Choice Based Credit System (CBCS)

Name of the Programme (UG):B.E

Syllabus for III - Semester and IV - Semester

With effect from 2017 - 2018

Specialization /Branch: Civil Engineering

Chaitanya Bharathi Institute of Technology (A)
Chaitanya Bharathi (P.O), Gandipet
Hyderabad-500075, Telangana State.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Choice Based Credit System
B.E. (Civil Engineering)

SEMESTER – III

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16CE C03	Surveying	4	-	3	30	70	4
2	16CE C04	Building Materials Planning&Constructions	3	1	3	30	70	4
3	16CE C05	Strength of Materials-1	3	-	3	30	70	3
4	16CE C06	Engineering Geology	3	-	3	30	70	3
5	16MT C05	Engineering Mathematics III	3	-	3	30	70	3
6	16MB C01	Engineering Economics & Accountancy	3	-	3	30	70	3
PRACTICALS								
7	16CE C07	Surveying Lab - 1	-	3	3	25	50	2
8	16CE C08	Engineering Geology Lab	-	2	2	15	35	1
9	16CE C09	Computer Aided Civil Engineering Drafting Lab	-	2	2	15	35	1
TOTAL			**19**	**8**	**-**	**235**	**540**	**24**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Assessment Procedures for Awarding Marks

The distribution of marks is based on internal assessment (Sessional) by concerned teacher and the Semester end examination shall be as follows:

Course (in terms of credits)	CIE	Semester end Examination (Marks)	Remarks	Duration of Semester End Examination
Three(3) Credits/ Four(4) Credits	30*	70**	Theory Course/ Engg . Graphics	3 Hours
Two(2) Credits	20*	50***	Theory	2 Hours
Two(2) Credits	25	50	Lab Course/Workshop	3 Hours
One(1) Credit	15	35	Lab Course	2 Hours
Two(2) Credits	50	—	Project Seminar/Seminar	----
Six(6) Credits	50	100	Project	Viva
One(1) Credit	—	50***	Environmental Studies, Professional Ethics and Human values	2 Hours
One(1) Credit	50		Mini Project	-----

CIE: Continuous Internal Evaluation

* Out of 30/20 sessional marks(CIE), 10/5 marks are allotted for slip-tests(Three slips test will be conducted, each of 10/5 marks, best two average is considered) and the remaining 20/15 marks are based on the average of two tests, weightage for each test is 20/15 marks.

** The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 20 marks. Part-B carries 50 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

***The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 15 marks. Part-B carries 35 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

Note:A course that has CIE(sessional marks) but no semester end examination as per scheme, is treated as Pass/Fail for which pass marks are 50% of CIE.

A candidate has earned the credits of a particular course, if he/she secures not less than the minimum marks/ grade as prescribed. Minimum pass marks for theory course is 40% of total marks i.e., CIE plus semester end examinations where as for the lab course/project is 50%.

SURVEYING

Instruction	4 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives :

1. To enable the student understand the basic principles of surveying and its role in civil engineering.
2. To make the student understanding about the levelling operations and methods of computations for finding areas and volumes.
3. To enable the student to get acquainted with simple angular measurements and understanding the operations of modern instruments like Total station and GPS instruments .
4. To make the student to know about the computation data required for setting curves like simple ,compound and reverse curves.
5. To enable the student to understand the role of transition curve and the data necessary for setting vertical curves.

Course out comes:

1. To use the instruments like chain, compass and plane table and gets an idea about the circumstances in which they can be used in field.
2. To know the methods of levelling along with developing of contours and use the contours in civil engineering related problems.
3. To get exposure to the modern instruments like Total station and GPS instruments.
4. To be in a position to set various horizontal curves .
5. To be able to compute the data required for setting vertical curve and able to understand the difference between transition curve and other horizontal curves.

UNIT1:

Principles of surveying, objectives of surveying and classifications of surveying, Basic principles of Chain surveying, types of chains and accessories required for chain surveying various lines used in chain survey, computation of areas using offsets, principles of compass survey, concepts of meridians, bearings and systems of measuring bearings and computations of angles from bearings. Principles of Plane table surveying accessories required for plane table survey, Radiation, intersection and concepts of resection.

UNIT-II:

Levelling : Concepts of levelling, terms used in levelling, reduction of levels, types of levelling, corrections in levelling, errors in levelling, Contours- definition, contour interval, characteristics, methods of contouring and interpolation and uses of contours, estimation of volumes using Trapezoidal and Simpson's method.

UNIT-III:

Theodoiite- introduction, terms used , fundamental lines, uses ,traversing - types, checks, plotting, consecutive coordinates- Total coordinates, balancing of traverse, Gale's traverse table, Errors in theodolite survey, omitted measurements, Total station - working principle and its applications in surveying. Fundamental principles of tachometry, concepts of fixed hair method of tachometric survey. GPS survey - working principles, methods of GPS survey.

UNIT-IV:

Curves- types, designation of curves, terms used in curves, elements of curves, Angular methods of setting of simple curves, elements of reverse and compound curves.

UNIT-V:

Transition curves- principles, fundamental equation of transition curve , length of transition curves-arbitrary gradient, time rate, rate of change of radial acceleration, ideal transition curve- modified, cubic parabola and spiral curves. Vertical curves- types, chord gradient method and tangential correction methods of finding elevations.

Text Books:

1. C. Venkata Ramaiah, "A Text book of Surveying", University press, Hyderabad, 1997.
2. B.C. Punmia "Surveying vol. I and II", Laxmi Publications, 1994.

Suggested Reading:

1. T.P. Kanetker and S.V.Kulkarni Surveying and Levelling, PuneVidyarthi Gruha Prakashan, Pune,1994.
2. AM. Chadra, "Plane Surveying", New Age International", 2007.
3. Dr. K.R. Arora, "Surveying", Standard Book House, 2011.
4. R. Subramanyam, " Surveying and leveling", 2nd edition oxford university press, New Delhi.

16CE C04

BUILDING MATERIALS PLANNING & CONSTRUCTION

Instruction	3T+1D Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives: To enable the student

1. To study about the basic building materials, properties and their applications.
2. To know the smart building materials, types of paints and varnishes.
3. To understand different types of masonries and their applications
4. To acquire concepts in building planning, arrangement of windows, doors, electrical and plumbing services.
5. To acquire ability to draw, plan, section, elevation of buildings with a flat /sloped roof.

Course outcomes:

At the end of the course the student is able

1. To identify various building materials and select suitable type for given situation.
2. To know different types of masonry, types of bonds used in construction of walls of buildings.
3. To know the different types of doors, windows , roofs, stair used in building works.
4. To plan suitable types of building for given requirement including arrangement of electrical and plumbing services.
5. To prepare plan, section and elevation of building with flat / sloped roof of client requirement.

