



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

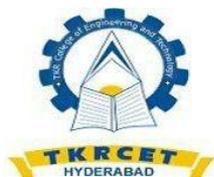
### COURSE STRUCTURE & SYLLABUS

#### B. Tech. III Semester

Sl. No	Course Code	Course title	L	T	P	Credits
1	B13PC1	Building Materials, Construction & Planning	2	1	0	2
2	B13PC2	Surveying & Geomatics	3	1	0	3
3	B13PC3	Strength of Materials -I	3	1	0	3
4	B13PC4	Fluid Mechanics	3	1	0	3
5	BBSM3	Probability & Statistics	3	0	0	3
6	B13PC6	Surveying Lab-I	0	0	3	1.5
7	B13PC7	Strength of Materials Lab	0	0	3	1.5
8	B13PC8	Computer Aided Design Lab-II	0	0	3	1.5
<b>Total credits</b>						<b>18.5</b>

#### B. Tech. IV Semester

Sl. No	Course Code	Course title	L	T	P	Credits
1	B14PC1	Engineering Geology	2	1	0	2
2	B14PC2	Strength of Materials –II	3	1	0	3
3	B14PC3	Hydraulics & Hydraulic Machinery	3	1	0	3
4	B14PC4	Structural Analysis -I	3	1	0	3
5	B14PC5	Soil Mechanics	3	1	0	3
6	BBSM6	Numerical Methods	2	1	0	2
7	B14PC7	Surveying Lab-II	0	0	3	1.5
8	B14PC8	Fluid Mechanics Lab	0	0	3	1.5
9	B14PC9	Engineering Geology Lab	0	0	3	1.5
<b>Total Credits</b>						<b>20.5</b>



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

**BUILDINGS MATERIALS, CONSTRUCTION & PLANNING -B13PC1**

**B.Tech. III Semester**

**L/T/P/C**

**2/1/0/2**

**COURSE OBJECTIVES:**

To give the students a basic idea about the construction Materials, building components and to introduce various.

**COURSE OUTCOMES:**

At the end of the course student will be able to

1. Identify various building materials required for good quality construction & better planning.
2. Have the knowledge of construction methodology, materials and its planning
3. Know the functional design of various elements such as arches, lintels, floors, stairs, doors & windows
4. Have the complete knowledge of form work and plastering.
5. Get the innovative methods of construction by using the latest technology

**UNIT – I:**

**Stones, Bricks, Tiles and Sand :**

Building stones – classifications and quarrying – properties

– Structural requirements – dressing – Sand and M-Sand

Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics.

**Timber, Aluminum, Glass, Paints and Plastics:** Wood - structure – types and properties – seasoning – defects; alternate materials for Timber – GI / fibre – reinforced glass bricks, steel & aluminum, Plastics.

**UNIT – II:**

**Cement & Admixtures:** Ingredients of cement – manufacture – Chemical composition

– Hydration - field & lab tests.

Admixtures – mineral & chemical admixtures – uses.

**UNIT – III:**

**Building Components:**

Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed ; foundations – types ; Damp Proof Course ; Joinery – doors – windows – materials – types.

**Building Services:** Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Harzards – Classification of fire resistant materials and constructions.

#### **UNIT – IV:**

##### **Concrete, Mortars, Masonry and Finishing's**

**Concrete:** Plain, reinforced and steel fiber reinforced, light-weight concrete, high performance concrete, and polymer concrete.

**Mortars:** Lime and Cement Mortars

Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick- stone composite; Concrete, Reinforced brick.

**Finishers:** Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP. **Form work:**

**Types:** Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

#### **UNIT – V:**

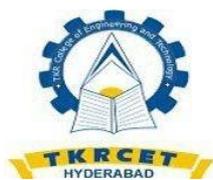
**Building Planning:** Principles of Building Planning, Classification of buildings and Building by laws.

#### **TEXT BOOKS**

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
2. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi.
3. Building Materials by P. C. Varghese, Prentice Hall India Learning Pvt Ltd.

#### **REFERENCES**

1. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
2. Building Materials by Duggal, New Age International.
3. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
4. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.
5. Engineering Materials by S.C.Rangwala, Charotar Publishing House Pvt.Ltd.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

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## B.TECH. CIVIL ENGINEERING -R18

### SURVEYING & GEOMATICS - B13PC2

**B.Tech. III Semester**

**L/T/P/C**

**3/1/0/3**

#### **COURSE OBJECTIVES:**

The first step in engineering practice is surveying and the soundness of any civil engineering work is dependent on the reliability and accuracy of surveying. Therefore, it is imperative that a student of engineering should have good knowledge of surveying. To impart the knowledge of surveying and latest technologies in surveying it is necessary to introduce this subject in the curriculum.

#### **COURSE OUTCOMES:**

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

1. Calculate angles, distances and levels and Identify data collection methods and prepare field notes.
2. To Understand the working principles of survey instruments and Estimate measurement errors and apply corrections
3. Ability to measure horizontal, vertical, and zenith angles with a transit, theodolite, total station or survey grade Global Navigation Satellite System (GNSS) instruments.
4. Ability to Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.

