

COURSE STRUCTURE (R20)**I - SEMESTER**

S. No	Course Code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE01	Professional Communication-I	2	0	0	2	30	70	100
2	20FE03	Differential Equations	2	1	0	3	30	70	100
3	20FE05	Applied Chemistry	3	0	0	3	30	70	100
4	20CE01	Surveying	3	0	0	3	30	70	100
5	20CE02	Building Materials and Construction	3	0	0	3	30	70	100
Laboratory Courses									
6	20FE52	Applied Chemistry Lab	0	0	3	1.5	15	35	50
7	20CE52	Civil Engineering Drafting Techniques	0	0	3	1.5	15	35	50
8	20CE51	Surveying Lab	0	0	2	1	15	35	50
9	20ME51	Engineering Workshop	0	0	3	1.5	15	35	50
Total			13	01	11	19.5	210	490	700

II - SEMESTER

S. No	Course Code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE02	Professional Communication -II	2	0	0	2	30	70	100
2	20FE04	Linear Algebra and Transformation Techniques	2	1	0	3	30	70	100
3	20FE08	Engineering Physics	2	1	0	3	30	70	100
4	20CS01	Programming for Problem Solving using C	3	0	0	3	30	70	100
5	20CE03	Applied Mechanics	2	1	0	3	30	70	100
6	20MC01	Constitution of India	2	0	0	0	30	70	100
Laboratory Courses									
7	20FE51	Professional Communication Skills Lab	0	0	2	1	15	35	50
8	20FE55	Engineering Physics Lab	0	0	3	1.5	15	35	50
9	20CS51	Programming for Problem Solving using C Lab	0	0	3	1.5	15	35	50
10	20ME54	Computer Aided Engineering Graphics	0	0	3	1.5	15	35	50
Total			13	03	11	19.5	240	560	800

III SEMESTER

S. No	Course code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SE E	Total
Theory Courses									
	20FE10	Numerical Methods and Integral Calculus	2	1	0	3	30	70	100
	20CE04	Mechanics of Fluids	3	0	0	3	30	70	100
	20CE05	Solid Mechanics	3	0	0	3	30	70	100
	20CE06	Concrete Technology	3	0	0	3	30	70	100
	20CE07	Engineering Geology	3	0	0	3	30	70	100
	20MC02	Environmental Science	2	0	0	0	30	70	100
Laboratory Courses									
	20CE53	Solid Mechanics Lab	0	0	3	1.5	15	35	50
	20CE54	Building Materials and Concrete Technology Lab	0	0	3	1.5	15	35	50
	20CE55	Engineering Geology Lab	0	0	3	1.5	15	35	50
		Skill Oriented Course - I	1	0	2	2		50	50
Total						21.5	225	575	800

IV SEMESTER

S. No	Course code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SE E	Total
Theory Courses									
	20FE09	Probability and Statistics	3	0	0	3	30	70	100
	20CE08	Hydraulics and Hydraulic Machinery Systems	3	0	0	3	30	70	100
	20CE09	Geo Technical Engineering	3	0	0	3	30	70	100
	20CE10	Structural Analysis	3	0	0	3	30	70	100
	20HS01	Universal Human values 2: Understanding Harmony	3	0	0	3	30	70	100
Laboratory Courses									
	20CE56	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	1.5	15	35	50
	20CE57	Geo Technical Engineering Lab	0	0	3	1.5	15	35	50
	20CE58	Advanced Surveying Lab	0	0	3	1.5	15	35	50
		Skill Oriented Course - II	1	0	2	2	-	50	50
Total						21.5	195	505	700
Honors/Minor Courses						4			

L	T	P	Cr.
2	0	0	2

B.Tech. (I Sem.)

20FE01 - PROFESSIONAL COMMUNICATION-I

Pre-requisites: Nil

Course Educational Objectives: To improve English language proficiency of the students on various aspects like vocabulary, grammar, communication skills, listening skills, Reading & Writing skills.

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

- CO1 : Write sentences and paragraphs using proper grammatical structures and word forms (**Remember – L1**)
- CO2 : Comprehend the given text by employing suitable strategies for skimming and scanning and draw inferences (**Understand – L2**)
- CO3 : Write summaries of reading texts using correct tense forms & appropriate structures (**Remember – L1**)
- CO4 : Write Formal Letters; Memos & E-Mails (**Apply – L3**)
- CO5 : Edit the sentences/short texts by identifying basic errors of grammar/vocabulary/syntax (**Understand – L2**)

Unit - I

Exploration - ‘A Proposal to Girdle the Earth – Nellie Bly’; Reading: Skimming for main idea; Scanning for specific information; Grammar & Vocabulary: Content Words; Function Words; Word Forms: verbs, nouns, adjectives and adverbs; Nouns: Countable and Uncountable, Singular and Plural forms; Wh - Questions; Word Order in Sentences; Writing: Paragraph Analysis; Paragraph Writing; Punctuation and Capital Letters

Unit – II

On Campus- ‘The District School as it Was by One Who Went to it – Warren Burton’; Reading: Identifying Sequence of Ideas; Grammar & Vocabulary: Cohesive Devices: Linkers/signposts/Transition signals, Synonyms, Meanings of Words/Phrases in the context; Writing: Memo Drafting.