UNIT-I:

Traditional Building Materials: Properties, Types, Applications and testing of traditional building materials, Mud, Stone, Timber & Brick, Cement Fly Ash Sand, Aggregate Mortar, Concrete and Steel.

UNIT-II:

Emerging Building Materials: Smart and Eco Friendly materials - Sustainable materials - Recycled materials.

Miscellaneous Materials: Paints, Varnishes and Distembers - Water proofing materials and other construction chemicals.

UNIT - III:

Building Elements: Walls - Brick and Stone Masonry Walls **Brick Bonds:** Plan and isometric view of wall junctions for half brick wall ; one and one and a half brick wall. Brick masonry courses for odd and even courses of English and Flemish bond.

Stone Masonry: Elevation, sectional plans and cross sections of walls of Ashlar , CRS I and II sorts, URCS and RR stone masonry.

Doors and Windows: Various types and advantages - Introductory concepts and types of Roofs, beams, columns, Foundations and stairs. Different types of steel sections and roof trusses.

UNIT-IV:

Concepts of Building Planning: Types of Buildings, Functional needs and differences in their planning requirements - Introduction to building byelaws - Provisions of National Building code - Conventional Representation of building materials and elements in plans and sections - Representations of electrical and plumbing services - planning a single storied residential building with one, two and three bedrooms - preparation of drawings.

UNIT-V:

Drawing of plans, sections and elevations and sections of a single storey 1,2 and 3- bed room residential buildings and an industrial shed with steel roof trusses mounted on steel stanchions.

Text Books:

1. Sushil kumar, "Building Construction", Standard Publishers,1992.
2. S.P.Arora & S.P.Bindra, "A text book of Building Construction", Dhanpat Rai Publications.

Suggested Reading:

1. P.C. Vergiees -Building materials and construction.
2. CBRI Rookee, "Advance in Building Materials and construction".
3. NIIT, Chandigarh - Civil Engineers Material.
4. National Building Code of India, 2006.

STRENGTH OF MATERIALS - I

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives: To enable the student

1. Understand the basic concept of the stress and strain and stress - strain behaviour of different materials.
2. Draw shear force and bending moment diagrams for statically determinate beams.
3. Understand bending stress and shear stress.
4. Comprehend compound stresses, direct and bending stresses in beams.
5. Analyze thin and thick cylinders for fluid pressure and /or shrink fit pressures and to analyze perfect frames by different methods.

Course Outcomes: At the end of the course the students are able to

1. Evaluate the strength of various Civil Engineering materials, against structural actions such as compression, tension, shear and bending.
2. To compute Shear force and Bending moment of statically determinate beams.
3. To suggest suitable material and sections from among the available, for use in Civil Engineering context.
4. To evaluate the behaviour and strength of Civil Engineering materials under the action of compound stresses and thus understand failure concepts.
5. To design thin and thick cylinders for resisting internal and external pressures and to evaluate forces in the members of truss / frames.

UNIT-I:

Simple Stresses and Strains: Various types of stresses and strains. Hooke's law, Modulus of Elasticity. Stress-Strain curve for ductile & brittle materials. Working stress and factor of safety. Deformation of bars of uniform, varying and tapering sections under axial loads. Elongation of bars due to self weight. Bars of uniform strength. Compound bars and temperature stresses. Statically indeterminate problems in tension and compression.

Elastic Constants: Poisson's ratio, volumetric strain and derivation of relationship between elastic constants.

UNIT-II:

Shear force and Bending moment: Different types of beams and loads- Shear force and bending moment diagrams for cantilever, and simply supported beams with and without over hangs subjected to different kinds of loads viz, point loads, uniformly distributed loads, uniformly varying loads and couples- Relation between loading, shear force and bending moments.

UNIT-III:

Bending stresses in Beams: Assumptions in theory of simple bending- Derivation of bending equation, Moment of resistance -Calculation of stresses in statically determinate beams for different loads and different types of structural sections.

Shear stresses in Beams: Equation of shear stresses, distribution across rectangular, circular, triangular, I, T, H and diamond sections .

UNIT-IV:

Direct and bending stresses : Basic concept, Eccentric loading, limit of eccentricity - core of sections-rectangular and circular, solid and hollow sections.

Compound Stresses and Strains: Stresses on oblique planes, principal plane and principal stresses. Ellipse of stress and Moh's circle of stress.

UNIT-V:

Thin cylinders: Thin cylinders subjected to internal fluid pressure. Volumetric change Wire winding of thin cylinders.

Thick cylinders & spheres: Lame's equations, stresses under internal and external fluid pressure. Compound cylinders-shrink fit pressure.

Analysis of perfect frames / truss: Analysis of trusses by method of joints and method of sections.

Text Books:

1. B.C.Punmia, Mechanics of Materials, Laxmi publishers, Delhi, 2011.
2. S.Ramamrutham, Strength of Materials, Dhanpat Rai & Sons, Delhi, 2012.

Suggested Reading:

1. S.B. Junnarkar, Mechanics of structures (Vol-I & Vol-II), Charotar Publishing house.
2. D.S. Prakash Rao, Strength of Materials-A Practical Approach, Universities Press, Hyd 1999.
3. E.P. Popov, Engineering Mechanics of solids, 1993.
4. G.H. Ryder, Strength of Materials, 3rd Edition in SI units, Macmillan India Ltd,
5. A.Pytel and F.L.Singer, Strength of Materials , Harper & Row , 4th Edition, New York,1987.

16CE C06

ENGINEERING GEOLOGY

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives :

1. Enable the student know about various types of rocks, their orgin, formation and geological structures.
2. Enable the student understand the occurrence and movement of ground water and know the provinces of ground water in India.
3. Enable the student understand the engineering properties of rocks and their stress-strain behaviour.
4. Enable the student get the concepts of geological investigations on a site.
5. Enable the student understand the geology of dams, tunnels and also get the awareness of geological hazards.

Course Outcomes:

1. To identify various types of rocks, their properties, utility and suitability for construction purposes.
2. To identify various rock deposits in India and thus suggest suitable types of foundation.
3. To implement the geological investigations on site.
4. To suggest suitable measures for the construction of Dam and Tunnels.
5. To suggest suitable preventive / remedial measures as part of mitigation and management of geological Hazards.

UNIT-I

Rocks: Distinguishing feature of Igneous, Sedimentary and Metamorphic Rocks, Geological description of Granite, Basalt, Dolerite, Gabbro, Laterite, Sandstone, Shale, Limestone, Slate, Gneiss, Quartzite and Marble, Khondalite and charnocite.

Geological Structures: Folds , Fractures (joints)and faults - Fundamental types, mechanism, originand classifications, field identification and Engineering analysis of folds, Fracture (joints) and faults as mechanical defects of rock masses.

UNIT-II

Rock weathering: Processes and end products of weathering, Susceptibility of rocks to weathering, assessment of the degree of weathering, Tests of weather ability, and engineering and Engineering classifications of rock weathering.

