COURSE STRUCTURE AND DETAILED SYLLABUS

II - B.TECH - I & II- SEMESTERS

CIVIL ENGINEERING

FOR

B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2014-2015)

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)
(Formerly CVSR College of Engineering)
Venkatapur, Ghatkesar, Hyderabad – 501 301.
www.cvsr.ac.in
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# ANURAG GROUP OF INSTITUTIONS  
## (AUTONOMOUS)

### II YEAR I SEMESTER  
#### COURSE STRUCTURE

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject Name</th>
<th>Lectures</th>
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### II YEAR II SEMESTER  
#### COURSE STRUCTURE

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**Note:** All End Examinations (Theory and Practical) are of three hours duration.

**T – Tutorial  P – Practical  D – Drawing**
II Year B.Tech. Civil - I Sem

(A53001) MATHEMATICS-III

Course Objectives:
• To acquaint students with the fundamental concepts of Numerical Analysis
• To develop an understanding of the role of Numerical Analysis in engineering.
• To familiarize students with computer-based computational analysis through a suitable Software Package
• To develop alternative ways to solve a problem and systematic approach of a solution in real Life
• To provide an understanding of the processes by which real life problems are analyzed
• To develop an understanding of the role of numerical methods in engineering.
• Able to know basic properties of standard partial differential equations to solve engineering problems.
• To gain experience of doing independent study and research

Course Outcomes:
Upon successful completion of this course, the student will be able to:
1. Be aware of the use of scientific methods in modern scientific computing.
2. Be familiar with numerical solution of Non Linear equations.
3. Be familiar with numerical interpolation and approximation of functions.
4. Be familiar with calculation and interpretation of errors in Numerical Methods
5. Be familiar with numerical differentiation and integration.
6. Be familiar with curve fitting.
7. Apply Partial differential equations to solve complex engineering problems.

UNIT-I: Solution of Non-linear Equations and Linear System of Equations.
Solving system of non-homogeneous equations by L-U Decomposition method (Crout's Method). Jacobi's and Gauss-Seidel Iteration method,

UNIT-II: Interpolation:
Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences – Central differences – Symbolic relations

UNIT-III: Numerical Differentiation, Numerical Integration & Curve fitting

UNIT – IV: Numerical solution of IVP’s in ODE

UNIT-V: Partial differential equations

TEXT BOOKS:

REFERENCE BOOKS:
5. Schaum's outline series on Matrices.
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II Year B.Tech. Civil - I Sem

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(A53002) ELECTRICAL TECHNOLOGY AND MECHANICAL TECHNOLOGY

COURSE OBJECTIVES:
• To impart the basic knowledge of electrical and electronics engineering.
• To know the types of power supply and circuits, generators, transformers.
• To provide the knowledge of earth moving and excavation equipment and aggregate and concrete producing equipment.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Know the basic knowledge required on electrical and electronics engineering as a Civil Engineering professional.
• Understand the purpose and functioning of all mechanical equipment used in the construction of structures.

ELECTRICAL TECHNOLOGY

UNIT I: ELECTRICAL CIRCUITS

Types of power supply and circuits – AC – DC – Solar - UPS

UNIT II: TRANSFORMERS AND MOTORS

Basic Principle and application of single phase induction motors Capacitor start I phase induction motor. Protection of Building from electrical shocks (Lightening, thunderbolts etc.)
Laying out of various types of cables (LT, HT, armoured cables)
MECHANICAL TECHNOLOGY
UNIT III: EARTHMOVING AND CONVEYING EQUIPMENT
Operation and selection of the following: Earthmoving and Excavation equipment - shovels, dragline, calm shell, cable excavator, Bucket wheel excavator, tractor, Bull dozer, scraper, earth compactors
Conveying equipment: Belt conveyor, screw conveyor, bucket conveyor, aerial ropeway. Hoisting equipment hoist winch, differential and worm geared chain hoists,
Fork lift truck, guyed derricks, swing and non swing mobile crane, wheeler crane, tower crane.

