

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

## B.TECH. CIVIL ENGINEERING -R18

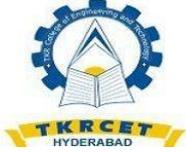
### COURSE STRUCTURE

#### B. Tech. VII Semester

Sl. No	Course Code	Course Title	L	T	P	Credits
1	B17PC1	Estimation & Costing	3	1	0	3
2	B17PE2	<b>Professional Elective –III</b> 1) Water Resources Engineering -II 2) Pipe line Engineering 3) Ground Water Development & Management	3	1	0	3
3	B17PE3	<b>Professional Elective-IV</b> 1) Air and Noise Pollution 2) Environmental Impact Assessment 3) Solid and Hazardous waste Management	3	1	0	3
4	B17PE4	Remote Sensing & Geographic Information System	1.5	1	0	1.5
5	B17OE5	Open elective-II	3	1	0	3
6	B17PW6	Project Stage –I	0	0	7	4
Total Credits						17.5

#### B. Tech - VIII Semester

Sl. No	Course Code	Course Title	L	T	P	Credits
1	B18PE1	<b>Professional Elective - V</b> 1) Traffic Engineering & Management 2) Railway Engineering 3) Pavement Design, Construction & Maintenance	3	1	0	3
2	B18PE2	<b>Professional Elective-VI</b> 1) Construction Project Planning & management 2) Bridge Engineering 3) Rehabilitation and Retrofitting	3	1	0	3
3	B18OE3	Open elective-III	3	1	0	3
4	B18PW4	Comprehensive Viva Voce	0	0	3	3
5	B18PW5	Project Stage -II	0	0	16	8
Total Credits						20



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(Autonomous)

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

**ESTIMATION & COSTING - B17PC1**

**B.Tech. VII SEMESTER**

**L/T/P/C**

**3/1/0/3**

## **COURSE OBJECTIVES:**

1. Determination of quantities of items and labour requirement of civil engineering works.
2. Preparation of estimate of the civil engineering works.
3. Preparation of specification of construction items.
4. To introduce the students in depth knowledge of professional practice as well the quantity
5. Analysis of construction works like, multi-storied structures, Water works & sanitary works, Irrigation works, Road estimates, culverts, etc.

## **COURSE OUTCOMES:**

1. The students will get a diverse knowledge of estimating, costing.
2. The Professional practice, which will be use full in tackling real life problems.
3. The students will be able to understand the procedure to carry out the estimation and steps to prepare reports of construction works.
4. The students will learn the purpose and importance of valuation.
5. The students will get a diverse knowledge of bar bending schedules in real life problems.

## **UNIT-I:**

Introduction - Type of estimates - Elements of estimate - Methods of estimating - Standard Units - Data required for preparation of estimates - Technical terms used in preparation of estimation - Specification report on estimate - Principles of working out quantities for detailed and abstract estimates - Schedule items - Non schedule items.

## **UNIT-II:**

Specifications - Objectives and importance of specifications - Standard Specifications - Specifications for non- schedule items - Specifications for different items of work- Language for writing Specifications.

Rate Analysis - Introduction and principles of rate analysis - SSR-DSR - Lead statement - Overhead charges - Rate analysis for Schedule items and Non schedule items - Supplementary items of work - Working out rate analysis for various items of work - Overhead and contingent charges.

## **UNIT-III:**

Detailed Estimates for Buildings - Estimation of quantities for water supply & sanitary works- culverts and bridges - Road works - Earthwork Calculations for roads, embankments and canals.

## **UNIT-IV:**

Reinforcement bar bending schedule for beams, columns and slabs - preparation of work bills - record of measurements - methods of measurements of civil engineering works - IS Code provisions - preparation of revised estimates.

**UNIT-V:**

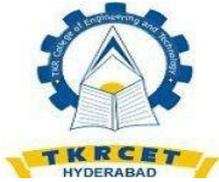
Valuation of buildings - Purpose of valuation, types of property - Depreciation, Sinking fund, Lease hold and free hold property, obsolescence, Gross income, Outgoing and Net income, Capitalized value and year's purchase. Rental method of valuations and typical problems.

**TEXT BOOKS**

1. Estimating and Costing by B.N. Dutta, UBS publishers.
2. Estimating and Costing by G.S. Birdie, Dhanpat Rai Publications.

**REFERENCE BOOKS**

1. Standard Schedule of rates and standard data book by public works department.
2. IS-1200 (Parts I to XXV - 1974/ method of measurement of building and Civil Engineering works - B.I.S).
3. Estimation, Costing and Specifications by M. Chakraborti; Laxmi publications.
4. National Building Code.
5. CPWD Standard Specifications Vol-1 & 2, GoI.



**T K R COLLEGE OF ENGINEERING & TECHNOLOGY**  
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**B.TECH. CIVIL ENGINEERING - R18**

**WATER RESOURCES ENGINEERING-II - B17PE2**

**B.Tech. VII SEMESTER**

**L/T/P/C**

**3/1/0/3**

**PRE-REQUISITES:**

Water Resources Engineering - I

**Course Objectives:**

1. Introduce students to the structure of the dams, earth dam, canals, spillways and cross drainage works.
2. Learn to estimate the capacity of reservoir using mass curve.
3. Design the principle of Sarda type, trapezoidal notch, straight glacis fall.
4. Necessity and importance of diversion, storage head works, weir and barrages.
5. Determine the uplift pressure, impervious floors using the theory.

