T K R COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)

B.TECH. CIVIL ENGINEERING

COURSE STRUCTURE & SYLLABUS

III SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	A13BS1	Mathematics – IV	4	1	0	4
2	A13PC2	Strength of Materials	4	1	0	4
3	A13PC3	Fluid Mechanics	4	1	0	4
4	A13PC4	Building Materials Construction and Planning	3	0	0	3
5	A13PC5	surveying	3	0	0	3
6	A13PC6	Strength of Materials Lab	0	0	3	2
7	A13PC7	Computer Aided Design Lab	0	0	3	2
8	A13PC8	Surveying-I Lab	0	0	3	2
9	A13MC3	*Gender Sensitization Lab	0	3	0	0
		Total Credits	**18**	**6**	**9**	**24**

IV SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	A14PC1	Strength of Materials -II	4	1	0	4
2	A14PC2	Fluid Mechanics-II	4	1	0	4
3	A14PC3	Structural Analysis	4	1	0	4
4	A14PC4	Engineering Geology	3	0	0	3
5	A14HS5	Business Economics and Financial Analysis	3	0	0	3
6	A14PC6	Fluid Mechanics Lab	0	0	3	2
7	A14PC7	Surveying II Lab	0	0	3	2
8	A14PC8	Engineering Geology Lab	0	0	3	2
9	A14MC4	*Environment Science and Technology	0	3	0	0
		Total Credits	**18**	**6**	**9**	**24**

***Mandatory Course**

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B.TECH. CIVIL ENGINEERING

B.Tech III Semester **L/T/P/C 4/1/0/4**

ENGINEERING MATHEMATICS- IV (A13HS1)

Course Objectives: To learn

1. Differentiation and integration of complex valuedfunctions
2. Evaluation of integrals using Cauchy's integralformula and residuetheorem.
3. Laurent's series expansion of complexfunctions
4. Express a periodic function by Fourier series
5. Express a non-periodic function by Fourier transform

Course Outcomes:

After learning the contents of this paper the student must be able to

1. Analyze the complex functions with reference to their analyticity, integration using Cauchy's integraltheorem
2. Find the Taylor's and Laurent's series expansion of complex functions
3. The bilineartransformation
4. Finding any periodic function in term of sines andcosines
5. Finding a non-periodic function as integralrepresentation

UNIT–I

Functions of a complex variable:
Introduction, Continuity, Differentiability, Analyticity, properties, Cauchy, Riemann equations in Cartesian and polar coordinates**.** Harmonic and conjugate harmonic functions-Milne-Thompson method.
Bilinear transformation- fixed point-cross ratio-properties-invariance of circles

UNIT–II

Complex integration:
Line integral, Cauchy's integral theorem, Cauchy's integral formula, and Generalized Cauchy's integral formula, Power series: Taylor's series- Laurent series

UNIT–III

Evaluation of integrals:

Singular points, isolated singular points, pole of order m – essential singularity, Residue, Cauchy Residue theorem (Without proof).

Types of real integrals:

a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ b) $\int_{c}^{c+2\Pi} f(cos\theta, sin\theta)dx$

UNIT–IV

Fourier series:

Introduction, Periodic functions, Fourier series of periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half range sine and cosine series.

UNIT–V

Fourier transforms

Fourier integral theorem (without proof), Fourier sine and cosine integrals, sine and cosine, transforms, properties, inverse transforms, Finite Fourier transforms

Applications Fourier Transforms: Heat Equation and Wave Equation

Text Books:

1. A first course in Complex Analysis with applications by Dennis G. Zill and Patrick Shanahan, Johns and BartlettPublishers.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, KhannaPublishers.
3. Advanced Engineering Mathematics with MATLAB by Dean G.Duffy

Reference Books:

1. Fundamentals of Complex Analysis by Saff, E. B. and A. D. Snider,Pearson.
2. Advanced Engineering Mathematics by Louis C. Barrett, McGrawHill.

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B.Tech III Semester **L/T/P/C 4/1/0/4**

STRENGTH OF MATERIALS –I (A13PC2)

Course Objectives:

The subject provide the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.

Course Outcomes:

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

- Analyze the statically determinate and indeterminate problems.
- Determine the stresses and strains in the members subjected to axial, bending.
- Evaluate the slope and deflection of beams subjected to loads.
- Determine the principal stresses and strains in structural members.

UNIT – I

Simple Stresses and Strains:

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 and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

Flexural Stresses:

Theory of simple bending Assumptions Derivation of bending equation: $M/I = f/y = E/R$ - Neutral axis – Determination of bending stresses – Section modulus 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 angle sections.