Geology of Soils: Formation of soils, nature of parent materials, relative stability of minerals, important clay minerals, geological classification ,description and engineering types of soils and Uses.

Hydrogeology: Hydrological Cycle, water table, aquifers, occurrence of ground water in various lithological formations, Ground water movement, springs, ground water exploration, Ground water provinces of India.

UNIT-III

Rock Mechanics: Engineering properties of rocks, Stress - strain behaviour of rocks.

Site Investigation and Geo techniques: Geological maps and aerial photographs. Electrical Resistivity and seismic refraction methods, Bore hole drilling., suspension, Ground anchors.

UNIT-IV

Rocks as a construction material: Geological considerations in the selection of concrete roofi aggregate, Highway and Runway aggregates, Building stones, Decorative Facing stones. Geology of Dams and **Reservoirs:** Types of dams, Dam foundation and reservoirs, Engineering geological investigations for a masonry dam site; analysis of dam failures in the past .Engineering Geology of major dam sites of India.

UNIT-V

Tunnels: Stand-up time of different rocks, Engineering geological investigations of tunnels in rock, problems in tunneling, pay line and over break, logging of tunnels and Geology of some well known tunnels.

Geological Hazards: Geographical aspects of earthquake, tsunamis and landslides. Disaster prevention Mitigation and management.

Text Books:

1. Parbin singh, "A Text Book of Engineering and General Geology", Eighth revised edition, S.K. Kataria & Sonce, 2010.
2. Chenna Kesavulu.N, "A Text Book of Engineering Geology", Macmillan, 2004.
3. Dugal S.K etal.,"Engineering Geology",McGraw Hill Education(India) (P)Ltd., 2014.

Suggested Reading:

1. Fundamentals of Engg. Geology, F.G.Bell, Butterworths Publications, 1980, Aditay Books Pvt Ltd., New Delhi, 1992.
2. Krynine& Judd, Principles of engineering Geology & Geotechnical, CBS Publishers and Distributors, First Edition, 1998. Additional Reading.
3. P.B.Attewell and I.W. Farmer, Principles of Engineering Geology, Chapman and Hall 1976.
4. Officers of the Geological Survey of India, 'Engineering Geology Case Histories MiscilleaneousPublication No. 29, 1975.
5. K.S.Valdiya, 'Environmental Geology', Tata McGraw Hill, 1987.
6. R.V.G.K. Gokhale, Engineering Geology, BS publishers, 2005.

ENGINEERING MATHEMATICS-III

Instruction:	3 Hours per week
Duration of End Examination:	3 Hours
Semester End Examination:	70 Marks
Continuous Internal Evaluation:	30 Marks
Credits:	3

Course objectives:

1. To study the expansion of functions in various intervals.
2. To form P.D.E and to find its solution.
3. To solve Wave, Heat & Laplace equations.
4. To learn Differentiation and Integration of complex valued functions.
5. To evaluate Complex Integration.
6. To evaluate Real definite integrals.

Course outcomes: On the successful completion of this course the student will be able to

1. Expand functions in the given intervals.
2. Solve linear and non linear PDEs.
3. Solve one-dimension, two-dimension, Heat steady state equations and also one-dimension wave equation.
4. Solve problems on Analytic functions, Cauchy's theorem and Cauchy's integral formula.
5. Expand functions by using Taylor's and Laurent's series.
6. Solve Real and Complex integrals by using Cauchy Theorems.

UNIT - I

Fourier series: Definition of Periodic, Single valued, finite maxima and minima of functions. Euler's Formulae, Dirichlets Conditions for Fourier expansion, Functions having points of discontinuity, Change of interval, Expansion of odd and even functions, Half-range sine series and cosine series.

UNIT-II:

Partial differential equations: Formation of partial differential equations by eliminating the arbitrary constants or arbitrary functions, solutions of linear partial differential equation of first order by using Lagrange's Method, solution of Non-linear partial differential equations of first order by using standard types, Charpit's Method.

UNIT - III

Applications of Partial differential equations: Solution of partial differential equations by using method of separation of variables, solution of vibration of a stretched string (1D-Wave equation), one dimensional heat equation, Two dimensional heat equation under steady state conditions.

UNIT - IV

Theory of Complex variables: Analytic functions, Cauchy Riemann equations (Cartesian and polar forms), construction of Analytic functions by using Milne-Thomson's method. Harmonic function. Complex line integrals, Cauchy's theorem, Cauchy's Integral formula and its derivatives and problems related to the above theorems.

UNIT - V

Expansion of functions, Singularities & Residues: Taylor's and Laurent's series Expansions (Only statements). Zeros, types of singularities, Residues and Cauchy's Residue theorem, Evaluation of real integrals by Cauchy's residue theorem. Evaluation of Improper real integrals of the type: $\int_{-\infty}^{\infty} f(x)dx$ Where f(x) has no poles on real axis and $\int_0^{2\pi} f(\sin\theta,\cos\theta)d\theta$

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, 2015.
2. M.D. Raisinghania, "Advanced Differential equations", 7th edition, S Chand publishers, 2013.
3. J. W. Brown and R. V. Churchill, "Complex Variables and Applications", 7th edition, McGraw Hill publishers, 2003.

Suggested Reading:

1. N P Bali and Manish Goyal, "A Text Book of Engineering Mathematics", 9th Edition, Laxmi publishers, 2016.
2. Alan Jeffrey, "Mathematics for Engineers and Scientists", 6th Edition, Chapman & Hall/CRC publishers, 2013.
3. A R Vasistha and R K Gupta, , "Integral transforms", Krishna prakashan publishers, 2004.
4. R.K.Jain & S.R.K.Iyenger, "Advanced Engineering Mathematics", 3rd edition, Narosa Publications, 2007.

16MB C01

ENGINEERING ECONOMICS AND ACCOUNTANCY

Instruction	3 hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Course Objectives: The Objectives of the course are:

1. to introduce managerial economics and demonstrate its importance in managerial decision making.
2. to develop an understanding of demand and relevance of its forecasting in the business.
3. to provide the basics of market structure and the concept of equilibrium in different market structures.
4. to examine the economic analysis of production process, types of inputs and to explain different costs and their relationship with the output.
5. to understand the importance of project evaluation in achieving a firm's objective.
6. to explain the concept of Accountancy and provided knowledge on preparation and analysis of Final accounts.

Course Outcomes: After completion of the course, student will be able to:

1. apply fundamental knowledge of Managerial economics concepts and tools.
2. understand various aspects of demand analysis and forecasting.
3. understand price determination for different markets.
4. study production theory and analyze various costs & benefits involved in it so as to make best use of resources available.
5. analyze different opportunities and come out with best feasible capital investment decisions.
6. apply accountancy concepts and conventions, Final accounts and financial analysis.