**COURSE OUTCOMES:**

1. To know the types of reservoirs, zones of storages of a reservoir.
2. Know about the merits and demerits of dams, factor effecting selection of dams, gravity dams, earth dams, canals, and spillways.
3. The causes of failure of the dams, canals and spillways.
4. The design of reservoir, canals, diversion; storage head works by the Bligh's and Khosla's theory.
5. Understand about the types of fall in canals and its application which have designed in the all cases.

**UNIT – I:**

**Storage Works Reservoirs:** Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve – Reservoir Sedimentation – Life of Reservoir. Types of dams, factors affecting selection of types of dam, factors governing selection of site for dam.

**UNIT – II:**

**Gravity dams:** Forces acting on a gravity dam, causes of failure of a gravity dam, elementary 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.

**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.  
**Spillways:** Types of spillways, Design principles of Ogee spillways – Spillway gates. Energy Dissipates and Stilling Basins Significance of Jump Height Curve and Tail Water Rating Curve – USBR and India types of Stilling Basins.

## **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 Excludes Weirs on permeable Foundations – Creep Theories – Bligh's Lane's 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.

## **UNIT – V:**

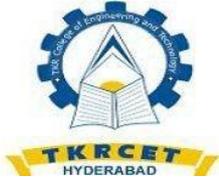
**Canal Falls:** Types of falls and their location, Design principal of Notch Fall and sarda type fall. Canal regulation work, design principals of distributors and head regulators, Cross Regulators–canal outlets, types of canal modules, Cross Drainage work type's-selection of site.

## **TEXT BOOK**

1. Irrigation engineering and hydraulic structures, Santosh Kumar Garg, Khanna publishers.
2. Irrigation and water power engineering, Dr. B. C. Punmia, Dr. Pande B. B. Lal, Ashok Kumar Jain & Arun Kumar Jain, Laxmi publication Pvt, Ltd, New Delhi.
3. Irrigation Water Power and Water Resource Engineering, K. R. Arora, Standard Publishers Distributors

## **REFERENCE BOOKS**

1. Irrigation and water resources engineering by G.L Asawan, New Age International Publishers.
2. Theory and Design of Irrigation Structures by R. S. Varshney, Gupta & Gupta, Nem Chand & Bros.
3. Irrigation engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers.
4. Introduction to hydrology by Warren Viessvann, Jr, Garyl, Lewis, PHI.
5. Engineering Hydrology by CS Pojha, R. Berndtsson and P. Bhunya, Oxford University Press.



# TKR COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

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

**PIPELINE ENGINEERING - B17PE2**

**B.Tech. VII SEMESTER**

**L/T/P/C**

**3/1/0/3**

## **PRE-REQUISITES:**

A preliminary background in hydraulic engineering, is desired.

## **COURSE OBJECTIVES:**

1. To familiarize the students with the various elements and stages involved in transportation of water.
2. To know about the materials and appurtenances required for construction of pipeline.
3. To understand the surveying involved in pipe line design and layout of pipeline.
4. To understand international standards and practices in piping design.
5. To know various equipment and their operation in pipeline transportation.

## **COURSE OUTCOMES:**

Upon the completion of course the students would be able to

1. Understand the key steps in a pipeline's lifecycle
2. Understand the types of materials and appurtenances required.
3. Understand the selection of route, surveying and laying out of pipeline
4. Understand the design and construction of pipe line.
5. Understand the installation, management and maintenance of pipes.

## **UNIT-I:**

**Elements of pipeline design:** Introduction to pipeline engineering -Fluid properties - Effects of pressure and temperature -Supply / Demand scenario –analysis of flow in water transmission and water distribution systems - Codes and standards - Pipeline design formula – Expansion and flexibility – Joint design for pipes, design of thrust block.

## **UNIT-II:**

**Pipe Materials:** piping material and selection procedure-specifications. Valves & Operators: History, Appurtenances-Valve Standards/Applicable Codes, Definition and Types for Pipeline Applications, Valve Operators, Automatic Line-Break Controls, Side/Takeoff Valves Station Tie-ins. Valve Assemblies, Automation For Liquid Pipelines, Surge protection Valve Characteristics, Valve Application Ranking and Identification, Valve Maintenance Requirement.

## **UNIT-III:**

**Pipeline route selection, survey and geotechnical guidelines:** Introduction - Preliminary route selection - Key factors for route selection - Engineering survey - Legal survey - Construction / As-built survey - Environmental and hydrological considerations, Pipeline integrity monitoring, Geotechnical design.

## **UNIT-IV:**

**Pipeline construction:** Construction – Commissioning, Welding and NDT, Various types of welding depending on the material and pressure welding. Pipe installation trench-less

technology and methods, transportation trenching, dewatering, pipe installation making the joints, bedding and back fill, blasting operation, micro tunnelling, paint finishes for marine application, protective coatings for underground use.

## **UNIT-V:**

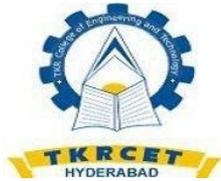
**Pipeline protection, Instrumentation, pigging & Operations:** Corrosion, control materials, burying of the pipelines, pigging and smart pigging. Inspection, testing, quality control, leak detection, pipeline marks and integrity management programme. Pipeline coating – Cathodic protection calculations for land pipelines – Internal corrosion – Flow meters and their calibration – Sensors – Pigs-Pipeline Operations and maintenance.