#### **UNIT – I:**

**Introduction and Basic Concepts:** Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

#### **Measurement of Distances and Directions**

**Linear distances-** Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.

**Prismatic Compass-** Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

#### **UNIT – II:**

##### **Levelling and Contouring**

**Leveling-** Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

**Contouring-** Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

##### **Computation of Areas and Volumes**

**Areas -** Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

**Volumes -** Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits,

capacity of reservoirs.

### **UNIT – III:**

**Theodolite Surveying:** Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

**Traversing:** Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

### **UNIT – IV:**

**Tacheometric Surveying:** Principles of Tacheometry, stadia and tangential methods of Tacheometry.

**Curves:** Types of curves and their necessity, elements of simple curve, setting out of simple Curves, Introduction to compound curves.

### **UNIT – V:**

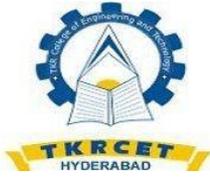
**Modern Surveying Methods:** Total Station and Global Positioning System. : Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

### **TEXT BOOKS**

1. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
2. Surveying (Vol – 1 & 2), by Duggal S K, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
3. Surveying (Vol-1 & 2), by K.R. Arora, Rajson's Publications.

### **REFERENCES**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000.
2. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
3. Surveying by Bhavikatti; Vikas publishing house ltd.
4. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
5. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
6. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer - Verlag Publishers, 2001.
7. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
8. Advanced Surveying, Madhu & Gobi, Pearson India
9. Geomatics Engineering, Arora & Badjatia, Nem Chand & Co.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

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## B.TECH. CIVIL ENGINEERING -R18

### STRENGTH OF MATERIALS-I - B13PC3

B.Tech. III Semester

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

#### PRE REQUISITES:

1. Concepts of Engineering Physics and Mathematics.
2. Elements of Engineering Mechanics.
3. Analytical and Creative thinking.

#### COURSE OBJECTIVES:

The subject provides the knowledge on concepts of simple stresses, strains, flexural stresses, shear stresses and deformations in structural members so that the concepts can be applied to the Engineering problems for determining the strength, stiffness and stability of the various members in a structural system.

#### COURSE OUTCOMES:

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

1. Analyze the statically determinate structures.
2. Determine the stresses and strains in the members subjected to axial forces and bending forces.
3. Evaluate shear forces and bending moments.
4. Evaluate the slope and deflection of beams subjected to loads.
5. Determine the principal planes, stresses and strains in structural members.

#### UNIT – I:

##### Simple Stresses and Strains:

Concept of stress and strain, St. Venant's principle - Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-Strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic Moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Elastic constants.

**Strain Energy** – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

#### UNIT – II:

##### Shear Force and Bending Moment:

Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads, moments and combination of these loads – Point of contra flexure – Relation between SF, BM and Rate of Loading at a section of a beam.

### UNIT – III:

**Flexural Stresses:** Theory of simple bending – Assumptions – Derivation of bending equation:  $M = f \cdot E \cdot I$  - Neutral axis – Determination of bending stresses – Section modulus  $I_{xx}$  &  $I_{yy}$

of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

**Shear Stresses:** Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and Angle sections.

### UNIT – IV:

#### Deflection of Beams:

Bending of a member into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, UDL, Uniformly varying load – Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

Conjugate Beam Method: Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

### UNIT – V:

#### Principal Stresses and Strains:

Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

Theories of Failure: Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum Shear Stress Theory - Maximum Strain Energy Theory and Maximum Shear Strain Energy Theory.

### TEXT BOOKS

1. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
2. Strength of Materials by R. Subramanian, Oxford University Press.
3. Strength of Materials by S. S. Bhavikatti, S. Chand Publications.
4. Strength of Materials by R. K. Rajput, S. Chand Publications.

### REFERENCE BOOKS

1. Mechanics of Structures Vol –I by H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.
2. Strength of Materials by R. S. Khurmi, Vikas Publishing House Pvt. Ltd.
3. Strength of Materials by S. S. Rattan, McGraw Hill Education Pvt. Ltd.
4. Strength of Materials and Structures by John Case *et al.*, Butterworth-Heinemann.
5. Strength of Materials by Dr. Sadhu Singh, Khanna Publishers, 11<sup>th</sup> edition - 2015.
6. Strength of Materials by W. A. Nash, MC Graw Hills 2014 6<sup>th</sup> edition.

7. Mechanics of Materials by James M. Gere and Barry J Goodno Cengage Learning India Pvt. Ltd Eight edition.
8. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.
9. Strength of Materials by D.S. Bedi, Khanna Publishings.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

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## B.TECH. CIVIL ENGINEERING -R18

### FLUID MECHANICS - B13PC4

B.Tech. III Semester

L/T/P/ C

3/1/0/ 3

#### PRE REQUISITES:

Engineering Mechanics

#### Course Objectives:

Students who take this class can expect to

1. Develop an appreciation for the properties of Newtonian fluids.
2. Study analytical solutions to variety of simplified problems.
3. Understand the dynamics of fluid flows and the governing non- dimensional parameters.
4. Apply concepts of mass, momentum and energy conservation to flows.
5. Grasp the basic ideas of turbulence.