UNIT IV: Aggregate and Concrete producing equipment: Crushers, Jaw, Gyroratory, Hammer, and Roll crushers, screens, stationary revolving shaking and vibrating screens. Concrete mixers, concrete pump, pneumatic equipment, reciprocating air compressor.
Construction of pneumatic tools: Jack hammer, paving breaker, concrete vibrator.

UNIT V: TRANSISTORS
P-N-P and N-P-N Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

TEXT BOOKS:
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.
3. Mehra VK principles of Electrical Engineering and Electronics, S Chand & Co 1999
Spence G and Wood CL Building and Civil Engineering Plant, John Wiley and Sons
2nd Edn 2004

REFERENCE BOOKS:
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition
II Year B.Tech. Civil - I Sem

(A53003) ENVIRONMENTAL STUDIES

COURSE OBJECTIVES:
- To impart the knowledge of multidisciplinary nature of environmental studies.
- To provide the knowledge of natural resources, environmental pollution, waste management technology.
- To impart the knowledge of rules and regulations of environmental policy.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Understand the natural resources such as water, mineral, food, energy, land and their associated problems.
- Understand causes of the environmental pollution and their controlling measures.
- Know environmental policy rules and regulations.

UNIT – I
Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

(a) Ecosystems: Concept of an ecosystem – Classification, structure and function of different ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids.


UNIT – II
Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems: Forest resources – Use and over – exploitation, deforestation, – Timber extraction, mining, dams and other
effects on forest and tribal people: Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources: Equitable use of resources for sustainable lifestyles.

UNIT – III
(a) Environmental Pollution: Definition, Cause, effects and control measures of:
- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear pollution.
- e-Waste

(b) Social Issues and the Environment: From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, and watershed management. - Climate change, global warming, ozone layer depletion, nuclear accidents and holocaust.

UNIT – VI
(a) Waste management technology: Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.

UNIT – V


(b) Field work: Visit to a local area to document environmental assets River/forest grassland/hill/ mountain Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds, Visit to effluent treatment Plant/sewage treatment plant Study of simple eco systems pond, river, hill slopes, etc.

TEXT BOOK:
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
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II Year B.Tech. Civil - I Sem

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(A53004) SURVEYING - I

COURSE OBJECTIVES:
• To understand principles and classification of surveying.
• To understand principles and functioning of basic survey equipment such as chain, prismatic compass, plane table, levels.
• To impart the knowledge of calculating the areas and volumes and contours and their usage.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Understand the objectives, principles and classification of surveying.
• Understand the functioning and usage of the basic surveying equipment.
• Gain the knowledge of handling the advanced equipment like total station.
• Apply the innovative methods of calculating the areas and volumes.

UNIT I
Introduction: Overview of plane surveying - Objectives, Principles and Classifications of surveying.
Chain Surveying - Principles - Chain Survey instruments – Distance measurement conventions and methods - Direct and indirect Ranging – Obstacles in ranging Distances and Direction.

UNIT II

UNIT III
Plane table survey: Instruments employed in plane table survey. Use and adjustment of these instruments including simple alidate. Setting up off the

UNIT IV

LEVELLING: Definitions and principles of construction of a levelling instrument and parts. Use of dumpy level, tilting level and auto levels. Types of leveling staves. Methods of booking and reduction of levels. Bench marks, establishment of bench marks by longitudinal leveling and cross sectional levelling. Fl leveling, reciprocal leveling. Errors in leveling, curvature and refraction correction.

UNIT V

Calculation of areas and Volumes: Simpsons rule and trapezoidal rule, computation of area of cross section of level section and two level section. Contouring. Definition of contour, contour interval and characteristics of contours. Direct and indirect methods of contouring uses of contours, grade contours. Computation of volumes of earth work and water storage by means of contour lines and sections. Computation of volume from spot levels.