## **TEXT BOOKS**

1. Pipeline Design and Construction: A Practical Approach, M. Mahitpour, H. Golshan and M.A. Murray, 2<sup>nd</sup> Edition, ASME Press, 2007.
2. Piping and Pipeline Engineering: Design, Construction, Maintenance Integrity and Repair, George A. Antaki, CRC Press, 2003.
3. Pipeline Engineering, Henry Liu, Lewis Publishers (CRC Press), 2003.

## **REFERENCES**

1. Piping Calculation Manual, E. Shashi Menon, McGraw-Hill, 2004.
2. Pipeline Route Selection for Rural and Cross country pipeline, American Society of Civil Engineers, 1998.
3. Pipeline Planning and Construction Field Manual, E. Shashi Menon, Gulf Professional Publishing, 2011.
4. Pipeline Rules of Thumb Handbook, E. W. McAllister, 7<sup>th</sup> Edition, 2009.
5. Buried Pipe Design; A. Moser, Steve Folkman; McGraw Hill Professional, 3rd Edition, 2008.
6. Pipeline Pigging Technology, 2nd Edition, J.N.H Tiratsoo, Butterworth Heinmann, 1999.
7. Pipeline Engineering, Henri Liu, CRC Press, 2003.



# TKR COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING – R18

### GROUND WATER DEVELOPMENT & MANAGEMENT - B17PE2

B.Tech. VII SEMESTER

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

#### COURSE OBJECTIVES:

1. Appreciate groundwater as an important natural resource.
2. Understand flow towards wells in confined and unconfined aquifers.
3. Understand the principles involved in design and construction of wells.
4. Create awareness on improving the groundwater potential using various recharge techniques.
5. Know the importance of saline water intrusion in coastal aquifers and its control measures.
6. Appreciate various geophysical approaches for ground water exploration.

#### COURSE OUTCOMES:

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

1. Estimate aquifer parameters and yield of wells.
2. Analyse radial flow towards wells in confined and unconfined aquifers.
3. Design wells and understand the construction practices.
4. Interpret geophysical exploration data for scientific source finding of aquifers.
5. Determine the process of artificial recharge for increasing groundwater potential.
6. Take effective measures for controlling saline water intrusion.
7. Apply appropriate measures for groundwater management.

#### UNIT-I:

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

#### UNIT-II:

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

#### UNIT-III:

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

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

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

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

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

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

**Well Construction:** Drilling Equipment used for Well Construction - Bore log, Interpretation of Log Data.

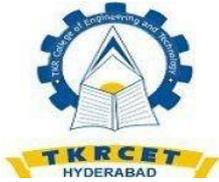
**Saline Water Intrusion in aquifer:** Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion. Groundwater Basin Management: Concepts of conjunction use, Case studies.

#### **TEXT BOOKS**

1. Ground Water Hydrology by David Keith Todd, John Wiley & Sons, New York.
2. Ground Water by H. M. Raghunath, Wiley Eastern Ltd.
3. Ground Water Hydrology by D.K. Todd and L.R Mays, John Willey.

#### **REFERENCE BOOKS**

1. Groundwater Hydrology by Bower, John Wiley & Sons.
2. Groundwater System Planning & Management, R. Willes & W. W. G. Yeh, Prentice Hall.
3. Applied Hydro-geology by C. W. Fetta, CBS Publishers & Distributers.
4. Ground water assessment, development and management by K.R. Karanth, Tata Mc- Graw Hill.



# TKR COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING - R18

### AIR AND NOISE POLLUTION - B17PE3

B.Tech. VII SEMESTER

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

#### **COURSE OBJECTIVE:**

1. To introduce the students to the basics of air pollution, current air pollution issues, principles, concepts,
2. To understand methods adopted in the air quality management.
3. To provide an introduction to design principles and their applications in design of air pollution control system.

#### **COURSE OUTCOME:**

1. An understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
2. Ability to identify, formulate and solve air and noise pollution problems
3. Ability to design stacks and particulate air pollution control devices to meet applicable laws.

#### **UNIT – I:**

##### **INTRODUCTION:**

Definition – Classification and Characterization of Air Pollutants, Emission Sources, Behavior and Fate of air Pollutants, Chemical Reactions in the Atmosphere, Photo-chemical Smog, Coal-induced smog, Air Pollution Inventories.

#### **UNIT – II:**

##### **EFFECTS AND METEOROLOGY OF AIR POLLUTION:**

Effect of air pollution, specific air pollutant ,effects on human health, animals and plants, effect on various structures, automobile pollution, effect of automobile pollution , Standards as per central pollution control board (CPCB). Introduction – Meteorological Variables, Primary and Secondary Lapse Rate, Inversions, Stability Conditions, Windrose, General Characteristics of Stack Plumes, Metrological Models.

#### **UNIT – III:**

##### **MANAGEMENT OF AIR POLLUTION AND CONTROL:**

Objectives of using control equipment, settling chambers, cyclone separators, multi - clones, scrubbers, bag filters, dust suppression systems electrostatics precipitators. Factors to be considered in Industrial Plant Location and Planning, Environmental Policy, Environmental Acts, Air Standards. Pollution Episodes – London Smog, Los Angeles Smog & Bhopal Gas Tragedy.