#### COURSE OUTCOMES:

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

1. Apply conservation laws to derive governing equations of fluid flows.
2. Compute hydrostatic and hydrodynamic forces.
3. Analyze and design simple pipe systems.
4. Apply principles of dimensional analysis to design experiments.
5. Compute drag and lift coefficients.

#### UNIT – I:

**Introduction:** Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers. Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

#### UNIT – II:

**Buoyancy and floatation:** stability of bodies, Meta center, liquids in relative equilibrium.

**Fluid Kinematics:** Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, circulation and Vorticity.

#### UNIT – III:

**Fluid Dynamics and Measurement of Flow:** Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, (Navier – stokes equations (Explanatory) Momentum equation and its application – forces on pipe bend. Pitot tube, Venturi meter, and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs.

**UNIT – IV:**

**Closed Conduit Flow:** Reynold's experiment – Characteristics of Laminar & Turbulent flows. Laws of Fluid friction – Darcy's equation, variation of friction factor with Reynold's number, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Water hammer.

**UNIT – V:**

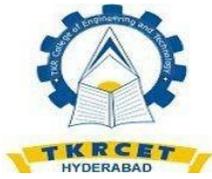
**Boundary Layer Theory:** Basic Concepts of Boundary Layer Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers (no derivations), separation of BL, control of BL, Drag and Lift- Magnus effect.

**TEXT BOOKS**

1. Hydraulic and Fluid Mechanics including Hydraulic Machines by Modi & Seth, Standard Book House, New Delhi.
2. Fluid Mechanics and Hydraulic Machines by RK.Bansal, Laxmi publications.

**REFERENCE BOOKS**

1. Fluid Mechanics by Dr. A. K. Jain Khanna Publishers, twelfth edition 2014
2. Mechanics of Fluids by Potter, M.C D.C Wiggers, B.H Ramdan Cengage, 2012.
3. Fluid Mechanics by J F Douglas, J M Gasiorek, J A Swaffield and L B Jack, Pearson 2015.
4. Fluid Mechanics and Fluid Machines by S.K.Som,Gautam Biswas and S.Chakraborty, McGraw Hill Education (India) Pvt. Ltd, New Delhi 2015.
5. Engineering Fluid Mechanics by K L Kumar, S Chand, Eurasia Publishing House, New Delhi, 2014.
6. Fluid Mechanics by F.M. White McGraw Hill Education (India) Pvt. Ltd, New Delhi, 2011



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

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## B.TECH. CIVIL ENGINEERING -R18

### PROBABILITY & STATISTICS - BBSM3

**B.Tech. III Semester**

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

#### **COURSE OBJECTIVES:**

1. The objective of this course is to familiarize the prospective engineers with statistical techniques
2. It aims to equip the students to deal with advanced level of mathematics and application that would be essential for their disciplines.
3. Random variables that describe randomness of an uncertainty in certain realistic situations.
4. Sampling Distributions of means- variance- Point Estimation and Interval Estimation.
5. The testing of Hypothesis.

#### **COURSE OUTCOMES:**

The students will learn:

1. The ideas of probability and random variables and various discrete and continuous probability distribution and their properties.
2. The basic ideas of statistics including correlation and regression.
3. The statistical methods of studying data sample.
4. Differentiate among many random variables involving the probability models which are quite useful for all branches of engineering.
5. To calculate Mean and Proportion and to make impotent decisions from few samples which are taken from unmanageable huge populations.

#### **UNIT I:**

##### **Random variables**

Discrete and continuous Random variables- properties- Expectation of discrete and continuous Random variables and Variance of a sum.

#### **UNIT II:**

##### **Probability Distributions**

Binomial- poisson and Normal-evaluation of statistical parameters for these three distributions and problems.

#### **UNIT III:**

##### **Basic statistics**

Correlation and regression- Rank correlation- Curve fitting by the method of least squares- fitting of straight lines- second degree parabolas- power and exponential curves.

#### **UNIT IV:**

##### **Testing of hypothesis – I**

Null and Alternative hypothesis- critical region and types of errors- Test of significance- Large sample test for single proportion- difference of proportions- single mean- difference of means.

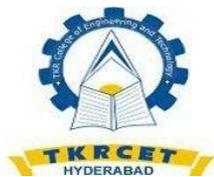
#### **UNIT V:**

##### **Testing of hypothesis – II**

Small samples Test for single mean- difference of two means- test for ratio of variances-Chi-square test for goodness of fit and independence of attributes.

#### **TEXT BOOKS**

1. Erwin Kreyszig- Advanced Engineering Mathematics- 9<sup>th</sup> Edition- John Wiley & Sons- 2006.
2. N.P. Bali and Manish Goyal- A text book of Engineering Mathematics- Laxmi Publications- Reprint-2010.
3. B.S. Grewal- Higher Engineering Mathematics- Khanna Publishers- 35<sup>th</sup> Edition- 2000.
4. S.Ross- A First Course in Probability- 6<sup>th</sup> Ed.- Pearson Education in India- 2002.
5. W.Feller- An introduction to probability theory and its applications- Vol.1- 3<sup>rd</sup> edition Wiley- 1968.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

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## B.TECH. CIVIL ENGINEERING - R18

### SURVEYING LAB-I - B13PC6

**B.Tech. III Semester**

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

**PRE REQUISITES:** Surveying Theory

#### **COURSE OBJECTIVES:**

To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

#### **COURSE OUTCOMES:**

At the end of the course, the student will be able to:  
Practically able to draw plans & maps to determine the areas before taking up any civil engineering works.