TEXT BOOKS:
1. Surveying Vol 1 B C Punmia, Ashok K. Jain, Arun K. Jain
3. Surveying and Levelling R. Subramanian
4. Plane Surveying Dr. A. M. Chandra
5. Surveying and Levelling T. P. Kanetkar and S. V. Kulkarni
6. Surveying theory and practice Anderson Mikhail

REFERENCE:
1. Fundamentals of Surveying SK Roy
2. Surveying Theroy and Practice, SS Bhavikatti
3. Surveying Vol 1, 2 by SK Duggal
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II Year B.Tech. Civil - I Sem

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3 1 - 3

(A53005) STRENGTH OF MATERIALS - I

COURSE OBJECTIVES:
- To provide the knowledge on elasticity and plasticity of various materials.
- To know the mechanism of development of shear force and bending moment in beams due to various loads.
- To estimate the bending stresses, shear stresses in beams of various cross sections.
- To estimate the slopes and deflection of beams by various methods.
- To impart the knowledge of principal stresses and strains and theories of failures.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Understand the meaning of basic terminology involved in estimation of strength of various materials.
- Understand the behaviour of beams under various loads through the shear force diagram, bending moment diagram, flexural and shear stress distribution diagrams.
- Understand the theories involved in the failure of a member due to compound stress system.
- Know the methods of estimation of deflection of beams and their limiting conditions

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.
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 with or without overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads-point of contraflexure-Relation between S.F, B.M and rate of loading at a section of a beam.

UNIT III:
STRESSES IN BEAMS:
FLEXURAL STRESSES:

UNIT IV:
DEFLECTION OF BEAMS: Pure bending of a beam and its derivation of deflection and 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 loads-Mohr's theorems-moment area method-application to simple cases including overhanging beams. Moment area method, conjugate beam method, application to simple cases.

UNITY:
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-Various theories of failures like Maximum Principal stress theory, Maximum principal strain theory -Maximum shear stress theory-Maximum strain energy theory-Maximum shear strain energy theory.
TEXT BOOKS:
1. Strength of Materials by S. Ramamrutham
2. Strength of Materials by Timashenk
Strength of Materials practical approach, DS Prakasha Rao, University Press

REFERENCE BOOKS:
5) Strength of materials by Bhavi Katti. New Age Publications.
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II Year B.Tech. Civil - I Sem

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4 1 - 4

(A53006) FLUID MECHANICS

COURSE OBJECTIVES:
• To know the various fluid properties and fluid pressure measurement.
• To study the different equations of fluid motion.
• To impart the knowledge of boundary layer theory and flow in pipes.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Understand the basic principles involved in fluid in static and dynamic condition.
• Know flow through pipes corresponding problems and flow measuring methods.

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, Pascals law, Hydrostatic law - atmospheric,
gauge and vacuum pressure measurement of pressure. Pressure gauges,
Manometers: differential and Micro Manometers.

UNIT II:
Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and
curved surfaces _Center of pressure. Derivations and problems.

UNIT III:
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, flow net analysis.
FLUID DYNAMICS: Surface and body forces- Eulers and Bernoullie'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.
UNIT IV:
Boundary layer Theory Approximate Solutions of Navier Stoke's 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
LAMINAR & TURBULENT FLOWS
Reynolds experiment - Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

UNIT V:
CLOSED CONDUIT FLOW: Laws of Fluid friction -Darcy's equation, Minor losses _ pipes in series -pipes in parallel - Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynolds number –Moody's Chart.
MEASUREMENT OF FLOW : Pitot tube, Venturimeter and orifice meter - classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches -Broad crested weirs.