Unit – III

Working Together- ‘The Future of Work’

Reading: Making basic inferences; Strategies to use text clues for comprehension; Summarizing; Grammar & Vocabulary: Verbs: Tenses; Reporting Verbs for Academic Purpose; Writing: Rephrasing what is read; Avoiding redundancies and repetitions Abstract Writing/ Summarizing.

Unit – IV

‘**A.P.J. Abdul Kalam**’; Grammar & Vocabulary: Direct & Indirect Speech; articles and their Omission; Writing: E-Mail Drafting.

Unit – V

‘**C.V. Raman**’; Grammar & Vocabulary: Subject-Verb Agreement; Prepositions; Writing: Formal Letter Writing.

Text Books:

1. Prabhavati. Y et al, “English All Round – Communication Skills for Undergraduate Learners”, Orient Black Swan, Hyderabad, 2019.
2. “Panorama – A Course on Reading”, A collection of prose selections, Oxford University Press, New Delhi, 2016.

Reference Books:

1. Swan, M., “Practical English Usage”, Oxford University Press, 2016.
2. Kumar, S and Latha, P, “Communication Skills”, Oxford University Press, 2018.
3. Rizvi Ashraf M., “Effective Technical Communication”, Tata Mc Graw Hill, New Delhi, 2008.
4. Baradwaj Kumkum, “Professional Communication”, I.K. International Publishing House Pvt. Ltd., New Delhi, 2008.
5. Wood, F.T., “Remedial English Grammar”, Macmillan, 2007.

L	T	P	Cr.
2	1	0	3

B.Tech. (I Sem.)

20FE03 - DIFFERENTIAL EQUATIONS

Pre-requisites: Nil

Course Educational Objective: The objective of this course is to introduce the first order and higher order differential equations, functions of several variables. The students also learn solving of first order partial differential equations.

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

- CO1: Apply first order and first-degree differential equations to find orthogonal trajectories (Apply – L3)
- CO2: Distinguish between the structure and methodology of solving higher order differential equations with constant coefficients (Understand – L2)
- CO3: Apply various Numerical methods to solve initial value problem (Apply – L3)
- CO4: Generate the infinite series for continuous functions and investigate the functional Dependence (Understand – L2)
- CO5: Solve partial differential equations using Lagrange's method (Apply – L3)

UNIT –I**Differential Equations of First Order and First Degree**

Differential equations of first order and first degree –Exact and Non Exact differential Equations, Applications of differential equations – Orthogonal Trajectories.

UNIT –II**Linear Differential Equations of Higher Order**

Homogeneous and Non-Homogeneous Linear differential equations of second and higher order with constant coefficients with R.H.S. functions e^{ax} , $\sin(ax+b)$, $\cos(ax+b)$, x^n , $e^{ax}V(x)$, $xV(x)$, Method of variation of parameters.

UNIT – III**Numerical solution of Ordinary Differential Equations**

Numerical solution of Ordinary Differential equations, Solution by Taylor's series - Picard's Method of successive approximations.
Euler's Method - Runge- Kutta Methods.

UNIT –IV**Functions of several variables**

Generalized Mean Value Theorem (without proof), Maclaurin's series, Functions of several variables, Jacobians (Cartesian and polar coordinates), Functional dependence. Maxima and Minima of function with two variables.

UNIT – V

Partial Differential Equations

Formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions. Solution of first order and first degree linear partial differential equation – Lagrange's method.

Text Books:

1. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH Publications, New Delhi, 2010

Reference Books:

1. M. D. Greenberg, "*Advanced Engineering Mathematics*", 2nd Edition, TMH Publications, New Delhi, 2011.
2. Erwin Kreyszig, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley & sons, New Delhi, 2011.
3. W.E. Boyce and R. C. DiPrima, "*Elementary Differential Equations*", 7th Edition, John Wiley & sons, New Delhi, 2011.
4. S. S. Sastry, "*Introductory Methods of Numerical Analysis*", 5th Edition, PHI Learning Private Limited, New Delhi, 2012.

L	T	P	Cr.
3	0	0	3

B.Tech. (I Sem.)

20FE05 - APPLIED CHEMISTRY

Pre-requisites: Nil

Course Educational Objective: It enables the students to understand the fundamental concepts of chemistry and to provide them with the knowledge of industrial problems and finding the solutions. It helps to strengthen the basic concepts of water, fuel technologies, electrochemistry, corrosion and advanced materials used in technologies.