UNIT – IV

Deflection of Beams

Bending 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, U.D.L, 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- Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

TEXT BOOKS:

1. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
2. Strength of Materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
3. Strength of Materials by W.A Nash, MC Graw Hills 2014 6th edition.
4. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.
5. Strength of Materials by R.K.Rajput, S.Chand Publications.

REFERENCES:

1. Mechanics of Structures Vol –I by H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.
2. Strength of Materials by S. S. Rattan, McGraw Hill Education Pvt. Ltd.
3. Strength of Materials and Structures by John Case *et al.*, Butterworth-Heinemann.
4. Strength of Materials by Dr. Sadhu Singh Khanna Publishers 11th edition 2015.
5. Strength of Materials by R. Subramanian, Oxford University Press.
6. Strength of Materials by W.A Nash, MC Graw Hills 2014 6th edition.
7. Mechanics of Materials by James M Gere and Barry J Goodno Cengage Learning India Pvt. Ltd Eight edition.

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B.TECH. CIVIL ENGINEERING

B.Tech III Semester **L/T/P/C 4/1/0/4**

FLUID MECHANICS (A13PC3)

Course Objectives:

Students who take this class can expect to

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

Course Outcomes:

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

- Apply conservation laws to derive governing equations of fluid flows.
- Compute hydrostatic and hydrodynamic forces.
- Analyze and design simple pipe systems.
- Apply principles of dimensional analysis to design experiments.
- 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.

UNTI – II

Buoyancy and floatation:

Stability of bodies, Meta Centre, 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, flow-net analysis.

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 (explanationary) 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 Moody's Chart, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems Flow between parallel plates, Flow through long tubes, flow through inclined tubes, water hammer.

UNIT – V

Boundary Layer Theory:

Approximate Solutions of Navier Stokes Equations – Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers (no derivations) BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

TEXT BOOKS:

1. Fluid Mechanics by P.N. Modi and S.M.Seth, Standard Book House, Delhi, 2011.
2. Fluid Mechanics-I by RK.Bansal, Laxmi publications.

REFERENCES:

1. Mechanics of Fluids by Potter, M.C D.C Wiggers, B.H Ramdan Cengage, 2012.
2. Fluid Mechanics by J F Douglas, J M Gasiorek, J A Swaffield and L B Jack, Pearson 2015.
3. Fluid Mechanics and Fluid Machines by S.K. Som,Gautam Biswas and S. Chakraborty, McGraw Hill Education (India) Pvt. Ltd, New Delhi 2015.
4. Engineering Fluid Mechanics by K L Kumar, S Chand, Eurasia Publishing House, New Delhi, 2014.
5. Fluid Mechanics by Dr. A. K. Jain Khanna Publishers, twelfth edition 2014.
6. Fluid Mechanics by F.M. White McGraw Hill Education (India) Pvt. Ltd, New Delhi, 2011.
7. Fluid Mechanics by V.L. Streeter., E.B.Wylie and K.W. Bedford, McGraw Hill Education (India) Pvt. Ltd, New Delhi2016.

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B.TECH. CIVIL ENGINEERING

B.Tech III Semester **L/T/P/C**
3/0/0/3

BUILDING MATERIALS CONSTRUCTION AND PLANNING (A13PC3)

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 identify various building materials required for good quality construction & better planning.

UNIT - I

Stones and Bricks, Tiles:

Building stones – classifications and quarrying – properties – structural requirements dressing. 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

Mortars, Masonry and Finishing's

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.
4. Building Construction by PC 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.

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B.TECH. CIVIL ENGINEERING

B.Tech III Semester **L/T/P/C**
3/0/0/3

SURVEYING (A13PC4)

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:

- Calculate angles, distances and levels.
- Identify data collection methods and prepare field notes.
- Understand the working principles of survey instruments.
- Estimate measurement errors and apply corrections.
- Interpret survey data and compute areas and volumes.

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

Tachometric Surveying:

Principles of Tachometry, stadia and tangential methods of Tachometry.

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. Delhi, 2002. 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 and leveling by R. Agor Khanna Publishers 2015.
4. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.

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.

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0/0/3/2

STRENGTH OF MATERIALS LAB (A13PC5)

Course Objectives:

The objective of the course is to make the student understand the behavior of materials under different types of loading for different types structures

Course Outcomes:

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

- Conduct tension test on Materials like steel etc.
- Conduct compression tests on spring, wood and concrete.
- Conduct flexural and torsion test to determine elastic constants.
- Determine hardness 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. Impact test.
9. Shear test.
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.
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.
12. Electrical Resistance gauges.

Refernces: Lab Manuals

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

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COMPUTER AIDED DRAFTING LAB (A13PC6)

Course Objectives:

The objective of this lab is to teach the student basic drawing fundamentals in various civil engineering applications, especially in building drawing.