TEXT BOOKS:
2.Fluid Mechanics and Hydraulic Machines - Dr.R.K.Bansal (laxmi publications (p) ltd New Delhi)
3.Fluid Mechanics and Hydraulic Machines - Er R.K.Rajput

REFERENCE BOOKS:
1. Introduction to Fluid Mechines (SI edition) - Edward J Shaughnessy, Jr, Ira M.Katz & James P.Schayer -Oxford University
Introduction to Fluid Mechines and fluid mechanics by sk.som and G.Biswa (tata Mc Grawhill publishers pvt ltd)
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II Year B.Tech. Civil - I Sem  
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(A53201) SURVEYING LAB-I

COURSE OBJECTIVES:
• To understand the practical applications of survey instruments.
• To know the field measurements and observations.
• To understand the different methods involved in survey field work.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Understand the usage and functioning of various basic survey instruments.
• Understand the innovative methods of surveying the given field.

LIST OF EXPERIMENTS:

1) Introduction to different survey instruments.
2) Survey of an area by chain survey. (Closed traverse and plotting).
3) Chaining across obstacles (different cases).
4) Survey of an area by compass and tape. (Closed, traverse, plotting).
5) Determination of distance between two inaccessible points with compass.
6) Plane table survey. (Radiation & traversing and intersection methods).
7) Two point and three point problem in P. T. S.
8) Simple, fly, differential leveling.
10) Two exercises on contouring.
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II Year B.Tech. Civil - I Sem

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(A53202) STRENGTH OF MATERIALS LAB

COURSE OBJECTIVES:
• To know the functioning and methods of conducting the practical on various equipment to know the properties of materials.
• To know the behaviour of various materials under the loading conditions.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Understanding the working principles of various machines to conduct the test on materials.
• To know the behaviour of members and their limiting conditions on loading.

1. Torsion Test
2. Bending test on steel/wood cantilever beam
3. Bending test on simply supported beam
4. Hardness test
5. Tension test
6. Test on Helical Spring
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's reciprocal theorem.
11. Demonstration on use of electrical resistance guages
12. Deflection test on cantilever beams

Note: Any 10 experiments may be completed from the list given above.
UNIT-I:
Probability: Sample space and events, Classical and Statistical definition of Probability, The axioms of probability, Some Elementary theorems of Probability, Conditional probability, Baye's theorem. Random variables, Discrete and continuous random variable,

UNIT-II:
Definitions of Probability Distribution function, Probability mass function, Probability density function and properties. Definitions of Mathematical expectation, Moments (about origin & Centre), Definition of moment generating function for discrete and continuous random variable.
Discrete Distributions: Binomial and Poisson distributions (definition and problems) their mean, variance and moment generating function.
Continuous Distribution: Normal and exponential distributions (definition and problems) related properties.
Concepts of Joint Distribution function of more than one random variable, Definition of joint, marginal and conditional distribution (for two variables only).

UNIT-III:
Sampling distribution: Populations and samples - Sampling distributions of mean (σ known and unknown)
Estimation: Concept of Point estimation and its properties (definition only), Concept of interval estimation with examples.
Test of Hypothesis: Null & Alternative Hypothesis, Critical region, Type I and Type II errors, level of significance, one tail, two-tail tests.
Large sample test: concerning means – proportions (One and Two samples).

UNIT-IV:
Small sample test: Chi-Square test, Student's t-test (Single mean, Difference of mean and Paired samples) and F-test.
Design of Experiment: Introduction to ANOVA (one – way, two – way), Principles of Design of Experiment, completely randomized design (CRD), randomized complete block design (RBD), Latin Square Design (LSD).(No Derivations only concept, definitions and problems)

Text Books:
3. Introduction to Probability by Charles M Grinstead, J Laurie Snell, American Mathematical Society.

References:
8. Zivorad R. Lazic, Design of Experiments in Chemical Engineering, Wiley-VCH.
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II Year B.Tech. Civil - II Sem

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4 1 - 4

(A54002) SURVEYING - II

COURSE OBJECTIVES:
• To provide the knowledge of theory and functioning of theodolites.
• To impart the knowledge of various curves and their setting in the field.
• To impart the knowledge of GPS Surveying and GIS applications.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Have the knowledge on the application of advanced survey equipment such as total station, theodolites, tachometry, GPS.
• Get an idea of application of innovative methods is surveying.