UNIT-I:

Introduction to Managerial Economics

Introduction to Economics and its evolution - Managerial Economics - its scope, importance, Its usefulness to engineers - Basic concepts of Managerial economics.

UNIT-II:

Demand Analysis

Demand Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting - Types of Market structures. (Simple numerical problems).

UNIT-III:

Production and Cost Analysis

Theory of Production - Firm and Industry - Production function - input-out relations - laws of returns - internal and external economies of scale. Cost Analysis: Cost concepts - fixed and variable costs - explicit and implicit costs - out of pocket costs and imputed costs - Opportunity cost - Cost output relationship - Break-even analysis. (Theory and problems).

UNIT-IV:

Accountancy

Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments.

UNIT-V:

Capital Budgeting

Introduction to capital budgeting, Methods: traditional and discounted cash flow methods. Introduction to Working capital management. (Numerical problems).

Text Books:

1. Mehta P.L., "Managerial Economics - Analysis, Problems and Cases", Sultan Chand & Son's Educational publishers, 2013.
2. Maheswari S.N. "Introduction to Accountancy", Vikas Publishing House, 2013.
3. Panday I.M. "Financial Management", Vikas Publishing House, 11th edition, 2015.

Suggested Readings:

1. Varshney and KL Maheswari, Managerial Economics, Sultan Chand, 2014.
2. M.Kasi Reddy and S.Saraswathi, Managerial Economics and Financial Accounting, Prentice Hall of India Pvt Ltd, 2007.
3. A.R.Aryasri, Managerial Economics and Financial Analysis, McGraw-Hill, 2013.

SURVEYING LAB - I

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. To know the use of simple survey instruments in the field.
2. To develop topo maps from the field data.
3. To be in a position to choose the appropriate methods for the solution of field problems.
4. To be in a position to obtain data precisely.
5. To know how to create north and mark in the field and use it for obtaining bearings.

Course Out comes : At the end of the course the student should have learnt

1. To locate the objects, measure the distances and areas and transfer the same on to the drawings.
2. To suggest suitable solution for practical field problems such as two point and three point problems.
3. To develop L.S and C.S for road works, Canal works, using Auto levels.
4. To attain skill and expertise in traversing works using Theodolite by various methods.
5. To understand and apply the necessary checks and practicing to choose appropriate method for balancing a traverse.

LIST OF EXPERIMENTS

1. Practicing of direct and indirect ranging and measuring the distance using Chains and tapes.
2. Location of objects using a chain and tape and plotting the same.
3. Use of prismatic compass for measuring the area of a given land.
4. Introduction to plane table work. - Radiation and inter section methods.
5. Solution to resection by Two point problem.
6. Solution to resection by Three point problem using trial and error method and tracing paper methods.
7. Introduction to levelling - Fly levelling using Dumppy level.
8. Development of L.S. and C.S after obtaining levels by using Auto levels.

9. Measurement of horizontal angles by Repetition method using Theodolite.
10. Measurement of horizontal angles by Reiteration method using theodolite.
11. Traversing by theodolite and balancing of traverse.

Suggested Readings:

1. C. Venkata Ramaiah, "A Text book of Surveying", University press, Hyderabad, 1997.
2. B.C. Punmia "Surveying vol. I and II", Laxmi Publications, 1994.

ENGINEERING GEOLOGY LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To enable the student understand the properties of minerals and characteristics of various rocks.
2. To enable the student study various structural models of rocks and understand the concepts of folds, faculty and unconformities.
3. To enable understand the electrical resistivity behaviour of rocks, soils and waters.
4. To enable the student know the distribution of building stones across India.
5. To enable the student understand the geological, geomorphologial and seismo ectonic aspects of the state and the country.

Course Out comes : At the end of the course the student should have learnt

1. To identify various types of minerals and rocks by their properties and characteristics.
2. To identify the folds, faults and unconformities in rocks and suggest necessary steps.
3. To suggest suitable measures before the construction of important structures like Dams, Bridges, Nuclear power plants, Sky scrapers across India, giving due reference to the distribution of various foundation rocks of that part of India.
4. To suggest on the ground water aspects, keeping in view the electrical resistivity aspects of soil/rock in that locality.
5. To contribute for the prediction of earthquakes, with the knowledge of seismo tectonic aspects of the country.

LIST OF EXPERIMENTS

1. Identification and Description of physical properties of minerals.
2. Identification and Description of Geotechnical characteristics of Rocks IS code:123(1975).
3. Determination of Apparent Specific gravity and Porosity and Water Absorption of different Rocks IS Code: 1124 (1974).
4. Study of Structural Models (folds, faults and unconformities).

5. Measurement of strike and dip of joints in granites using clinometer Compass- a field experiment.
6. Measurement of Electrical Resistivity of rocks, Soils and waters - a lab. Expt.
7. Vertical Electrical sounding - a filed Expt.
8. Study of Geological Maps of Andhra Pradesh and India w.r.t. the distribution of Building Stones.
9. Study of Geological Map of India and Geomorphologic Map of India.
10. Study of Hydro geological Maps of Andhra Pradesh and India.
11. Study of tectonic Map of India, Seismo tectonic Atlas of India and Seismic Zoning Map of India.
12. Study of Maps and Sections pertaining to the Foundation Geology of Major Dam sites of India.
13. Study of Topographic maps.
14. Study of maps showing geological consideration of dams, Bridges, nuclear power plants, sky scrapers.

Suggested Reading:

1. Parbin singh, "A Text Book of Engineering and General Geology", Eighth revised edition, S.K. Kataria & Sonce, 2010.
2. Chenna Kesavulu.N, "A Text Book of Engineering Geology", Macmillan, 2004.
3. Dugal S.K etal.,"Engineering Geology",McGraw Hill Education(India) (P)Ltd. 2014.

16CE C09

COMPUTER AIDED CIVIL ENGINEERING DRAFTING LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To enable the student learn the fundamentals of computer aided drafting.
2. To enable the student create Civil Engineering drawings such as plans and elevations of buildings.
3. To enable to student learn different styles of defining such as tests, icons, insertion of building elements etc.
4. To enable the student learn the aspects of dimensioning, hatching etc.
5. To enable the students to develop survey maps using different features in CAD.

Course Out comes : At the end of the course the student should have learnt

1. To use basic drafting tools and create Civil Engineering drawings.
2. To adopt different commands in creation of objects.
3. To acquaint various techniques for faster implementation with different combinations of commands.
4. To improve the presentation of the drawing by using defining tools, dimensioning, hatching etc.
5. To draw detailed schemes and working drawings up to 2-D single storey buildings.

LIST OF EXPERIMENTS

1. **CAD :** Introduction to Computer Aided Drafting - features and Environment.
2. **Coordinates and Basic Drafting Tools:** Exercises pertaining to basic building elements to illustrate use of absolute coordinates, relative Cartesian coordinates. Object tools, such as SNAP and GRID.
3. **Display Commands:** Drawing Scale & View magnification, zooming and panning Commands.