Course Outcomes:

At the end of the course, the student will be able to:
Master the usage of AutoCAD commands for drawing 2D & 3D building drawings required for different Civil Engineering applications.

List of Experiments:

1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different softwares.
3. Practice exercises on CAD software.
4. Drawing of plans of buildings using software

a) Single storey buildings b) Multi storeyed buildings.

5. Developing sections and elevations for

a) Single storey buildings b) Multi storeyed buildings.

6. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD softwares.
7. Exercises on development of working drawings of buildings.

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh – Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

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0/0/3/2

SURVEYING LAB – 1 (A13PC7)

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 draw plans & maps to determine the areas before taking up any civil engineering works.

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.
9. Height and distances using principles of tachometric surveying.
10. a) Measurement of Horizontal angle & vertical angle. b) Distance between inaccessible point by theodolite.

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B.Tech III Semester **L/T/P/C**
0/3/0/0

GENDER SENSITIZATION LAB (A13MC3)

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT-I

UNDERSTANDING GENDER

Gender:

Why Should We Study It? (Towards a World of Equals: Unit -1)

Socialization:

Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT-II

GENDER AND BIOLOGY

Missing Women:

Sex Selection and Its Consequences (Towards a World of Equals: Unit -4) Declining Sex Ratio. Demographic Consequences.

Gender Spectrum:

Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination.

UNIT-III

GENDER AND LABOUR Housework:

The Invisible Labour (Towards a World of Equals: Unit -3) "My Mother doesn't Work." "Share the Load."

Women's Work:

Its Politics and Economics (Towards a World of Equals: Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT-IV

ISSUES OF VIOLENCE

Sexual Harassment:

Say No! (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence:

Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice. Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11) Blaming the Victim-"I Fought for my Life" Additional Reading: The Caste Face of Violence.

UNIT-V

GENDER: CO - EXISTENCE

Just Relationships:

Being Together as Equals (*Towards a World of Equals*: Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

TEXTBOOK

All the five Units in the Textbook**, "*Towards a World of Equals: A Bilingual Textbook on Gender"*** written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by **Telugu Akademi, Hyderabad**,Telangana State in the year **2015**.

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

REFERENCE BOOKS:

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "*I Fought For My Life…and Won*."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

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B.TECH. CIVIL ENGINEERING

B.Tech IV Semester **L/T/P/C**
4/1/0/4

STRENGTH OF MATERIALS-II (A14PC1)

Course Objectives:

Study of the subject provides the understanding of principal stress, strains, springs, columns, and structures.

Course Outcomes:

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

- Determine stresses in the member subjected to Torsion
- Analyze columns and struts
- Understand the concept of direct and bending stresses
- Analyze and design springs, thin and thick cylinders
- Understand the concept of unsymmetrical bending.

UNIT – I

Torsion of Circular Shafts:

Theory of pure torsion – Derivation of Torsion equations : $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – 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, core of a section – determination of stresses in the case of chimneys, retaining walls and dams –

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 dia, and volume of thin cylinders – Thin spherical shells.

Thick Cylinders:

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

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. Strength of Materials by R.K. Bansal, Laxmi Publications.
2. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
3. Theory of Structures (SMTS-II)' by B.C. Punmai, Er.Ashok K.Jain, Dr.ArunK.Jain Laxmi Publications.
4. Strength of Materials by B.S. Basavarajaiah, B.S. Mahadevappa, Universities Press 3rd Edition 2015.

REFERENCES:

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 Pvt. Ltd.
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. Guru Raja, Narosa Publishing House.
7. Mechanics of Materials Ferdinand P. Beer et al., Tata McGraw Hill Education Pvt. Ltd 5th edition 2009.
8. Strength of Materials R. Subramanian, Oxford University Press 2010.

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B.TECH. CIVIL ENGINEERING

B.Tech IV Semester **L/T/P/C**
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FLUID MECHANICS-II (A14PC2)

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:

- Understand the concepts o channel flows.
- Compute flow profiles in channel transitions and analyze hydraulic transients.
- 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 Stickler's formula for Mannings 'n' – 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. Surges – Types.

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

Basics of Turbo Machinery:

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 characteristics-geometric similarity-cavitation and preventive measures.

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 Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

TEXT BOOKS:

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard Book House, New Delhi.
2. Fluid Mechanics by Dr. A. K. Jain Khanna Publishers 2016.
3. Hydraulic Machines by K. Subramanya McGraw Hill Education (India) Pvt Ltd, 2013.
4. Fluid Mechanics by R.K Bansal, Laxmi Publications.
5. Fluid Mechanics & Machinery by CSP Ojha, P.N. Chandramouli and R. Berndtsson Oxford University Press.
6. Hydraulic Machines by K. Subramanya McGraw Hill Education (India) Pvt Ltd, 2013.