UNIT I

UNIT II

UNIT III
UNIT IV
Vertical Curves. Types of vertical curves, length of vertical curves sight distance on sag curve passing under an overhead structure, elements of a summit and sag curves, analysis of sight distance on summit and sag curves. Computations of setting out data of summit and sag curves, setting out methods of vertical curves.

UNIT V

TEXT BOOKS:
3. Surveying and Levelling R.Subramanian
4. Plane Surveying Dr.A.M. Chandra
5. Surveying and Levelling T.P.Kanetkar and S.V.Kulkarni
6. Surveying theory and practice Anderson Mikhail
7. Surveying by Agore

REFERENCE:
1. Fundamentals of Surveying SK Roy
2. Surveying Theroy and Practice, SS Bhavikatti
3. Surveying Vol 1, 2 by SK Duggal
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(A54003) STRENGTH OF MATERIALS – II

COURSE OBJECTIVES:
- To provide the knowledge of the torsion induced in shafts and springs.
- To impart the knowledge of direct and bending stresses in columns.
- To impart the knowledge of analysis of simple indeterminate structures.
- The theory involved in the various columns with various end conditions.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Understand the behaviour of shafts under pure torsion and springs on various loads.
- Understand the behaviour of columns and struts and the theories involved.
- Know the analysis of indeterminate beams and curved beams.

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 – Tortional moment of resistance – polar section module – power transmitted by shafts – combined bending and torsion and end trust – design of shafts according to theories of failure

SPRINGS
Introduction – type 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
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.

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 area through the centroid - location of neutral axis - deflection of beams under unsymmetrical bending

UNIT III
Propressed cantilevers and fixed beams Analysis of propped cantilevers - shear force and bending moment diagrams - deflection of propped cantilevers
Statically Indeterminate Structures Fixed beams - Introduction to statically indeterminate beams with 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 - deflection of fixed beams effect of sinking of support effect of rotation of support.
Continuous beams - introduction - Clapeyron's theorem of three moments - analysis of continuous beams with constant moment of inertia with one or both ends fixed - continuous beams with overhand, continuous beams with different moment of inter for different spans - Effects of sinking of supports = shear force and bending moment diagrams

UNIT IV
Continuous beams - 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 V
Columns and struts
Beam columns
Laterally loaded strut subjected to uniformly distributed and concentrated loads - Maximum BM and Stress due to transverse and lateral loading
TEXT BOOKS:
1. Strength of Materials by S. Ramamrutham
2. Strength of Materials by Timashenk
3. Theory of structures by S. Ramamrutham
5. A Text of strength of materials by RK Bansal - Laxmi publication (P) Lt., New Delhi
6. Strength of materials by Basavarajaiah and Mahadevappa, university press
7. Strength of Materials by Vazrani and Ratwani

REFERENCE:
2. Strength of Materials by Bhavikatti, Vikas publications
4. Strength of materials by Rk Rajput, S. Chand & Co, New Delhi
6. Strength of Matterials by LS Srinath etal, Macmillan India Ltd, Delhi
II Year B.Tech. Civil - II Sem

(A54004) HYDRAULICS AND HYDRAULIC MACHINERY

(L T P/D C)

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COURSE OBJECTIVES:
• To provide the knowledge of the flow in open channels and hydraulic models.
• To provide the types, working principles of various turbines and pumps.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Understand the behaviour of flow in open channels and the hydraulic similitude.
• Know the types, working principles and the usage of various turbines and pumps.