#### **UNIT – IV:**

##### **NOISE POLLUTION**

Noise pollution – sources, types of noise pollution, \_Industrial Noise, Transport Noise, Neighborhood noise, Effects of Noise pollution.

**UNIT – V:**  
**NOISE POLLUTION MANAGEMENT**

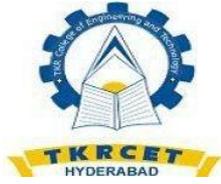
Control measures: source control: transmission path intervention: receptor control Preventive measures, measurement units, Environmental Policy, Environmental Acts, Noise Pollution Standards.

**TEXT BOOKS**

1. C. S. Rao, “Environmental Pollution Control Engineering”, Wiley Eastern Limited, 2000.
2. M. N. Rao, H. V. N. Rao, Air Pollution, Tata McGraw Hill Pvt Ltd, New Delhi, 1993
3. Dr. Y. Anjaneyulu, “Air Pollution And Control Technologies”, Allied Publishers Pvt. Ltd., 2002.

**REFERENCE BOOKS**

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.
2. Air Pollution and Control by K.V.S.G. Murali Krishna, Kousal & Co. Publications, New Delhi.
3. Environmental meteorology by S. Padmanabham Murthy , I.K. Internationals Pvt Ltd, New Delhi



# TKR COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING - R18

### ENVIRONMENTAL IMPACT ASSESSMENT - B17PE3

B.Tech. VII SEMESTER

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

#### **COURSE OBJECTIVE:**

1. To make the students conversant Impacts of Development on Environment
2. To understand the Frame work of Impact Assessment and its determination
3. To expose the students to understand the design of Environmental Monitoring Plan
4. To provide adequate knowledge about the Baseline monitoring of Socio economic environment and Social impacts of developmental projects.

#### **COURSE OUTCOMES:**

1. To Understand environmental problems arising due to engineering and technological activities and the science behind those problems
2. To Analyse and mitigate the environmental and social impacts of developmental projects.
3. To apply EIA standards for Social impacts of developmental projects
4. To evaluate a suitable method for Mathematical models for Impact prediction

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

##### **Introduction**

Impacts of Development on Environment – Rio Principles of Sustainable Development- Environmental Impact Assessment (EIA) –Need for EIA Studies – EIA Types– EIA in project cycle –EIA Notification and Legal Framework–Stakeholders and their Role in EIA– Selection & Registration Criteria for EIA Consultants – Screening and Scoping in EIA – Development Activity and Ecological Factors EIA, Rapid and Comprehensive EIA, EIS, FONSI .

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

##### **Environmental Impact Assessment**

Frame work of Impact Assessment -Baseline monitoring- Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods Mathematical models for Impact prediction – Analysis of alternatives

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

##### **Environmental Management Plan**

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna– Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Environmental Clearance – Environmental Audit.

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

##### **Socio Economic Assessment**

Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts Cost benefit Analysis- Public Consultation.

## **UNIT-V:**

### **Case Studies**

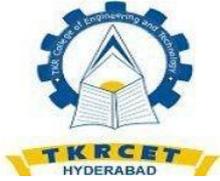
EIA case studies pertaining to Infrastructure Projects – Real Estate Development Highway projects – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – Wastewater Treatment Plants- Waste Processing and Disposal facilities Mining Projects-Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant Construction Activities.

### **TEXT BOOKS**

1. Environmental Impact Analysis-Jain R.K.-Van Nostrand ReinholdCo.
2. Environment Impact Assessment.- Anjaneyalu. Y.
3. Environment Impact Assessment - Larry W. Canter – McGraw Hill Publication.

### **REFERENCE BOOKS**

1. Environmental Science and Engineering, by Suresh K. Dhaneja –S.K.,Katari & Sons Publication., New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi
3. Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
4. Environmental Science and Engineering, by J. Glynn and Gary W.Hein Ke – Prentice Hall Publishers.
5. EIA Notifications – 2006 of Government of India
6. EIA Manuals Prepared by IL & FS



# TKRC COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### SOLID AND HAZARDOUS WASTE MANAGEMENT - B17PE3

B.Tech. VII SEMESTER

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

#### PRE-REQUISITES:

Environmental science and Engineering, Environmental Engineering II

#### COURSE OBJECTIVES:

1. To understand the concepts of solid waste types, impacts, issues collection, separation, transportation and disposal.
2. To learn the methods of waste collection and transfer of hazardous and e- wastes.
3. Ability to design the operation of landfills.
4. Ability to gain knowledge about alternate technology and create novel idea for proper disposal of plastic waste.

#### COURSE OUTCOMES:

1. To Understand environmental problems arising due to improper disposal of solid waste
2. To Analyse and mitigate the environmental issues due to hazardous waste management.
3. To apply standard methods for collection handling and safe disposal of biomedical and E-waste
4. To know the appropriate method for solid waste collection, transportation, redistribution and disposal.
5. To evaluate a alternate technology reduce the impact of solid waste in the Environment

#### UNIT-I:

##### Introduction

Definition of solid waste – type of solid wastes – sources of solid wastes – Generation of solid waste; characteristics – methods of sampling and characterization – impact on environmental health – elements of SWM – Municipal solid waste (M&H) rules – Public awareness. On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian.