4. **Creating and Editing 2D Geometry:** Creating LINE objects, creating CIRCLE, ARC, ELLIPSE and VARIUOS POLYGONS. Introduction to POLYLINE. Use of editing and modifying commands.
5. **Construction Techniques:** Tools to assist drafting - Creating Offsets, Trimming and extending of lines, Filtering of corners, creating multiple objects through Mirroring and Array Generation.
6. **Managing Object Properties:** Concept Significance of Layers and its applications in building drawing - Use of different types of lines and their weightages.
7. **Creating Text and Defining Styles:** Exercises in adding text to the drawing. Management of text styles.
8. **Introduction to Blocks:** Significance of blocks in drawing - creating blocks of common building elements and their insertion.
9. **Dimensions and Hatching:** Addition of dimensions to the drawing - Dimension style management - Hatching of sections - styles of hatch.
10. 2-D Single story building plan.

Suggested Reading:

1. M.G. Shah, C.M. Kale and S.Y. Patki, Building Drawing , Tata Mc Graw-Hill Book Co., 2002.
2. Mastering Autocad, BPB Publications, 2000.
3. A. Balagopal and T.S. Prabhu, Building Drawing and Detailing, Spades publishers, Calicut, 1987.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Choice Based Credit System
B.E. (Civil Engineering)

SEMESTER – IV

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16CE C10	Transportation Engineering	4	-	3	30	70	4
2	16CE C11	Construction Mangaement and administration	3	-	3	30	70	3
3	16CE C12	Water & Waster Water Engineering	4	-	3	30	70	4
4	16CE C13	Strength of Materials-II	3	-	3	30	70	3
5	16CE C14	Fluid Mechanics-I	3	-	3	30	70	3
PRACTICALS								
6	16CE C15	Strength of Materials Lab	-	3	3	25	50	3
7	16CE C16	Lurvey Lab - II	-	3	3	25	50	2
8	16EG C03	Soft Skills and Employ-ability Enhancement Lab	-	2	2	15	35	1
9	16CE C17	Mini Project-Survey Camp	-	-	-	50	-	1
TOTAL			**18**	**8**	**-**	**265**	**485**	**24**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Assessment Procedures for Awarding Marks

The distribution of marks is based on internal assessment (Sessional) by concerned teacher and the Semester end examination shall be as follows:

Course (in terms of credits)	CIE	Semester end Examination (Marks)	Remarks	Duration of Semester End Examination
Three(3) Credits/ Four(4) Credits	30*	70**	Theory Course/ Engg . Graphics	3 Hours
Two(2) Credits	20*	50***	Theory	2 Hours
Two(2) Credits	25	50	Lab Course/Workshop	3 Hours
One(1) Credit	15	35	Lab Course	2 Hours
Two(2) Credits	50	—	Project Seminar/Seminar	----
Six(6) Credits	50	100	Project	Viva
One(1) Credit	—	50***	Environmental Studies, Professional Ethics and Human values	2 Hours
One(1) Credit	50		Mini Project	-----

CIE: Continuous Internal Evaluation

* Out of 30/20 sessional marks(CIE), 10/5 marks are allotted for slip-tests(Three slips test will be conducted, each of 10/5 marks, best two average is considered) and the remaining 20/15 marks are based on the average of two tests, weightage for each test is 20/15 marks.

** The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 20 marks. Part-B carries 50 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

***The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 15 marks. Part-B carries 35 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

Note:A course that has CIE(sessional marks) but no semester end examination as per scheme, is treated as Pass/Fail for which pass marks are 50% of CIE.

A candidate has earned the credits of a particular course, if he/she secures not less than the minimum marks/ grade as prescribed. Minimum pass marks for theory course is 40% of total marks i.e., CIE plus semester end examinations where as for the lab course/project is 50%.

TRANSPORTATION ENGINEERING

Instruction	4 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives: To enable the student

1. Understand the design concepts of the highways, the quality of the materials required for the construction of highways and different techniques used in construction of flexible and rigid pavements.
2. Know how to collect the field data for the evaluation of traffic patterns.
3. To get an idea about the concepts of designing flexible and rigid pavements.
4. Know the requirements for designing the railway tracks and the material required for the construction of permanent way.
5. Get an idea for the planning of airports and fixing of run way orientation and also applying the various corrections.

Course Outcomes: At the end of the course, the student

1. Know how to apply various IRC Standards for the Geometric design of highways.
2. Applies the Pavement design concepts to different types of pavement and analyze the collected field data and carries out the process for design of traffic management techniques.
3. Takes precautions required for the execution of construction of pavements and applies relevant IRC standards.
4. Is able to apply the design concepts of super elevation of railway curves and knows the requirements for the permanent way.
5. Knows how to select a site for airport construction and also knows how to fix the run way orientation and the circumstances in which the corrections to the run way length are to be applied.

UNIT-I:

Highway alignment and geometric design: History of highway engineering, factors to be considered for highway alignment, engineering surveys, obligatory points. Geometric design - Highways classification as per IRC and its standard dimensions, carriageway, shoulders, medians, right of way, footpaths, cycle tracks, service roads, frontage roads, sight distance, stopping sight distance, overtaking sight distance. Camber,

horizontal curves, super-elevation, transition curve, extra widening, gradient, grade compensation and design of vertical curves.

UNIT- II:

Traffic engineering: Objectives of traffic studies, traffic characteristics, volume, speed, density, headways and relationship among them. Traffic volume studies, speed and delay studies, intersection delay studies, highway capacity and level of service concept as per HCM 2000, origin and destination studies, intersection improvement studies at grade, need of grade separated intersections, channelization, rotary planning and design, concept of signal design, parking and accident studies.

UNIT-III:

Highway materials & Pavement design: Various properties of highway materials, pavement types, factors to be considered for pavement design, structural difference between flexible and rigid pavement design. Flexible pavement design - concept of layer theory, design wheel load, ESWL, EALF, vehicle damage factor, design by CBR developed by US corps of engineers, IRC cumulative standard axles method (IRC - 37: 2013). Rigid pavement design - concept, wheel load stresses analysis by Westergaard. Sub-grade, dry lean concrete, radius of relative stiffness. Modulus of sub grade reaction and other characteristics of concrete, critical wheel load and temperature stresses. Longitudinal and transverse joints, contraction joints, expansion joints, construction joints, dowel bars and tie bars functions.

UNIT-IV:

Railway Engineering: Introduction to Railways, permanent way component parts and its functions. Rails - various types, functions, creep in rails, creep measurement, coning of wheels and rail fixations. Sleepers - various types. merits and demerits, ballast, various types and sub grade preparation. Railway alignment and geometric design - alignment. super-elevation, negative super elevation, cant deficiency. Example problems. Points and crossing. Layout of left and right hand turnouts. Construction and maintenance of permanent way.