UNIT I
Open channel Flow Types of flows type of channels – velocity distribution – energy and momentum correction factors - Chezy's mannings and bazin formulae for uniform flow – Most economics sections
Critical flow specific energy - critical depth - computation of critical depth - critical sub-critical and super critical flows
Open channel flow II: non uniform flow dynamic equation for GV mild, critical, steep, horizontal and adverse slopes

UNIT II
surface profiles direct step method, rapidly varied flow, hydraulic jump, energy dissipation
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

UNIT III
Basics of turbo machinery
Hydrodynamic force of jets on stationery and moving flat, inclined and curved vanes, net 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.
Hydraulic turbines - I
Layout of a typical hydropower installation heads and efficiencies classification of turbines pelton wheel, Francis turbine, Kaplan turbine,

UNIT IV
Working proportions, velocity diagram, work done and efficiency, hydraulic design draft tube, theory and function efficiency.
Hydraulic turbines II: governing of turbines sure tanks - unit and specific turbines unit speed unit quantity unit power - specific speed performance characteristics - geometry similarity cavitations

UNITY
Centrifugal Pumps
Hydropower engineering - classification of hydro power plants definition of terms - load factor - utilization factor, capacity factor, estimation of hydropower potential

TEXT BOOKS:
1. Hydraulics and Fluid Mechanics (including Hydraulic Machines) (in SI units) - Dr. P. N. Modi & Seth (19th edition -2013)
2. Open channel flow by K Subramanya - Tata MC Grawhill Publishers
3. Fluid Mechanics & fluid machines by narayana Pillai, Universities Press.

REFERENCES:
1. A text of Fluid mechanic and Hydraulic machines by Dr. RK Bansal Lamxi publication (P) old New Delhi
2. Elements of Open channel flow by Ranga Raju, Tata MC Graw Hill publications
3. Fluid mechanics and fluid machines by Rajput, S chand &n Co
4. Open channel flow by VT chow, MC Graw hills Book company
5. Fluid mechanics and machinery by D ramadurgaiah, new age publications.
II Year B.Tech. Civil - II Sem

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(A54005) ENGINEERING GEOLOGY

COURSE OBJECTIVES:
- Role of geology and geophysics in Civil Engineering structures such as dams, reservoir, tunnels, excavations and man made or natural environmental disasters etc.
- Impact of structural geology, ground water and weathering in civil engineering
- Geological and geophysical implications on and civil structures.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Know the application of geological, geophysical knowledge which will help in construction of resistant, long life civil structures on the earth.
- Distinguishing between strong and weak rock structures and making weak structures strong in construction of dams, tunnels, reservoirs etc.
- Understand that the engineering geology paves the way to produce strong geotechnical engineers which is back bone of civil structures.

UNIT I
Introduction Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of civil engineering construction due to geological draw backs. Importance of physical geology, perology 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 ineralogy definition of mineral, importance of study of minerals, different methods of study of minerals, advantages of study of mineral by physical properties. Role of study of physical properties of minerals in the identification of miners. Study of physical properties of following common rock forming minerals feldspar, quartz, flint, jasper, olivine, agate, hornblende, muscovite, biotite, asbestos, chlorite, kyanite, garnet, talc, calcite, study of other common economics of minerals such as pyrite, hematite, magnetite, chorite, galena, pyrolusite, graphite, magnetite, and bauxite.
UNIT II
Petrology definition of rock. Geological classification of rocks into igneous, sedimentary and metamorphic rocks. Dykes and silt, common structures and textures of igneous, sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic study of granite, dolerite, basalt, pegmatite, laterite, conglomerate, sand stone, shale, limestone, gneiss, schist, quartzite, marble and slate. Rock excavation, stone aggregates.

UNIT III
Structural geology. Indian starigraphy and geological time scale. Out crop, strike and dip study of common geological structures, associating with rocks such as folds, faults unconformities and joints - their important types. Geophysical studies importance of geophysical studies principles of geophysical study by gravity methods, Magnetic methods, electrical methods, seismic methods, radio methods, and geothermal method.