REFERENCES:

1. Elements of 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 Hydraulics by R.H. French, McGraw Book Company, New York, 1986.
4. Open Channel flow by K. Subramanya, Tata McGraw Hill Education (India) Pvt Ltd.
5. Fluid Mechanics & Machinery by CSP Ojha, P.N. Chandramouli and R. Berndtsson Oxford University Press.

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B.TECH. CIVIL ENGINEERING

B.Tech IV Semester **L/T/P/C**
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STRUCTURAL ANALYSIS (A14PC3)

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:

- Analyze Perfect , Imperfect And Redundant Frames
- Formulate Equilibrium and compatibility equations for structural members
- Analyze one dimensional and two dimensional problems using classical methods
- Analyze indeterminate structures
- 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.V. Muthu et.all, I.K International
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.

REFERENCES:

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.

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ENGINEERING GEOLOGY (A14PC4)

Course Objectives:

The objectives was course is to give the basics 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:

- Understand weathering process and mass movement.
- Distinguish geological formations.
- Identify geological structures and processes for rock mass quality.
- Identify subsurface information and groundwater potential sites through geophysical investigations.
- 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 draw backs. 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: Feldsper, Quartiz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

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, Laerite,

Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT - III

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.

UNIT - IV

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 Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

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 (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005.
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.

REFERENCES:

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 university press.
4. Engineering Geology for Civil Engineers – P.C. Varghese PHI.

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B.TECH. CIVIL ENGINEERING

B.Tech IV Semester **L/T/P/C**
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BUSINESS ECONOMICS AND FINANCIAL ANALYSIS (A14HS5)

Course Objective:

To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcome:

The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analyzing the Financial Statements of a Company.

UNIT – I

Introduction to Business and Economics:

Business:

Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics:

Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II

Demand and Supply Analysis:

Elasticity of Demand:

Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis:

Determinants of Supply, Supply Function & Law of Supply.

UNIT- III

Production, Cost, Market Structures & Pricing:

Production Analysis:

Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis:

Types of Costs, Short run and Long run Cost Functions.

Market Structures:

Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition.

Pricing:

Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT-IV

Financial Accounting:

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, preparation of Final Accounts.

UNIT -V

Financial Analysis through Ratios:

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw Hill Education Pvt. Ltd. 2012.

REFERENCES:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

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B.TECH. CIVIL ENGINEERING

B.Tech IV Semester **L/T/P/C**
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FLUID MECHANICS LAB (A14PC6)

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:

- Determine coefficient of discharge for orifice and mouthpiece.
- Calibrate notches venturimeter orifice meters.
- Determine miner 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 / Triangular Notch/Trapezoidal Notch.
4. Determination of friction factor of a pipe.
5. Calibration of Venturimeter.
6. Calibration of Orifice meter.
7. Determination of Coefficient for minor losses - Sudden Expansion.
8. Determination of Coefficient for minor losses- Sudden Contraction.
9. Verification of Bernoulli's equation.
10. Study of Water Hammer due to sudden Closure of valve.

References: Lab Manuals

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

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SURVEYING II LAB (A14PC7)

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. Distance, gradient, differential height between two inaccessible points using total station.
7. Curve settling using total station.
8. Resection using total station.
9. Setting out works for buildings and pipe lines.
10. Finding position of stations using G.P.S.

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ENGINEERING GEOLOGY LAB (A14PC8)

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.

List of Experiments:

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Microscopic study of rocks.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
5. Simple Structural Geology problems.
6. Electrical resistivity meter.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals.
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks).
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.
5. Microscopic identification of rocks.

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B.Tech IV Semester **L/T/P/C**
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Environment Science & Technology (A14MC4)

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

Course Outcomes:

Based on this course, the Engineering graduate will understand /evaluate/develop technologies on the basis of ecological principles and environmental regulations which in-turn helps in sustainable development.

UNIT-I

Ecosystems:

Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources:

Living and Non-Living resources.

Water resources:

Use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.

Mineral resources:

Use and exploitation, environmental effects of extracting and using mineral resources.

Land resources: Forest resources.

Energy resources:

Growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity and Biotic Resources:

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution.

Air Pollution:

Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.

Water pollution:

Sources and types of pollution, drinking water quality standards.

Soil Pollution:

Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazard standards,

Solid waste:

Municipal Solid Waste management, composition and characteristics of e-Waste and its management.

Pollution control technologies:

Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation.

Global Environmental Problems and Global Efforts:

Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

UNIT-V

Environmental Policy, Legislation & EIA:

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economic aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future:

Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4^{th} Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.