UNIT -V:

Airport engineering: Introduction to air transportation, history and international organizations role in development of airports, air craft types and its characteristics. General lay-out of an airport and its component parts. Site selection of an airport as per ICAO, orientation of runway by wind rose diagrams, basic runway length determination, corrections to basic runway length, geometric design, types of airports as per landing & take-off and dimensions.

Text Books:

1. Khanna. S. K. and Justo, C. E. G (1994), "Highway Engineering", Nemchand& Bros, New Delhi. India.
2. Khanna. S. K. Arora, M. G. and Jain. S. S. (1994) "Airport Planning and Design" Fifth edition. Nem Chand & Bros, Roorkee, India.
3. Chandra, S and Agarwal, M. M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi.

Suggested Reading:

1. McShane, W.R., Roess, R.P. and Prassas, E.S., Traffic Engineering. Prentice Hall. Englewood Cliffs, 1997.
2. Yang, H. and Huang., "Pavement Analysis and Design", Prentice Hall India Ltd-2004.
3. "Highway Capacity Manual", Transportation Research Board, National Research Council. Washington, D.C., 2000.
4. Saxena. S.C and Arora. S, "Text book of railway Engineering" DhanpatRai and Sons. 1988.
5. Relevant IRC codes.

16CE C11

CONSTRUCTION MANAGEMENT AND ADMINISTRATION

Instruction	4 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives: To make the student

1. Understand the significance & aspects of construction management, and principles & types of organization.
2. Understand various planning & controlling tools like bar charts, and network techniques for solving construction problems.
3. Acquire knowledge about Network planning, Project updation &Time-cost analysis.
4. Familiar with construction contracts, project delivery methods, construction safety and laws applicable to construction Industry in India.
5. Understand optimization techniques for decision-making in construction Industry.

Course Outcomes: At the end of the course, student should be able to:

1. Successfully apply management skills in positions within the construction industry.
2. Apply technical skills and knowledge in construction, and technology in support of planning, analyzing, and solving construction problems.
3. Apply professional and ethical standards of behavior in dealing with all stakeholders to manage a quality construction project from start to completion, while maintaining budget, time - schedule, quality and safety requirements.
4. Put in efforts to manage the construction sites accident-free as far as possible and deal with contract management and untoward incidents at construction site efficiently.
5. Apply optimization techniques to decision-making scenarios in professional endeavours.

UNIT-I

Significance of construction management: objectives and functions of construction management, construction management team, principles of organization, types of organization.

UNIT-II

Construction Planning: Large scale production, economics of large scale production. Construction planning, bar charts, network techniques in construction management, CPM and PERT.

UNIT-III

Time Cost Analysis: Cost time analysis in network planning, updating, simple problems of civil engineering works.

Time estimate: expected likely, pessimistic and optimistic time, normal distribution curve and network problems.

UNIT-IV

Contracts: Introduction, types of construction contracts and their advantages and disadvantages, conditions of contracts, safety in safety in construction and safety measures, workmen compensation act, contract labour act. Demolition of Buildings. Tender: Tender form, Tender Documents, Tender Notice, Work Order.

Project Delivery Methods: BOT, SBOO, BOOT; Public Private Partership (PPP), Detailed Report (DPR).

UNIT-V

Optimization: Optimization through linear programming, need for linear programming, linear programming model, graphical method, simplex method and linear programming in construction.

Text Books :

1. Gahlot P.S. and Dhir. B.M., Construction Planning and Management, Wiley Eastern LTd., 1992.
2. Punmia B.C. and Khandelwal, PERT and CPM, Lakshmi Publications 1990.

Suggested Reading:

1. Seetharaman, "Construction Engineering and Management, 4th Edition, Umesh Publications, New Delhi, 1999.
2. Srinath L.S., PERT and CPM: Principles and Application, East West Press, 1975.
3. Mahesh Varma, Construction Planning and Equipment, Metropolitan Book Co. Pvt. LTd., 1985.
4. Taha H., Opeartions Research, Wiley Int., 2002.
5. Gupta .V.K, "Operations Research", S.Chand Publications, 2008.

16CE C12

WATER AND WASTE WATER ENGINEERING

Instruction	4 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives: To enable the student

1. Know how to forecast future population to estimate water demand of any community and also to calculate the head losses in the distribution pipe network analysis.
2. Know the design aspects of sedimentation tanks, clariflocculators and sand filters.
3. Estimate storm water and sewage quantity and design the hydraulics of sewers .
4. Design waste water treatment units in a sewage treatment plant.
5. Study the different sludge disposal methods available and to know about the solid waste management in India and its drawbacks.

Course Outcomes: At the end of the course, the student should have learnt

1. To design the water distribution system based on the population forecast.
2. To design various units of a WTP.
3. To apply the concepts of BOD, COD and TOC in sewerage systems and design of sewers.
4. To design the various treatment units in waste water treatment plant.
5. About solid waste management in India and low cost treatment technologies.

UNIT-I

Introduction: Necessity of protected water supply and sanitation. Water demand and per capita consumption, factors affecting population forecasts.

Water supply: Sources of water and quality parameters, standards of potable water, infiltration pipes & galleries, intake structures pipes, joints, valves & pumps. Water distribution systems and solution of a simple network using Hardy Cross method.

UNIT-II

Treatment of water: Clarification, sedimentation - Principles. Design of sedimentation tanks, coagu1ation and flocculation, design of a clari-

flocculator. Filtration - Types of filters and filter media. Design principles of slow and rapid sand filters. Backwash mechanisms. Pressure filters.
Disinfections - Necessity and methods, Chlorination of water supplied, action of chlorine, break point chlorination. Ozone and U-V radiations, Removal of hardness, tastes &odour control.

UNIT - III

Domestic sewage: Quantity estimation, quality parameters - BOD, COD and TOC. Sewerage systems, ultimate disposal of sewage. Land and water bodies. Sewage conveyance - Sewer types and appurtenances. Velocity in sewers, Design of a simple sewerage system. Storm water sewers - Storm water estimation by rational method.

UNIT-IV

Waste water treatment: Preliminary treatment, screens, grit chambers. Primary treatment - Sedimentation - rectangular and circular sedimentation tanks. Secondary treatment - sewage filtration - trickling filter design. Activated sludge process - design parameters, secondary clarifier. Design aspects of a sewage treatment facility.

UNIT - V

Sludge: Sludge digestion and disposal methods - septic tanks- design parameters and working principles. Low cost waste treatment - oxidation ponds, Aerated Lagoons.
Solid waste: - Types, source and composition of solid waste. Methods of collection, separation transportation and disposal.

Text Books:

1. G.S. Birdi, Water Supply and Sanitary Engineering, DhanpatRai& Sons; 2002.
2. Garg, S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi, 1994.