#### **LIST OF EXPERIMENTS:**

1. Surveying of an area by chain survey (closed traverse) & plotting.
2. Chaining across obstacles
3. Determine of distance between two inaccessible points with compass
4. Survey of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane table survey.
6. Two point and three point problems in plane table survey.
7. Levelling – Longitudinal and cross-section and plotting
8. Trigonometric leveling using theodolite by Base Accessible
9. Trigonometric leveling using theodolite by Base Inaccessible
10. Height and distances using principles of tacheometric surveying
11. Measurement of Horizontal angle & vertical angle.
12. Distance between inaccessible points by theodolite.

#### **REFERENCE BOOKS**

1. Elements of plane surveying by Arthur R Benton and Philip J Taety, McGraw Hill.
2. Plane Surveying by Chandra A. M, New Age International Pvt. Ltd., New Delhi.
3. Surveying by Bhavikatti, Vikas Publishing House Ltd.
4. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
5. Global Positioning System Theory and Practice by Hoffman.B, H. Lichtenegga & J. Collins, Springer - Verlag Publications
6. Surveying (volume 1,2 & 3) by Arora K R, Standard Book House New Delhi.
7. Advanced surveying by Madhu & Gobi, Pearson India.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

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## B.TECH. CIVIL ENGINEERING -R18 STRENGTH OF MATERIALS LAB - B13PC7

**B.Tech. III Semester**

**L/T/P/C**

**0/0/3/1.5**

### **COURSE OBJECTIVES:**

The objective of the course is to make the student understand the procedure for conducting various preliminary tests on materials to observe and measure their behaviour under different types of loading for different types of structures.

### **COURSE OUTCOMES:**

1. At the end of the course, the student will be able to:
2. Conduct tension test on Materials like steel etc.
3. Conduct compression tests on spring, wood and concrete
4. Conduct flexural and torsion tests to determine elastic constants
5. Determine hardness and impact strength of metals

### **LIST OF EXPERIMENTS:**

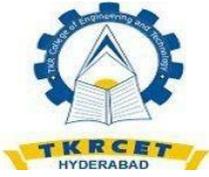
1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Charpy Impact test
9. Izod Impact Test
10. Shear test
11. Verification of Maxwell's Reciprocal theorem on beams.
12. Continuous beam – deflection test

### **EQUIPMENT REQUIRED:**

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Spring testing machine
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup

## **REFERENCE BOOKS**

1. Material Testing Laboratory manual by C B. Kukreja, K. Kishore, Ravi Chawala, Standard Publishers Distributors.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

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## B.TECH. CIVIL ENGINEERING -R18

### COMPUTER AIDED DESIGN LAB-II - B13PC8

**B.Tech. III Semester**

**L/T/P/ C**

**0/0/3/1.5**

#### **COURSE OBJECTIVES:**

To make students understand 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:

1. To understand and draw the 2D building drawing
2. To draw reinforcement detailing of various structural elements
3. Ability to use software and draw various steel structural members

#### **EXPERIMENTS:**

1. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone and dimensioning.
2. Drawing of plans of buildings using software
  - a) Single storey buildings
  - b) Multi storeyed buildings
3. Drawing sectional views of prism, pyramid, cylinder, and cone.
4. Developing sections and elevations for
  - a) Single storey buildings
  - b) Multi storied buildings
5. Drawing Orthographic projections of simple objects.
6. Drawing Isometric view of simple objects by orthographic views.
7. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software.
8. Different plans of one and two storeyed buildings.
9. Building with load bearing walls (flat and pitched roof) including details of doors and windows.
10. RCC framed structures.
11. Industrial buildings- North light roof structures – Trussess.
12. Exercises on development of working drawings of buildings.

#### **REFERENCE BOOKS**

1. Computer Aided Design Laboratory by M. N Sessa Prakash & Dr. G.S Servesh- Lakshmi Publications.
2. Engineering Graphics by PJ Sha – S. Chand. & CO



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

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## B.TECH. CIVIL ENGINEERING -R18 ENGINEERING GEOLOGY - B14PC1

**B.Tech. IV Semester**

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

### **COURSE OBJECTIVES:**

The objectives of this course is to give the basic knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and Environmental Geology which gives a complete picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.

### **COURSE OUTCOMES:**

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

1. Understand weathering process and mass movement
2. Distinguish geological formations
3. Identify geological structures and processes for rock mass quality
4. Identify subsurface information and groundwater potential sites through geophysical investigations
5. Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels

### **UNIT – I:**

#### **Introduction:**

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological drawbacks. Importance of Physical geology, Petrology and Structural geology. Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”.