#### UNIT-II:

##### Municipal Solid Waste Management

Source-types-composition-Estimation of physical, chemical Characteristics- conditions – Collection of solid wastes – analysis of collection system – alternative collection system – separation of solid waste –material recovery–Type of vehicles – collection route – transfer and transport - transfer station – selection of location Dumping of solid waste, landfills and sanitary landfills–Leachate collection & treatment– site selection and design operation. Energy recovery –incineration, composting, pyrolysis.

### **UNIT-III:**

#### **Hazardous Waste Management**

Definition of hazardous waste – Characteristics of HW – different type of Hazardous wastes - -TCLP tests-Storage, labelling and handling of hazardous wastes - Effects of improper management Hazardous wastes regulation - Hazardous wastes minimization – labeling and handling of Hazardous wastes - – Treatment and disposal of Hazardous wastes –Hazardous waste management in India. -Remediation of Hazardous Landfill sites.

### **UNIT-IV:**

#### **Biomedical and Radioactive Wastes Management**

Biomedical waste Classification, collection, segregation treatment and disposal - Radioactive wastes- definition-low level and high level radioactive wastes and their management, radiation standards.

### **UNIT-V:**

#### **E-Waste and Plastic Waste Management**

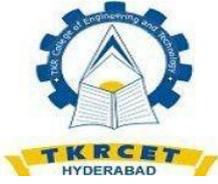
Waste characteristics, generation, collection, transport and disposal, regulatory aspects of E-waste, global strategy, recycling- plastic waste, its Disposal and Utilization- environmental issues and challenges- novel idea to utilize thick plastic bags.

### **TEXT BOOKS:**

1. George Tchobanoglous and Frank Kreith (2002). Handbook of Solid wastes Management, Mc GrawHill , New York.
2. Billitewski, Bernd ,Hardtle, Georg, Marek , Klaus, “ Waste Management”, Springer, 1994.

### **REFERENCE BOOKS**

1. “Manual on Municipal Solid Waste Management”, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
2. George Tchobanoglous and Frank Kreith "Handbook of Solidwaste Management", McGraw Hill, New York, 2002
3. Design of landfills and integrated solid waste management by A. Bagchi. John Wiley and sons.
4. Information on common Hazardous Waste Treatment, Storage and Disposal Facilities from CPCB, GoI.



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

## B.TECH. CIVIL ENGINEERING -R18

### REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM - B17PE4

B.Tech. VII SEMESTER

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

#### COURSE OBJECTIVES:

1. Remember the concepts of Photogrammetry and its applications such as determination of heights of objects on terrain.
2. Understand the basic concept of Remote Sensing and know about different types of satellites and sensors.
3. Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and top sheet maps.
4. Understand different components and stages of GIS and learning about map projection and coordinate system.

#### COURSE OUTCOMES:

1. After completing this course the student will be able to
2. Understand the concepts and principles of Aerial Photogrammetry and Compute heights of the objects using relief displacement and parallax.
3. Understand the principles and basic concept of remote sensing and GIS and its applications; know different types of data representations in GIS.
4. Understand the map projections and coordinates systems.
5. Understand the application of vector and raster data structures to the real world.
6. Understand the importance of source map and on screen digitization.

#### UNIT-I:

**Introduction to Photogrammetry:** Principles & types of aerial photographs, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, height measurement based on relief displacement, fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

#### UNIT-II:

**Remote Sensing:** Basic concept of remote sensing, Data and Information, Remote sensing data collection, remote sensing advantages & limitations, Remote Sensing process. Electro-magnetic spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors, their characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

#### UNIT-III:

**Geographic Information Systems:** Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data, Attribute data - Joining Spatial and Attribute data; GIS Operations: Spatial Data Input - Attribute data Management - Data display - Data Exploration - Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections - Map projection parameters - Commonly used Map Projections - Projected coordinate Systems

## **UNIT-IV:**

**Vector Data Model:** Representation of simple features - Topology and its importance; coverage and its data structure, Shape file; Data models for composite features; Object Based Vector Data Model; Classes and their Relationships; The geobase data model; Geometric representation of Spatial Feature and data structure, Topology rules.

## **UNIT-V:**

**Raster Data Model:** Elements of the Raster data model, types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

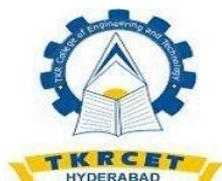
**Data Input:** Metadata, Conversion of Existing data, Creating new data; Remote Sensing data, Field data; Text data; Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing. Demonstration of GIS Software

## **TEXT BOOKS**

1. Remote Sensing of the Environment - An Earth Resource perspective by John R. Jensen, Pearson Education.
2. Introduction to Geographic Information System by Kang-Tsung Chang, Tata Mc-Graw Hill

## **REFERENCES BOOKS**

1. Concepts & Techniques of GIS by C.P. Lo Albert, K.W. Young, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M. Anji Reddy.
3. Principals of Geo physical Information Systems by Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers.
4. Basics of Remote Sensing & GIS by S. Kumar, Laxmi Publications.