Suggested Reading:

1. Peavy H.S, Rowe D.R and Tchobanoglous G, ""Environmental Engineering " Tata McGraw Hill Publications,
New Delhi, 1985.
2. G.M. Fair, J.C. Geyer and D. Okun, "Water and waste Engineering", vol. II, John Wiley & sons, Inc., New York. 1968.
3. Metcalf & Eddy, M.C. "Wastewater Engineering - Treatment & Reuse", Tata McGraw Hill, Publications,
New Delhi, 2003.

STRENGTH OF MATERIALS - II

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives: To enable the students

1. Study the basic concept of deflections of beams using various methods.
2. Draw SFD & BMD for indeterminate beams.
3. Understand the behavior of circular shafts subjected to torsion and also combined bending and torsion; compute the strain energy of members subjected to axial loads, shear, bending and torsion.
4. Know the theory and practical applications of springs and also to understand the failure behavior of columns & struts.
5. Know the concept of unsymmetrical bending and shear centre for different members.

Course Outcomes: At the end of the course, the student is able to

1. Compute deflections in various types of beams under-various types of static loads, using various methods.
2. Determine the moments and shears in indeterminate beams under various types of loadings.
3. Determine the torsional strength of structural members and also to design them to resist a given torque; also to compute strain energy in member under various loading situations.
4. Design various types of springs and also columns & struts.
5. Evaluate the behavior of members under unsymmetrical bending and locate shear centres for different section.

UNIT-I

Slopes and Deflections: Slope and deflections by double integration method and Macalay's Method for cantilever, simple supported beams and overhanging beams carrying point loads, uniformly distributed loads, uniformly varying loads and couples. Moment area method and Conjugate beam method.

UNIT-II

Propped Cantilevers : Cantilever beams on elastic and rigid props for point loads and uniformly distributed loads. Shear force, bending moment diagrams, deflections.

Fixed beams: Analysis of fixed beam & sketching of BMD & SFD , slope and deflections in fixed beams with and without sinking of supports for point loads, uniformly distributed loads, uniformly varying loads.
Continuous beams: Theorem of three moments (Clapyron's theorem) & Analysis of continuous beams with and without sinking of supports by theorem of three moments. Shear force and bending moment diagrams.

UNIT-III

Torsion: Theory of pure torsion solid and hollow circular shafts, strength and stiffness of shafts . Transmission of power. Combined torsion and bending with and without end thrust. Determination of principal stresses and maximum shear stress. Equivalent B.M. and Equivalent T.M.

Strain energy: Strain energy, proof resilience and modulus of resilience. Strain energy in bars subjected to gradually applied loads , suddenly applied and impact loads. Strain energy due to shear, bending and torsion.

UNIT-IV

Springs: Types of Springs & significance, Close and open coiled helical springs under axial load and axial twist. Carriage springs.

Columns and Struts: Emperical formulae Column & Struts, Failure of short, medium & slender column, Different end conditions of columns, Euler's theory for long columns. Rankine-Gordon's formula. Eccentrically loaded columns, Secant and prof. Perry's formulae.

UNIT-V

Unsymmetrical bending of beams: Unsymmetrical bending - Location of neutral axis, maximum stresses for rectangular section. Symmetric channel section.

Shear Centre: Shear stress, shear flow, shear center locating shear center for angle section, channel section and T-section , with one axis of symmetry.

Text Books:

1. B.C.Punmia , Strength of Materials, Laxmi publishers, Delhi, 2011.
2. S.Ramamrutham, Strength of Materials, Dhanpat Rai & Sons, Delhi, 2012.

Suggested Reading:

1. S.B. Junnarkar, Mechanics of structures (Vol-I & Vol-II), Charotar Publishing house, Anand, 2002.
2. D.S. Prakash Rao, Strength of Materials-A Practical Approach, Universities Press, Hyd 1999.
3. E.P. Popov, Engineering Mechanics of solids, 1993.
4. G.H. Ryder, Strength of Materials, 3rd Edition in SI units, Macmillan India Ltd, Delhi, 2012.
5. A.Pytel and F.L.Singer, Strength of Materials , Harper & Row , 4th Edition, New York.1987.

FLUID MECHANICS - I

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand fluid properties, fluid pressure & forces, basic concepts and continuity equation.
2. To understand the fluid motion, energy equation, analyze the forces on various objects.
3. To know various measuring instruments in finding the fluid pressure, velocity, and discharge.
4. To understand and analyze different flow characteristics of laminar and turbulent flows.
5. To study the motion of compressible flows and it's behaviour with different processes.

Course Outcomes: At the end of the course, the student should have learnt

1. To evaluate the various properties of fluid, analyse fluid flow and forces.
2. To apply the various laws and principles governing fluid flow to practical problems.
3. To measure pressure, velocity and Discharge of fluid flow in pipes, channels, and tanks.
4. To apply laws related to laminar and turbulent flow in pipes.
5. To evaluate compressibility of gases and its behaviour, apply energy & continuity equation.

UNIT-I

Fluid Properties and Kinematics: Definition of fluid, Properties of fluids-Density, specific Weight, Specific volume, Specific Gravity, Bulk Modulus, Vapour pressure, Viscosity and Surface tension, Newton's law of Viscosity and its application. Capillarity.

Fluid Statics: Pascal's Hydrostatic Law, Absolute and gauge pressure. Forces on immersed bodies:
Total pressure, center of pressure, pressure on curved surface.
Buoyancy: Buoyancy, Metacentre, stability of submerged and floating bodies.

Fluid Kinematics: Classification of fluid flow- steady unsteady, uniform, non uniform, one, two and three dimensional flows. Concept of streamline, stream tube, path line and streak line. Law of mass conservation - continuity equation from control volume and system analysis. Rotational and Irrotational flows, Stream function, Velocity potential function. Significance and use of flownets.

UNIT-II

Fluid Dynamics: Convective and local acceleration, body forces and surface forces, Eulers equation of motion from control volume and system analysis.

Law of energy conservation : Bernoulli's equation from integration of the Euler's equation. Signification of the Bernoulli's equation, its limitations, modifications and application to real fluid flows.

Impulse momentum equation: Momentum Correction factor. Impact of Jets, force exerted on flat and curved vane. Application of the impulse momentum equation to evaluate forces on nozzles and bends. Pressure on curved surface- vortex flow- forced and free vortex.

UNIT-III

Measurement of Pressure: Piezometer sand Manometers- Micro manometer- Bourdon Gauge, Transducers.

Measurement of Velocity: Pitoto tube, pitot static tube, Current meter and Hot-wire anemometer.

Measurement of Discharge in pipes and tanks: Venture meter, Orifice meter, nozzle meter, elbow meter and rotameter. Flow through mouthpiece and orifice.

Measure of Discharge in Free surface flows: Notches and weirs.