### **UNIT – II:**

#### **Mineralogy:**

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

### **UNIT III:**

#### **Petrology**

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

## **UNIT– IV:**

### **Structural Geology:**

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types and case studies. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India,

Stabilization of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

### **Geological Hazards:**

Earth Quakes: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and landslides. Importance of Geophysical Studies: Principles of geophysical study by Electrical resistivity methods.

## **UNIT – V:**

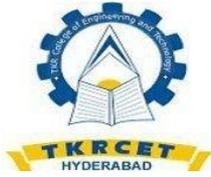
**Geology of Dams, Reservoirs, and Tunnels:** Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs – Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations in tunneling over break and lining in tunnels.

## **TEXT BOOKS**

1. Engineering Geology by N. Chennakesavulu, Trinity press.
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications.

## **REFERENCE BOOKS**

1. F.G. Bell, Fundamental of Engineering B.S. Publications, 2005.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution
3. Engineering Geology by Subinoy Gangopadhyay, Oxford universitypress.
4. Engineering Geology for Civil Engineers – P.C. Varghese PHI.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

## B.TECH. CIVIL ENGINEERING -R18 STRENGTH OF MATERIALS-II - B14PC2

B.Tech. IV Semester

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

### PRE REQUISITES:

1. Strength of Materials - I
2. Concepts of Engineering Physics and Mathematics.
3. Elements of Engineering Mechanics.
4. Analytical and Creative thinking.

### COURSE OBJECTIVES:

Study of the subject provides the understanding on concepts of Torsion in circular shafts & springs, columns, combined direct & bending stresses, basic analysis of cylinders and unsymmetrical bending so that the concepts can be applied to the Engineering problems for determining the strength, stiffness and stability of the various members in a structural system.

### COURSE OUTCOMES:

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

1. Determine stresses in the members subjected to Torsion
2. Analyze columns and struts
3. Understand the concept of direct and bending stresses
4. Analyze and design shafts, springs, thin and thick cylinders
5. Understand the concept of unsymmetrical bending.

### UNIT – I:

**Torsion of Circular Shafts:** Theory of pure torsion – Assumptions made in the theory of pure torsion – Derivation of Torsion equation:  $T = \frac{q}{r} = \frac{N\theta}{L}$  – Torsional moment of resistance

– Polar section modulus – Torsional Rigidity & Torsional Stiffness - Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

**Springs:** Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

### UNIT – II:

**Columns and Struts:** Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions – derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine-Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

**Beam Columns:** Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

### **UNIT – III:**

**Direct and Bending Stresses:** Stresses under the combined action of direct loading and bending moment, Kernel of a section – determination of stresses in the case of Dams, Retaining walls and Chimneys – conditions for stability – stresses due to direct loading and bending moment about both axis.

**Beams Curved In Plan:** Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semi-circular beam simply supported on three equally spaced supports.

### **UNIT – IV:**

**Thin Cylinders:** Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter and volume of thin cylinders – Thin spherical shells.

**Thick Cylinders:** Introduction - Lamé's theory for thick cylinders – Derivation of Lamé's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Shrink fit allowance – Thick spherical shells.

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### **UNIT – V:**

**Unsymmetrical Bending:** Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Deflection of beams under unsymmetrical bending.

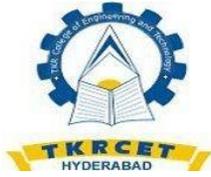
**Shear Centre:** Introduction - Shear centre for symmetrical and unsymmetrical (Channel, I, T and L) sections.

### **TEXT BOOKS**

1. Mechanics of Materials by Dr. B C Punmia, Er. A. K. Jain, Dr. Arun Kumar Jain, Laxmi Publication (P) Ltd.
2. Strength of Materials by B.S. Basavarajaiah, B.S. Mahadevappa, Universities Press..
3. Theory of Structures (SMTS-II)' by B.C. Punmai, Er. Ashok K. Jain, Dr. Arun K. Jain, Laxmi Publications.
4. Strength of Materials by R.K Rajput, S. Chand & CompanyLtd

### **REFERENCE BOOKS**

1. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.
2. Introduction to Strength of Materials by U. C. Jindal, Galgotia Publications.
3. Mechanics of Materials by R. C. Hibbeler, Pearson Education
4. Strength of Materials by S. S. Rattan, Tata McGraw Hill Education Pvt. Ltd.
5. Strength of Materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
6. Advanced Mechanics of Solids and Structures by N. Krishna Raju, D.R. GuruRaja, Narosa Publishing House.
7. Mechanics of Materials, Ferdinand P. Beer et al., Tata McGraw Hill.
8. Strength of Materials by R. Subramanian, Oxford University Press.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

## B.TECH. CIVIL ENGINEERING- R18

### HYDRAULICS & HYDRAULIC MACHINERY - B14PC3

**B.Tech. IV Semester**

L/T/P/C

3/1/0/3

**PRE REQUISITES:** Fluid Mechanics

#### **COURSE OBJECTIVES:**

To understand basic concept of fluid flow and its application to chemical process industries including pipe flow, fluid machinery and agitation & mixing.