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

## B.TECH. CIVIL ENGINEERING - R18

### TRAFFIC ENGINEERING & MANAGEMENT - B18PE1

B.Tech. VIII Semester

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

#### RE-REQUISITES:

Transportation Engineering

#### COURSE OBJECTIVES:

1. To give an overview of traffic engineering, traffic regulation, management and traffic safety with integrated approach in Traffic planning as well.
2. To give basic knowledge about the traffic studies and issues.
3. To solve traffic related problems.

#### COURSE OUTCOMES:

On Completing this course, the students will be able to

1. Analysis Traffic Problems and Plan For Traffic Systems Various Uses
2. Design Channels, Intersections, Signals and Parking Arrangements
3. Students will be able to study about the traffic and congestions.
4. Implement traffic regulations and control measures at intersections.
5. To minimize the road accident rate by using traffic monitoring systems.
6. To facilitate good parking facilities.
7. Develop Traffic Management Systems.

#### UNIT-I:

**Traffic Characteristics Measurement and Analysis:** Basic traffic Characteristics - Speed, Volume and Concentration. Relationship between Flow, Speed and Concentration. Traffic Measurement and Analysis - Volume Studies - Objectives, Methods; Speed studies - Objectives, Definition of Spot Speed, time mean speed and space mean speed; Methods of conducting speed studies; Presentation of speed study data; Head ways and Gaps; Critical Gap; Gap acceptance studies.

#### UNIT-II:

**Highway Capacity and Level of Service:** Basic definitions related to capacity; Level of service concept; Factors affecting capacity and level of service; Computation of capacity and level of service for two lane highways, Multilane highways and freeways.

#### UNIT-III:

**Parking Analysis and Traffic Safety:** Types of parking facilities - On-street parking and Off-street Parking facilities; Parking studies and analysis- Parking Inventory Study, Parking Usage Study By Patrolling, Questionnaire Survey, Cordon Surveys; Evaluation of parking parameters; Parking accumulation, Parking Load, Parking Turnover, Parking Index, Parking Volume. Traffic Safety - Accident studies and analysis; Causes of accidents - The Road, The vehicle, the road user and the Environment; Engineering, Enforcement and Education

measures for the prevention of accidents.

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

**Traffic Control, Regulation Signal Coordination:** Traffic Signals - Types of Signals; Principles of Phasing; Timing Diagram; Design of Isolated Traffic Signal by Webster method, Warrants for signalization. Signal Coordination - Signal Coordination methods, Simultaneous, Alternate, Simple progression and Flexible progression Systems.

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

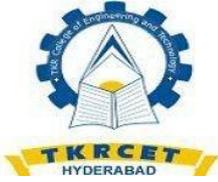
**Traffic Management:** Area Traffic Management System - Traffic System Management (TSM) With IRC Standards - Traffic Regulatory Measures - Travel Demand Management (TDM) - Direct And Indirect Methods - Congestion And Parking Pricing - All Segregation Methods - Coordination Among Different Agencies - Intelligent Transport System For Traffic Management, Enforcement And Education.

#### **TEXT BOOKS**

1. Traffic Engineering and Transportation Planning by L.R. Kadiyali, Khanna Publishers.
2. Traffic Engineering - Theory & Practice by Louis J. Pignataro, Prentice Hall Publications.
3. Traffic Management Planning, Operations and Control by John E Tyworth, Addison Wesley Publishing Company.

#### **REFERENCE BOOKS**

1. Fundamentals of Transportation Engineering by C.S. Papacostas, Prentice Hall India.
2. Principles of Highways Engineering and Traffic Analysis by Fred Mannering & Walter Kilareski, John Wiley & Sons Publications.
3. Transportation Engineering-An Introduction by C. Jotin Khisty, Prentice Hall Publications.



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

## B.TECH. CIVIL ENGINEERING - R18

### RAILWAY ENGINEERING - B18PE1

B.Tech.VIII Semester

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

#### **COURSE OBJECTIVES:**

1. To make students understand about the concept of railway infrastructure
2. Be able to give plan and design railway components.
3. To ensure the reliable and safe operations of signaling system.

#### **COURSE OUTCOMES:**

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

1. Understand the importance of railway infrastructure planning and design.
2. Identify the factors governing design of railway infrastructures.
3. Maintenance of the railway track and signal system for safe operations of railways.
4. Safe installation and operations of railway track and signalling system.
5. Maintenance of the railway track and infrastructure.

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

##### **Introduction to Railways**

Planning of railway lines network Railways operational system, historical background of Indian railways, plans and developments, traffic forecast and surveys, railway alignment, project appraisal and organization setup.

#### **UNIT –II:**

##### **Component of railway**

Permanent way, forces acting, rails, function of rails, rail fixtures and fastenings, sleepers and ballast, rail joints, elements of junctions and layouts, types of traction, locomotives and other rolling stock, brake systems, resistance due to friction, wave action, wind, gradient, curvature, starting, tractive effort of a locomotive, hauling power of a locomotive.

#### **UNIT –III:**

##### **Geometric design of railway track:**

Right of way and formation, field investigation, geometric design elements, safe speed on curves, speeds computation, string lining of curves, gradients, grade compensation, railway cant and cant deficiency, traction.

**Track construction and maintenance:** Special considerations and construction practices, track laying, inspection and maintenance, maintenance tools, maintenance of rail surface, track drainage, track circuited lengths, track tolerances, mechanized method, off-track tampers, shovel packing, ballast confinement and directed track maintenance, bridge maintenance, renewal, classification of renewal works, through sleeper renewals, mechanized relaying, track renewal trains.