UNIT-IV

Compressive Flow: compressibility of liquids and gases. Continuity equation, Bernoulli's energy equation (for isothermal and adiabatic processes) and impulse momentum equation. Velocity of a pressure wave for adiabatic and isothermal processes. Mach number and Mach cone and its applications. Stagnation Pressure, Density and Temperature in adiabatic process.

UNIT-V

Flow through pressure conduits: Reynold's Experiment and its signification. Upper. Lower Critical Reynold's Numbers, Critical velocity. Hydraulic gradient. Laminar flow through circular pipes. Hagen Poiseuille equation. Turbulent flow characteristics. Ehadloss through pipes. Darcy-Weisbach equation. Friction factor. Moody's diagram. Minor loss, Pipes in Series and Pipes in parallel.

Text Book:

1. P.N.Modi & S.M.Sethi, Hydraulic and Fluid Mechanics, Standard Book House, Delhi, 11th Edition, 1995.
2. A.K.Jain, Fluid Mechanics, Khanna Publishers, Delhi, 1993.

Suggested Books:

1. K.L. Kumar, Engineering Fluid Mechanics, Eurasia Publishing House, 1997.
2. R.K. Rajpur, Fluid Mechanics and Hydraulic Machines, S.Chand and Company, 2003.
3. Yunus A. Cengel & John M. Cimbla, Fluid Mechanics Fundamentals and Applications, Tata MsGraw Hill Education private Ltd, 2012.

STRENGTH OF MATERIALS LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. To know and understand the experiments on various materials to assess their behavior / limitations.
2. To know the brittle and ductile material failure patterns etc., by conducting experiments.
3. To assess the hardness property of engineering materials.
4. To understand the shear force, bending moments and deflections for different types of beams.
5. To know rigidity modulus by conducting spring and torsion test.

Course Outcomes: At the end of the course, the student should have learnt

1. To compute the strength of members of various materials under different structural actions such as compression, tension, flexure and torsion.
2. To compute the elastic property of the material of beams by measuring deflections in beams and using the relations between load and deflection for various type of beams.
3. To determine the hardness of different types of materials.
4. To study the load-deflection behaviour for various types of springs.
5. To study the Torque-Twist behaviour of a given shaft.

LIST OF EXPERIMENTS

1. Direct Tension test on metal rods.
2. Young's Modulus of metal specimen by direct Tension test.
3. Brinnel's and Rock well hardness test.
4. Compression test.
5. Impact test.
6. Test on helical Spring to determine the rigidity modulus.
7. Torsion Test to determine the rigidity modulus of a shaft.
8. Deflection test on a cantilever beam to determine the Young's modulus.
9. Deflection test on a simple beam to determine the Young's Modulus.

10. Deflection test on a Fixed beam to determine the Young's Modulus.
11. Deflection test on a Continuous beam to determine the Young's Modulus.

Suggested Readings:

1. B.C.Punmia , Strength of Materials, Laxmi publishers, Delhi, 2011.
2. S.Ramamrutham, Strength of Materials, Dhanpat Rai & Sons, Delhi, 2012.
3. G.H. Ryder, Strength of Materials, 3rd Edition in SI units, Macmillan India Ltd,

SURVEYING -II LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives :

1. To understand the importance of vertical angles for finding the heights and distances.
2. To get exposure to modern instruments for solving the problems and also understanding the concepts of automation in surveying.
3. To be in a position to set the curves by using various methods and identifying the data required to be computed for the same.
4. To get an idea about developing drawings based on field data.
5. To get an idea about the data transferring to field from the developed maps.

Course Outcomes :

1. To Find the Reduced level of a given point in different practical situations.
2. To determine the area of a given topography using principles of Tachometry.
3. To use Total Station for locating ground details and plotting.
4. To set simple curves using Total Station.
5. To locate ground features using GPS.

LIST OF EXPERIMENTS

1. Finding the R.L. of a given point using two instrument stations in the same vertical plane as that of the point when the base of the point is inaccessible.
2. Finding the difference of level between two given points using two theodilite stations (Baseline) in different planes.
3. Determination of Tacheometer constants and finding the area by using stadia tacheometer.
4. Finding the gradient of a line connecting two points using stadia tacheometry .
5. Locating ground details using Total Station and plotting the same.
6. Staking of points for a foundation or a Road centre line or a pipe line using Total station.

7. Setting of simple curve with the help of Total Station by coordinate system .
8. Location of Ground features using GPS instrument and plotting the same after processing the data.
9. Developing contour maps for a land using modern instruments.

Suggested Readings:

1. C. Venkata Ramaiah, "A Text book of Surveying", University press, Hyderabad, 1997.
2. B.C. Punmia, "Surveying Vol. I and II", Laxmi publications, 1994.

16EG CO3

SOFT SKILLS AND EMPLOYABILITY ENHANCEMENT LAB

Instruction	2 hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
Continuous Internal Evaluation	15 Marks
Credits	1

Course Objectives: To help the students

1. Participate in group discussions and case studies with confidence and to make effective presentations. Also to learn the art of communication.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management & goal setting, self confidence and assertiveness.
4. Understand what constitutes proper grooming and etiquette in a professional environment. Also to understand academic ethics and value systems.
5. To understand the elements of research and hone their soft skills through a live, mini project.

Course Outcomes: The students will be able to

1. Be effective communicators and participate in group discussions and case studies with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to mange time effectively and deal with stress.
4. Make the transition smoothly from Campus to Corporate. Also use media with etiquette and know what academic ethics are.
5. To do a live, mini project by collecting and analyzing data and making oral and written presentation of the same.

Exercise 1

Group Discussion and Case studies: Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.

Elements of effective presentation, Structure of presentation, Presentation tools, Body language, Creating an effective PPT.

Exercise 2

Interview Skills: Resume writing, structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets.

Interview Skills: Concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews.

Exercise 3

Personality Development: Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.

Exercise 4

Corporate Culture: Grooming and etiquette, communication media etiquette, Academic ethics and integrity.

Exercise 5

Mini Project: General/Technical Research, developing a questionnaire, data collection, analysis, written report and project seminar.

Suggested Reading:

1. Dr. Shalini Verma, Body Language- Your Success Mantra, S Chand, 2006.
2. Ramesh, Gopalswamy, and Mahadevan Ramesh, The ACE of Soft Skills, New Delhi: Pearson, 2010.
3. Covey and Stephen R, "The Habits of Highly Effective People", New York: Free Press, 1989.

16CE C17

Mini Project -Survey Camp

Instruction	6 days (36 hrs) between IV Semester to V Semester
Duration of Semester End Examination	-
Semester End Examination	-
CIE	50 Marks
Credits	1

A one week (6 days - 36 hours) surveying camp should be organized in the intervening period between the completion of the IV Semester and the commencement of V semester.

The work has to be graded for 50 Sessional marks by a committee consisting of the Head of the department and 2-3 Senior Faculty members.

The surveying camp should expose the student to all the aspects of planning, organizing and conducting a filed survey and plotting of the same.