#### **COURSE OUTCOMES:**

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

1. Understand the concepts of channel flows.
2. Compute flow profiles in channel transitions and analyze hydraulic transients
3. Understand the concepts of Hydrodynamic force of jets
4. Design the working proportions of hydraulic machines

#### **UNIT – I:**

**Open Channel Flow:** Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows. Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- for surface profiles -Rapidly varied flow, hydraulic jump, energy dissipation.

#### **UNIT – II:**

**Hydraulic Similitude:** Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations. Distorted and non-distorted models. Scale Effect.

#### **UNIT – III:**

**Hydrodynamic force of jets:** Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

#### **UNIT – IV:**

**Hydraulic Turbines:** Layout of a typical Hydropower installation – Heads and efficiencies-classification of turbines- pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency. Governing of turbines-surge tanks-unit and specific turbines- unit

speed, unit quantity, unit power, specific speed - performance characteristic curve.

#### **UNIT – V:**

**Centrifugal Pump:** installation details-classification-types work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed multistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-cavitation.

**Reciprocating pumps:** Basics, types, air vessels, slip  
Definition of terms – load factor, utilization factor, capacity factor.

#### **TEXT BOOKS**

1. Hydraulic and Fluid Mechanics including Hydraulic Machines by Modi & Seth, Standard Book House, New Delhi.
2. Fluid Mechanics and Hydraulic Machines by R.K Bansal, Laxmi Publications
3. Fluid Mechanics by Dr. A. K. Jain Khanna Publishers 2016.

#### **REFERENCE BOOKS**

1. Flow in Open channel flow by Ranga Raju, McGraw Hill Education(India) Pvt Ltd, 2013
2. Flow Through Open Channels by Rajesh Srivastava, Oxford University Press, 2011
3. Open Channel flow by K. Subramanya, Tata McGraw Hill Education (India) Pvt Ltd.
4. Fluid Mechanics & Machinery by CSP Ojha, P.N. Chandramouli and R. Berndtsson Oxford University Press.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

## B.TECH. CIVIL ENGINEERING - R18 STRUCTURAL ANALYSIS-I - B14PC4

B.Tech. IV Semester

L/T/P/C

3/1/0/3

**PRE REQUISITES:** Strength of Materials –I

### **COURSE OBJECTIVES:**

To make the students to understand the principles of analysis of structures subjected to static and moving loads by various methods.

### **COURSE OUTCOMES:**

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

1. Analyze Perfect, Imperfect And Redundant Frames
2. Formulate Equilibrium and compatibility equations for structural members
3. Analyze one dimensional and two dimensional problems using classical methods
4. Analyze indeterminate structures
5. Analyze structures for gravity loads, moving loads and lateral loads

### **UNIT – I:**

**Introduction to Structures and Indeterminacy:** Equilibrium and compatibility equations - types of supports and reactions, types of joints and equilibrium equations, Static and kinematic indeterminacies of beams and frames. Effect of force releases like moment hinge, shear releases, link on static indeterminacy, Relative Merits of indeterminate structures over determinate structures.

**Propped Cantilever and Fixed Beams:** Types of props : Elastic and Rigid props, Determination of - Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia, subjected to uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - Shear force and Bending moment diagrams for Propped Cantilever and Fixed Beams- Deflection of Propped cantilever and fixed beams; effect of sinking of support, effect of rotation of a support.

### **UNIT – II:**

**Frames:** Classification- plane and space frames, pin jointed and rigid jointed frames.

**Analysis of Perfect Frames:** Types of frames- Perfect, Imperfect and Redundant pin jointed frames, assumptions, transfer of load to joints from wind and other forces - Analysis of determinate pin jointed frames using method of joints and method of sections for vertical loads, horizontal loads and inclined loads, Tension coefficient method for pin jointed plane frames.

### **UNIT – III:**

**Energy Theorems:** Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Unit Load Method. Deflections of simple beams and pin- jointed plane trusses.

**Three Hinged Arches** – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches. Linear Arch. Eddy's theorem. Analysis of Three hinged arches.

Normal Thrust and radial shear in an arch. Geometrical properties of parabolic and circular arch. Three hinged circular arch at different levels. Absolute maximum bending moment diagram for a three hinged arch.

#### **UNIT – IV:**

**Slope Deflection Method:** Derivation of slope-deflection equation, application to continuous beams with and without settlement of supports. Shear force and bending moment diagrams and Elastic curve.

**Moment Distribution Method:** application to continuous beams with and without settlement of supports. Shear force and bending moment diagrams and Elastic curve.

#### **UNIT – V:**

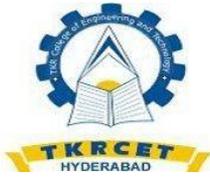
**Moving Loads and Influence Lines:** Introduction-applications to bridges (only description), Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section - Point loads, UDL longer than the span, UDL shorter than the span- maximum SF and BM at a given section and absolute maximum and B.M due to single concentrated load UDL longer than the span, UDL shorter than the span, two point loads with fixed distance between them and several point loads- Equivalent uniformly distributed load- Focal length. Influence lines for forces in members of deck and through type trusses like Pratt and Warren trusses. Equivalent uniformly distributed load. Focal length. Muller Breslau's principle for determinate and indeterminate beams (qualitative).