## **UNIT – IV:**

### **Signaling and interlocking:**

Objectives, classification, fixed signals, stop signals, signaling systems, mechanical signaling system, electrical signaling system, systems for controlling train movement, interlocking, modern signaling installations.

## **UNIT – V:**

### **Railway accidents and safety:**

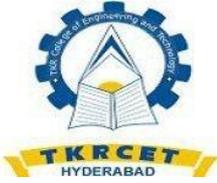
Train accidents, collision and derailments and their causes, restoration of traffic, safety measures, disaster management, classification of level crossings, accidents at level crossings, remedial measures, maintenance of level crossings.

## **TEXTBOOKS**

1. Satish Chandra and M. Agrawal, Railway Engineering, Second Edition, Oxford University Press.
2. S.C. Saxena and S.P. Arora, A textbook of Railway engineering, Sixth Edition, Dhanpat Rai Publications.
3. J.S. Mundrey, Railway Track Engineering, Fourth Edition, Tata McGraw-Hill Education Private Limited, New Delhi.

## **REFERENCE BOOKS**

1. Clifford F. Bonnett, Practical Railway Engineering, 2nd Edition, Imperial College Press, London.
2. Gupta, B.L. and Amit Gupta, Railway Engineering, Third Edition, Standard Publishers, New Delhi, India.
3. Rangwala, S.C. Railway Engineering, Charotar Publishing House, Anand, India.



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

## B.TECH. CIVIL ENGINEERING - R18

### PAVEMENT DESIGN, CONSTRUCTION AND MAINTENANCE - B18PE1

B.Tech. VIII Semester

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

#### PRE-REQUISITES:

Transportation Engineering, Traffic Engineering

#### COURSE OBJECTIVES:

1. To give an overview of various components of pavements.
2. To have knowledge on properties and usage of pavement materials.
3. To gain knowledge on various IRC guidelines for designing rigid and flexible pavements.
4. Further, he/she will be in a position to assess quality and serviceability conditions of roads.

#### COURSE OUTCOMES:

After the completion of the course, students will be able to

1. Understand various factors and stresses in pavements.
2. Know the properties of different materials used in pavements.
3. To design flexible and rigid pavements based on IRC guidelines.
4. Further they know various techniques to evaluate performance of pavements.
5. Maintenance of pavements based on environmental impacts.

#### UNIT – I:

**Factors Affecting Pavement Design:** Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESAL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

#### UNIT – II:

**Stresses in Flexible and Rigid Pavements:** Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements. Stress In Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts. Stresses In Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars

#### UNIT – III:

**Material Characteristics:** CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes,

Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics.

#### **UNIT – IV:**

**Design of Pavements:** Introduction of Flexible Pavements, Rigid Pavement. Pavement Components and Functions; Design of Flexible Pavements, Rigid Pavements as per IRC; Stresses in Rigid & Flexible Pavements; Strengthening of Pavement; Problems.

#### **UNIT – V:**

**Pavement Maintenance and Quality Control:** Causes of Deterioration, Traffic and Environmental Factors, Methods of Maintaining WBM, Bitumen and Cement Concrete Roads, Quality Assurance; Quality Control – ISO 9000.

#### **TEXTBOOKS**

1. A text book of Highway Engineering, R. Srinivasa Kumar, Universities Press.
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc.

#### **REFERENCE BOOKS**

1. Principles of Pavement Design, Yoder.J. & Witzorac Mathew, W. John Wiley & Sons Inc.
2. Principles and practice of Highway Engineering, L.R. Kadiyali and N.B. Lal, Khanna Publications.
3. IRC Codes for Flexible and Rigid Pavements design.



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

## B.TECH. CIVIL ENGINEERING -R18

### CONSTRUCTION PROJECT PLANNING & MANAGEMENT - B18PE2

B.Tech. VIII Semester

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

#### **COURSE OBJECTIVES:**

1. To learn the fundamental significance of Construction Project planning.
2. To know about the functions of construction management and network techniques.
3. To study about the resource management and schedule of construction.
4. To study about the contract and Tender information.
5. To know about the Labour administration, safety measures.

#### **COURSE OUTCOMES:**

Students will be able to

1. Understand the Process of planning and management.
2. Understand the construction stages and network techniques.
3. Apply the concept of resource planning scheduling.
4. Formulate and execute various contract documents and tenders.
5. Understand the labour safety and financial aspects of accidents.

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

Introduction to construction project planning and management, Management Process - Roles. Management theories. Social responsibilities. Planning and strategic management. Strategy implementation. Decision making, tools and techniques - Organizational structure, Human resource management - motivation performance - leadership.

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

Classification of construction projects, Construction stages, Resources - Functions of construction management and its applications. Preliminary planning - Collection of data - Contract planning - Scientific methods of management, Network technique in construction management - Bar chart, Ghant chart, CPM & PERT - Cost & Time optimization.

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

Resource planning - Planning for manpower, material, costs, equipment, Class of Labour, Labour productivity, Classification of construction equipment - Scheduling. Forms of scheduling - Resources allocation, Budget and budgetary control methods.

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

Contract - types of contract, contract document, Specification, Important conditions of contract - Tender and tender document - Deposits by the contractor - Arbitration, negotiation - M Book - Muster roll stores.

