Pvt. Ltd.

#### **REFERENCE BOOKS**

1. Prestressed Concrete by S. Ramamrutham, Dhanpat Rai & Sons, Delhi.
2. Prestressed Concrete by N. Rajagopalan, Narosa PublishingHouse.
3. Fundamentals of Prestressed Concrete by Dr. N C Sinha and Dr. SK Roy, S Chand Publishers.
4. Prestressed Concrete Design by Praveen Nagarajan, Pearson.
5. Design of Prestressed Concrete Structures by T. Y. Lin and Burn, Wiley Student Edition.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### ADVANCED STRUCTURAL DESIGN - B16PE5

B.Tech: VI Semester

L/T/P / C

3/1/0/3

**PRE-REQUISITES:** RCC

#### **COURSE OBJECTIVES:**

1. Understand the applications of concrete, requirements of concrete structures and learn the design of RCC Structures.
2. Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability.

#### **COURSE OUTCOMES:**

At the end of the course, the student will be able to:

1. Design and Detailing of Cantilever Structures elements.
2. Design the Reinforced Circular and Rectangular watertanks.
3. Design the Flat, Raft and Pile foundation.
4. Design the Concrete bridges.
5. Design the industrial structures like Bunkers Silos and Chimneys.

#### **UNIT-I:**

Design and Detailing of cantilever type of retaining walls - Stability Check. Principles of Counterfort Retaining walls.

#### **UNIT-II:**

Design of Circular and Rectangular Water tanks at Ground level and elevated with staging.

#### **UNIT-III:**

Design of Flat slabs - Design of Raft foundations.

#### **UNIT-IV:**

Design of Concrete Bridge - IRC loading, Design of Stab Bridge, T - beam Girder Bridge.

#### **UNIT-V:**

Design of RCC Chimney, Bunkers & Silos.

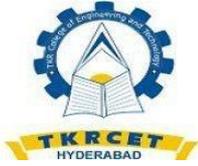
#### **TEXTBOOKS**

1. Advanced Reinforced Concrete Structures by Varghese, Pranties Hall of India Pvt. Ltd.
2. Bridge Engineering by S Ponnuswamy Mc Graw Hill Co.
3. Reinforced Concrete Design by S.A Pillai and D.Menon, Tata Mc. Ghrawhill Publishing Company.
4. Advanced Reinforced Concrete Structures by Krishna Raju.

#### **REFERENCE BOOKS**

1. Reinforced Concrete Structures Vol.2 by B.C.Punmia, Ashok Kumar Jain and Kumar Jain, Laxmi, Publications Pvt.Ltd. New Delhi.
2. Essentials of Bridge Engineering by D. John Son Victor, Oxford and IBM Publication Co, Pvt.Ltd.
3. IRC 6-2014 :Standard Specifications and Code of Practice for Road Bridges

4. IRC 112-2011 : Code of Practice for Concrete RoadBridges
5. SP: 34- 1987 Hand Book on Concrete Reinforcement anddetailing.
6. IS: 456-2000 Plain and Reinforced Concrete- Code ofpractice



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING - R18

### STRUCTURAL ANALYSIS BY MATRIX METHODS - B16PE5

B.Tech: VI Semester

L/T/P/C

3/1/0/3

**PRE-REQUISITES:** Structural Analysis, mathematical knowledge on matrix methods.

#### **COURSE OBJECTIVES:**

To impart knowledge

1. On the analysis of indeterminate structures like continuous beams, trusses and portal frames by matrix methods.

#### **COURSE OUTCOMES:**

1. To understand the importance of degrees of freedom and the concept of principle of superposition.
2. To know about the concept of strain energy and principle of virtual work.
3. To study the transformation of system matrices and element matrices for the determinate and indeterminate structures.
4. To analyze the forces in structures like continuous beam, truss and frames using flexibility method
5. To analyze plane truss, plane frame by stiffness method

#### **UNIT-I:**

Introduction to matrix methods of analysis(System Approach) - static indeterminacy and kinematic indeterminacy - degree of freedom - coordinate system - structure idealization stiffness and flexibility matrices - suitability element stiffness equations - elements flexibility equations - mixed force - displacement equations - for truss element, beam element and tensional element. Transformation of coordinates - element stiffness matrix - and load vector - local and global coordinates- System Approach.

#### **UNIT-II:**

Strain energy - Stiffness and flexibility matrices from strain energy - Symmetry and other properties of stiffness and flexibility matrices - Betti's law and its applications - Strain energy in systems and in elements- System Approach.

#### **UNIT-III:**

Assembly of stiffness matrix from element stiffness matrix - direct stiffness method - general procedure - band matrix - semi bandwidth - computer algorithm for assembly by direct stiffness matrix method- System Approach.

#### **UNIT-IV:**

Analysis of plane truss - continuous beam - plane frame and grids by flexibility methods- System Approach.

#### **UNIT-V:**

Analysis of plane truss - continuous beam - plane frame and grids by stiffness methods.

### **TEXT BOOKS:**

1. Matrix analysis of Frames structures by William Weaver J.R and James M. Gere, CBS publications.
2. Advanced Structural Analysis by Ashok. K. Jain, Nem ChandBrothers.

### **REFERENCE BOOKS**

1. Basic Structural Analysis by C.S. Reddy, Tata Mc-Graw Hill.
2. Matrix Structural Analysis by Madhu B. Kanchi, John Willeypublishers.
3. Indeterminate Structural Analysis by K.U. Muthuet al., I.K. International Publishing House Pvt. Ltd.
4. Matrix Methods of Structural Analysis by J.L. Meek, Mc-Grawhill.