UNIT IV

UNIT V
Ground Water Water table common types of ground water springs, cone of depressions, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precausition to be takes for buildings construction in seismic areas, landslides, landslides hazards, water in landslides and their causes and effect measurers to be takes to prevent the occurrence of importance of study of ground water. earthquake and landslides. Tunnels purpose of tunnelling effects of tunnelling on the ground role of geological consideration ( litho logical, structural and ground water ) in tunnelling over break and lining in tunnels, tunnels in rock. Subsidense over old mines. Mining substances.
TEXT BOOKS:
1. Principles of engineering geology by KVGK Ghkhale - BS publications
2. Engineering geology by N Chankesavulu, MAC Millan Punishers, 2nd edition India 2009

REFERENCES:
1. F.G Bell Fundamental of engineering geology Butterworths publications, New Delhi. 1992
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics CBS Publishers & Distribution
II Year B.Tech. Civil - II Sem

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**(A54201) SURVEYING LAB - II**

**COURSE OBJECTIVES:**
- To impart the knowledge of handling the theodolites and other advanced equipment in surveying.
- To provide the knowledge of aerial photograph and satellite images.
- To provide the knowledge of usage and working principles of total station.

**COURSE OUTCOMES:**
On successful completion of this course, it is expected that the students will be able to,
- Understand the usage of total station for all kinds of survey.
- Know the drawing of contours and the evaluation of areas and volumes.
- Get innovative ideas of fast surveying.

**List of Experiments:**
1. Study of Theodolite in detail - Practice for measurement of horizontal and vertical angles
2. Measurement of Horizontal angles by method of repetition and reiteration
3. Trigonometric leveling - Heights and distances problems (Two exercises)
4. Heights and distances using principles of tacheometric surveying (Two Exercises)
5. Curve Setting - Different methods (Two exercises)
6. Setting out works for building and pipe lines
7. Determine of area using Total Station
8. Traversing using total station
9. Contouring using total station
10. Determination of remote height using total station
11. State out using total station
12. Distance, gradient differential height between two inaccessible points using Total Station.
13. Study and interpretation of Aerial photographs and satellite imagery
14. Study of topographic map
15. Map Projections.

**Note:** Any 10 experiments may be completed from the list given above.
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II Year B.Tech. Civil - II Sem  

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(A54202) ENGINEERING GEOLOGY LAB

COURSE OBJECTIVES:
- Determination of Physical and Optical properties of rocks and economic ore minerals
- Delineation of geological subsurface structures by solving structural problems
- Understanding features of geological maps and its applications.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Student can identify important rocks, minerals, ore minerals based on Physical and optical properties to distinguish between strong and weak rocks
- Students can unravel the surface and subsurface geological structures for taking appropriate decision to either construct or to strengthen the existing geological structures for raising civil structures

1. Study of physical properties and identification of minerals referred under theory
2. Megascopic and microscopic description and identification of rocks referred under theory
3. Megascopic and microscopic identification of rocks and minerals
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc,
5. Simile structural geology problems.

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 geological section
4. Simple strike and dip problems
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(Autonomous)

II Year B.Tech. Civil - II Sem  

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(A54203) FLUID MECHANICS AND HYDRAULIC MACHINARY LAB

COURSE OBJECTIVES:
• To understand the measurement of flow through open channels and pipes and the problems faced there in.
• To provide the knowledge of working principles of various pumps and turbines.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Understand the flow measuring equipment and their functioning.
• To know the usage of pumps and turbines.

List of Experiments
1. Calibration of venture meter
2. Calibration of Orifice meter
3. Determination of Coefficient of Discharge of Orifice
4. Determination of Coefficient of Discharge of Mouthpiece
5. Calibration of contracted Rectangular Notch
6. Calibration of contracted Triangular Notch
7. Determination of Friction factor of a pipe.
8. Determination of Coefficient for minor losses.
9. Verification of Bernoulli's Equation.
10. Impact of Jet on Vanes.
13. Performance test on Francis turbine
14. Performance characteristics of a single stage centrifugal pump.
15. Performance characteristics of a multi stage centrifugal pump.
16. Performance characteristics of a reciprocating pump.

Note: Any 10 experiments may be completed from the list given above.