#### **TEXT BOOKS**

1. Basic Structural Analysis' by K.U. Muthu et.all, I.KInternational
2. Structural Analysis Vol –I & II by V. N. Vazirani and M. M. Ratwani, Khanna Publishers.
3. Structural Analysis Vol I & II by G. S. Pandit and S. P. Gupta, Tata McGraw Hill Education Pvt. Ltd.
4. Mechanics of Structures Vol – I and II by H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.

#### **REFERENCE BOOKS**

1. Structural Analysis by R. C. Hibbeler, Pearson Education
2. Structural Analysis by Devdas Menon, Narosa Publishing House.
3. Basic Structural Analysis by C. S. Reddy., Tata McGraw Hill Education Pvt. Ltd.
4. Fundamentals of Structural Analysis by M. L. Gamhir, PHI Learning Pvt. Ltd
5. Structural Analysis -I by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
6. Theory of Structures by S.Ramamrutham, R.Narayan, Dhanpat Rai Publishing Company.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

## B.TECH. CIVIL ENGINEERING - R18

### SOIL MECHANICS -B14PC5

**B.Tech. IV Semester**

**L/T/P/ C**

**3/1/0/3**

#### **COURSE OBJECTIVES:**

To enable the student to study the properties of soil and to determine the behavior of soil under various conditions and loads.

#### **COURSE OUTCOMES:**

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

1. To understand the mechanism Behavior of Soil for different loads.
2. From Soil Condition will be able to determine properties of soil.
3. Understand various stresses and their distribution in soil and other engineering properties of soil.
4. Understand shear strength of soil and various techniques for improving the shear strength

#### **UNIT – I:**

**Introduction:** Soil formation – clay mineralogy and soil structure – moisture content – Mass-volume relationship – Relative density.

**Index Properties of Soils:** Grain size analysis – Sieve analysis – Hydrometer method – consistency limits and indices – IS classification of soils.

#### **UNIT – II:**

**Permeability:** Soil water – capillary rise – flow of water through soils – Darcy's law permeability – Factors affecting permeability – laboratory determination of coefficient of permeability – Permeability of layered soils – In-situ permeability tests (Pumping in & Pumping out test).

**Effective Stress & Seepage Through Soils:** Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

#### **UNIT – III:**

**Stress Distribution In Soils:** Boussinesq's and Westergaard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark's influence chart for irregular areas.

**Compaction:** Mechanism of compaction – factors affecting compaction effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

#### **UNIT – IV:**

**Consolidation:** Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log (p) curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre consolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of

consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

**UNIT – V:**

**Shear Strength Of Soils:** Importance of shear strength – Mohr’s– Coulomb Failure theories  
– Types of laboratory tests for strength parameters – strength tests based on drainage conditions– strength envelopes – Shear strength of sands - dilatancy – critical void ratio.

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**TEXT BOOKS**

1. Soil Mechanics and Foundation Engineering By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering by C. Venkataramaiah, New Age International Pvt.Ltd.
3. Soil mechanics and foundation by B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi.
4. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers, 8th Edition.

**REFERENCES BOOKS**

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd.
2. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata McGraw Hill Publishers New Delhi.
3. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
4. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

## B.TECH. CIVIL ENGINEERING - R18 NUMERICAL METHODS -BBSM6

**B.Tech. IV Semester**

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

### **COURSE OBJECTIVES:**

1. The objective of this course is to familiarize the prospective engineers with techniques in numerical methods.
2. It aims to equip the students to deal with advanced level of mathematics and application that would be essential for their disciplines
3. The topics of those deals with methods to find roots of an equation.
4. The topics of integration that deals using numerical techniques.
5. The topics deals with the solution of PDE using numerical methods.

### **COURSE OUTCOMES:**

1. Find the root of an equation using numerical methods.
2. Finding integral values using numerical techniques.
3. To find the numerical solution of PDE.
4. learn the methods of interpolation
5. Solve the problems using numerical differentiation

### **UNIT I:**

**Solution of Algebraic and transcendental equations:** Bisection method- Newton-Raphson method and Regula-falsi method.

### **UNIT II:**

**Interpolation and Integration:** Finite differences- interpolation using Newton's forward and back ward difference formulae. Central difference interpolation- Gauss' forward and backward formulae. Interpolation with unequal intervals newton's divided difference and Lagrange's formulae.

### **UNIT III:**

**Numerical Differentiation & Integration:** Numerical Differentiation -Numerical Integration- Trapezoidal rule and Simpson's 1/3 and 3/8 rules

### **UNIT IV:**

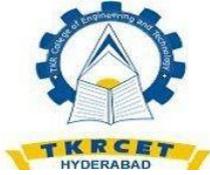
**Numerical solutions of Ordinary Differential Equations:** Ordinary differential equations- Taylor's series- Euler and modified Euler's methods. Runge- Kutta method of fourth order for solving first and second order equations.