# TKR COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### ENVIRONMENTAL ENGINEERING LAB -B16PC7

**B.Tech: VI Semester**

**L/T/P/C  
0/0/3/1.5**

**Pre-requisites: Engineering Chemistry I & II Course objectives:**

1. To quantify the water and wastewater pollutant
2. To measure the concentration of water and wastewater pollutant
3. To analyze the characteristics of water and wastewater
4. To study the growth of microorganism and its quantification.

### **COURSE OUTCOMES:**

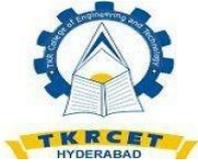
1. To quantify the pollutant concentration in water and wastewater
2. To recommend the degree of treatment required for the water and wastewater
3. To analyze the survival conditions for the microorganism and its growth rate

### **LIST OF EXPERIMENTS**

1. Characteristics, Sampling and preservation methods and significance of characterization of water and wastewater.
2. Determination of pH
3. Determination of Electrical Conductivity
4. Determination of Acidity and Alkalinity
5. Determination of Hardness
6. Determination of Chlorides
7. Determination of turbidity
8. Determination of Optimum Coagulant Dosage
9. Determination of suspended, dissolved and fixed solids
10. Determination of available Chlorine in Bleaching powder
11. Determination of iron
12. Determination of phosphate and nitrates
13. Determination of dissolved oxygen
14. Determination of B.O.D.
15. Determination of C.O.D. test
16. Introduction to Bacteriological Analysis

### **REFERENCE BOOKS**

1. IS 10500 :2012, Indian Standard DRINKING WATER — SPECIFICATION
2. Manual for water and waste water treatment- CPHEEO, 1999
3. Birdie. G.S., “Water Supply and Sanitary Engineering”, Dhanpat Rai and sons,
4. Mark J. Hammer, Mark J. Hammer Jr, “Water and Waste Water Technology”, Prentice hall of India, 7<sup>th</sup> edition



# TKRCET COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING - R18 HYDRAULIC MACHINERY LAB - B16PC8

B.Tech: VI Semester

L/T/P/C

0/0/3/1.5

### **COURSE OBJECTIVES:**

To give the student an exposure to various hydraulic and hydraulic machines.

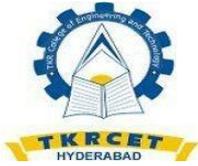
### **COURSE OUTCOMES:**

At the end of the course, the student will be able to:

1. Compute drag coefficients.
2. Test the performance of pumps and turbines.
3. Determine coefficients of discharge over orifice and venturimeter.
4. Determine Energy loss in Hydraulic jump and Calibrate standing wave flume.

### **LIST OF EXPERIMENTS:**

1. Impact of jet on vanes by Flat Bed
2. Impact of jet on vanes by Curved Bed
3. Study of Hydraulic jump in Open Channel by meanings and Chezy.
4. Study of Hydraulic jump in Open Channel by Hydraulic Jump
5. Impact of jet on vanes by Flat Bed
6. Performance test on Pelton wheel turbine.
7. Performance test on Francis turbine at constant speed
8. Performance test on Francis turbine at constant head
9. Performance test on Kaplan turbine. Constant Head
10. Performance test on Kaplan turbine. Constant Speed
11. Performance characteristics of a single stage centrifugal pump.
12. Performance characteristics of a multi-stage centrifugal pump.
13. Performance characteristics of a reciprocating pump.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### COMPUTER AIDED CIVIL ENGINEERING DRAWING -B16ES9

**B.Tech: VI Semester**

**L/T/P/ C  
0/0/3/1.5**

#### **COURSE OBJECTIVES:**

To make students understand the detailing of all kinds of structures such as reinforced concrete, plain concrete, steel structures.

#### **COURSE OUTCOMES:**

At the end of the course, the student will be able to draft the various structures.

1. Drawing sheet standards – Symbols – Templates – IS Code Provision – Different types of Drawings.
2. Detailing of reinforcement in Cantilever, Simply supported and Continuous Beams.
3. Detailing of reinforcement in columns.
4. Detailing of reinforcement in RCC isolated footings square, rectangular, circular and combined footings.
5. Detailing of reinforcement in RC one-way, two-way slabs and dog-legged staircases.
6. Drawing of Steel bolted and Welded connections.
  - a) Lap Joint b) Butt Joint c) Butt Weld d) Fillet Weld e) Slot and Plug Weld
7. Detailing of Simple Bolted Beam Connections
8. Drawing of steel compression and tension members.
9. Drafting of steel beams-built-up sections.
10. Drafting of steel plate girder – Stiffened and Unstiffened.
11. Drafting of steel roof truss.
  - a) King Post b) Queen Post
12. Layouts of Structural details for a building – Columns & Footings layout – Slabs & Beams Layout.

#### **TEXT BOOKS**

1. Civil Engineering drawing (Including computer aided building drawing), Third Edition by Rangwala, Charotar publishers.
2. Computer Aided Design Laboratory by M. N. Shesha Prakash, G. S. Suresh.
3. Computer Aided Drafting lab by V.Ramesh Babu, R. samyukta, M.Muniratnam, VRB publishers pvt ltd.
4. SP:34
5. IS: 13920-2016 – Ductile Design and Detailing of Reinforced Concrete Structures Subjected to Seismic Forces Code of Practice.
6. IS: 456-2009 – Plain and Reinforced Concrete Code of Practice.
7. IS: 800-2007 – General Construction in Steel Code of Practice.