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

Management Information System - Labour regulations; Social security - Welfare legislation - Law relating to wages, Bonus and industrial disputes, Labour administration - Insurance and safety regulations - Workmen's compensation act - other labour laws - safety in

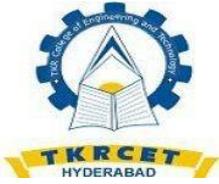
construction; legal and financial aspects of accidents in construction, occupational and safety hazard assessment.

### **TEXT BOOK**

1. Construction project Management by Kumar Neeraj Jha, Pearson publications.
2. Project Planning and Control with PERT and CPM by Punmia B. C, Laxmi publications.
3. Construction Project Management, Planning, Scheduling and Control, K.K. Chitkara, Tata Mc-Graw Hill.
4. PERT and CPM Principles and Applications by L.S. Srinath, Affiliated East West Press.

### **REFERENCE BOOKS**

1. Construction Planning, Equipment and Methods by Robert Peurifoy, Mc Graw Hill.
2. Project Management for Construction - Fundamentals by Chris Hendrickson and Tung Au.
3. Scheduling Construction Projects”, Willis. E.M., John Wiley and Sons.
4. Financial and Cost Concepts for Construction Management by Halpin D.W., John Wiley and Sons.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

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

**BRIDGE ENGINEERING (PE-VI) - B18PE2**

**B.Tech. VIII Semester**

**L/T/P/C**

**3/1/0/3**

## **COURSE OBJECTIVES:**

The objective of this course is to

1. Introduce the theory and application of analysis and design of reinforced concrete and steel bridges.
2. Designing and understanding the structural behaviour of reinforced concrete and steel components of highway and railway bridges subjected to static and dynamic loads.
3. To carry out a design of bridge starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements.

## **COURSE OUTCOMES:**

After learning the course the students should be able to

1. To develop an understanding of and appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
2. Understand the load-carrying capacity of various types of bridges with different kinds of loads.
3. To understand and appreciate significance of mechanical engineering in different Fields of engineering.
4. To carry out a design of bridge starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements
5. To understand the load flow mechanism and identify loads on bridges.

## **UNIT-I:**

Introduction - Types of bridges, economic spans, aesthetics, selection of suitable type of bridges.

## **UNIT-II:**

Design loads and their distribution, IRC loads, railway loading, analysis of deck slab and IRC loads, load distribution among longitudinal beams of a bridge.

## **UNIT-III:**

Design of superstructures - Design of balanced cantilever concrete bridge, introduction to design of RC arch bridge, pre-stressed concrete and box Girder Bridge. Design of lattice girder Railway Bridge.

## **UNIT-IV:**

Design of substructure - Different types of foundations, their choice and method of construction, design of well foundation, design of piers and abutments, various types of bearings and their design.

## **UNIT-V:**

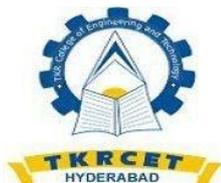
Construction methods - Erection of bridge superstructures, cantilever construction.

### **TEXT BOOKS**

1. Essentials of Bridge Engineering, Victor D J, Oxford & IBH
2. Design of Bridges, Raju N K Oxford & IBH
3. Bridge Engineering, Ponnuswamy S Tata McGraw Hill
4. Concrete Bridge Practice, Raina V K, Tata McGraw Hill

### **REFERENCE BOOKS**

1. IRC 6,22,24-2014 :Standard Specifications and Code of Practice for Road Bridges
2. IRC 112-2011 : Code of Practice for Concrete RoadBridges
3. IS:456-2000 Plain and Reinforced Concrete- Code practice
4. Design of Concrete Bridges by M.G. Aswani and V.N. Vazirani and MM Ratwani
5. Bridge Deck Behavior by EC Hambly.
6. Design of Bridges by VV Sastry, Dhanpat Rai & Co.
7. Concrete Bridge Design and Practice by VK Raina



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

## B.TECH. CIVIL ENGINEERING - R18

### REHABILITATION AND RETROFITTING - B18PE2

B.Tech. VIII Semester

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

#### **COURSE OBJECTIVES:**

To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

#### **COURSE OUTCOMES:**

1. Understand the causes and prevention deterioration of structures.
2. Interpret the types of damages and understand their mechanism.
3. Categorize the causes and prevention of corrosion in steel Reinforcement and fire induced damages
4. Examine to inspect and assess the structures using techniques of visual inspection and NDT.
5. Make use of the latest health monitoring and building instrumentation methods.

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

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage.

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

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation. Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

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

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT. Maintenance, repair and rehabilitation- Facets of Maintenance, importance of Maintenance various aspects of Inspection.

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

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

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

Health Monitoring of Structures– Use of Sensors Building Instrumentation. Engineered demolition techniques for dilapidated structures - case studies

#### **TEXT BOOKS**

1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
2. Concrete Technology by A.R. Santakumar, Oxford University press.
3. Maintenance, Repair and Rehabilitation and Minor works of Buildings by PC. Varghese. PHI Learning

## **REFERENCE BOOKS**

1. Defects and Deterioration in Buildings, EF & N Spon, London.
2. Non-Destructive Evaluation of Concrete Structures by Bungey - Surrey University Press.
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981).
4. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).