### **UNIT V:**

**Numerical Solutoins of Partial Differential Equations:** Partial differential equations finite difference solution two dimensional Laplace equation and poison equation- implicit and explicit methods for one dimensional heat equation (bender- Schmidt and crank-Nicholson methods) finite difference explicit method for wave equation.

## **TEXT BOOKS**

1. Erwinkreyszig- Advanced Engineering Mathematics- 9<sup>th</sup> Edition- John Wiley & Sons- 2006.
2. VeerarajanT.- Engineering Mathematics for first year- tataMcGraw-Hill- New delhi- 2008.
3. S.S.Sastry introductory methods of numerical analysis- PHI-4<sup>th</sup> edition 2005
4. N.P. Bali and Manish Goyal- A text book of engineering Mathematics- Laxmi Publications- Reprint- 2008.
5. B.S.Grewal- Higher Engineering Mathematics- Khanna Publishers- 36<sup>th</sup> Edition- 2010



# T K R COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

## B.TECH. CIVIL ENGINEERING - R18 SURVEYING LAB – II -B14PC7

**B.Tech. IV Semester**

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

**PRE REQUISITE: Surveying Theory**

### **COURSE OBJECTIVE:**

To impart the practical knowledge in the field to set out any Civil Engineering work

### **COURSE OUTCOME:**

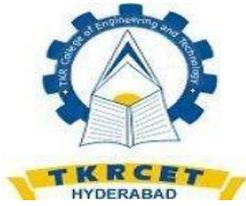
Perform surveying on any civil engineering work

### **LIST OF EXPERIMENTS:**

1. Determine of area using total station
2. Traversing using total station
3. Contouring using total station
4. Determination of remote height using total station
5. Stake out using total station
6. Determination of Distance, gradient using total station
7. Differential height between two inaccessible points using total station
8. Curve setting using total station
9. Resection using total station
10. Setting out works for buildings
11. Setting out works for pipe lines
12. Finding position of stations using G.P.S

### **REFERENCE BOOKS**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000.
2. Chandra A M, “Plane Surveying”, New Age International Pvt. Ltd., New Delhi, 2002.
3. Surveying by Bhavikatti; Vikas publishing house ltd.
4. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
5. Chandra A M, “Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
6. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer - Verlag Publishers, 2001.
7. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
8. Advanced Surveying, Madhu & Gobi, Pearson India



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

## B.TECH. CIVIL ENGINEERING -R18

### FLUID MECHANICS LAB - B14PC8

**B.Tech. IV Semester**

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

**PRE REQUISITES:** FM Theory

#### **COURSE OBJECTIVES:**

To give the student an exposure to various hydraulic devices and Pipe Flow.

#### **COURSE OUTCOMES:**

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

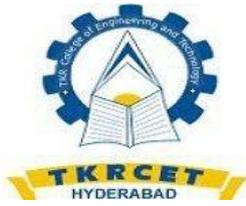
1. Determine coefficient of discharge for orifice and mouthpiece.
2. Calibrate notches venturimeter orifice meters
3. Determine minor losses in pipes

#### **List of Experiments:**

1. Determination of Coefficient of discharge for a small orifice.
2. Determination of Coefficient of discharge for a mouthpiece by constant head method.
3. Calibration of contracted Rectangular Notch
4. Calibration of contracted Triangular Notch.
5. Calibration of contracted Trapezoidal Notch.
6. Determination of friction factor of a pipe
7. Calibration of Venturimeter
8. Calibration of Orifice meter
9. Determination of Coefficient for minor losses - Sudden Expansion
10. Determination of Coefficient for minor losses- Sudden Contraction
11. Verification of Bernoulli's equation.
12. Study of Water Hammer due to sudden Closure of valve.

#### **REFERENCE BOOKS**

1. 'Hydraulics Laboratory Manual' by S.K. Likhi., New Age International (P) Limited.



# TKRC COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

## B.TECH. CIVIL ENGINEERING -R18

### ENGINEERING GEOLOGY LAB - B14PC9

**B.Tech. IV Sem**

**L/T/P/C**

**0/0/3/1.5**

**PRE REQUISITES:**

Engineering Geology.

**COURSE OBJECTIVES:**

The object of this lab is that to provide practical knowledge about physical properties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to: Identify the various rocks, minerals depending on geological classifications

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic study of rocks.
3. Microscopic study of rocks.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
5. Geological Investigation by using electrical resistivity meter.

**EXPERIMENTS:**

1. Identification of Minerals.
2. Identification of Igneous rocks.
3. Identification of Sedimentary rocks.
4. Identification of Metamorphic rocks.
5. Interpretation of Geological maps along with geological section.
6. Simple strike and Dip problems.
7. Microscopic Identification of rocks.
8. Measurement of Ground water exploration by Electrical Resistivity meter.
9. Measurement of Bed rock investigation.
10. Measurement of Mineral exploration.
11. Measurement of Study of Geological structural features.
12. Measurement of Sand in gravel deposit locations.

**MANUAL:**

1. Engineering Geology Lab record / Manual by Dr. N. Chenna Kesavulu, Trinity Press.