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

- CO1:** Identify the troubles due to hardness of water and its maintenance in industrial applications. (**Understand - L2**)
- CO2:** Understand the issues related to conventional fuels, biofuels and photo-voltaic cells in energy production. (**Understand - L2**)
- CO3:** Apply Nernst Equation for calculating electrode cell potentials and compare batteries for different applications. (**Apply - L3**)
- CO4:** Apply principles of corrosion for design and effective maintenance of various equipment. (**Apply - L3**)
- CO5:** Analyse the suitability of engineering materials like polymers, lubricants, nano materials and composites in technological applications. (**Understand - L2**)

UNIT – I**WATER TECHNOLOGY**

Sources of water and quality; Hardness of Water - Temporary and permanent hardness, units and their inter relation, problems on hardness and disadvantages of hard water in industries. Boiler troubles - Reasons, disadvantages and methods of prevention for Scale and sludge formation, caustic embrittlement, boiler corrosion and carry over (priming and foaming), W.H.O standards of potable water; Water softening: Ion- Exchange Process, merits and demerits; Desalination of brackish water - Electro dialysis and reverse osmosis; Treatment of industrial waste water.

UNIT – II**FUEL TECHNOLOGY**

Classification of fuels (solid, liquid and gaseous fuels, merits and demerits) and characteristics of a good fuel; Calorific value -Definition, gross and net calorific values (definition only).Solid fuels - Coal – origin, proximate analysis of coal and significance; Liquid Fuels - Petroleum-origin, types of crude oil and refining of petroleum. Cracking - moving bed catalytic cracking and synthetic petrol –Fischer Tropsch's process; Gaseous fuels - Natural gas composition and C.N.G - advantages. Bio fuels - Characteristics of bio fuels, sources of bio mass and advantages -Production of biodiesel from rape seed oil; Photo-voltaic Cell - Design, working, schematic diagram, advantages and disadvantages.

UNIT – III**ELECTRO CHEMISTRY & BATTERIES**

Types of Electrodes - Calomel Electrode, Glass Electrode, Calculation of EMF of Cell, Applications of Nernst Equation, Applications of Electro chemical Series
Batteries -Lead-acid Battery, Lithium ion Battery, H₂- O₂ Fuel Cell, Mg-Cu reserve battery.

UNIT – IV

SCIENCE OF CORROSION

Dry Corrosion (Direct Chemical corrosion) - Types of dry corrosion-oxidative corrosion, Pilling Bed worth rule, corrosion by other gases and liquid metal corrosion; Wet Corrosion (Electro Chemical corrosion) - Mechanism- oxygen absorption, hydrogen evolution, types of wet corrosion, Galvanic Corrosion, Concentration Cell Corrosion, passivity and Galvanic series; Factors Influencing Corrosion -Nature of metal (purity, position in galvanic series, relative area of cathode & anode, nature of surface film) and nature of environment (temperature, humidity, atmospheric pollution and nature of ions in the medium); Control of Corrosion - Cathodic Protection - Sacrificial anode and impressed current methods, electro plating and metal cladding.

UNIT – V

CHEMISTRY OF ENGINEERING MATERIALS

Polymers - Differences between thermoplasts and thermosets, Types of polymerization with examples, Preparation properties and engineering applications of PVC, Teflon, BUNA-S and Polyurethane;

Lubricants -Characteristics of a good lubricant and properties of lubricants (viscosity, flash and fire points, cloud and pour points, aniline point) and applications.

Nano Materials -Introduction, definition, extraordinary changes observed at nano size of materials and reasons, types of nano-materials, Gas-Phase Synthesis of nanomaterials, Applications;

Composites -Advantageous characteristics of Composites, Constituents, Fibre reinforced composites (GFRP, CFRP), Reasons for failure of composites.

TEXT BOOKS:

1. Shashi Chawla, “A Text book of Engineering Chemistry”, Dhanpat Rai Publishing Company, New Delhi, 3rd Edition, 2003.
2. Jain, Jain, “A Text book of Engineering Chemistry”, Dhanpat Rai Publishing Company, New Delhi, 16th Edition, 2015.

REFERENCE:

1. Shikha Agarwal, “A text book of Engineering Chemistry”, Cambridge University Press, New Delhi, 1st Edition, 2015.
2. S.S. Dara, S.S. Umare, “A Text book of Engineering Chemistry”, S. Chand Publications, New Delhi, 12th Edition, 2010.
3. Y. Bharathi Kumari, Jyotsna Cherukuri, “A Text book of Engineering Chemistry”, VGS Publications, Vijayawada, 1st Edition, 2009.

L	T	P	Cr.
3	0	0	3

B.Tech. (I Sem.)

20CE01 - SURVEYING

Pre-requisites: NIL**Course Educational Objective:**

The course aims to teach the basic principles of surveying and various methods for measuring linear and angular measurements. The coverage of the course enables the students to differentiate the available surveying equipments suitable for a specific purpose.

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

CO1: Understand the basic principles involved in linear and angular measurements, functioning of total station, levelling measurements and characteristic properties of simple curves.

(Understand - L2)

CO2: Develop the longitudinal, lateral and contour profiles of a given area using fundamental principles of levelling. **(Understand - L2)**

CO3: Calculate the area and volume of required boundaries. **(Apply - L3)**

CO4: Determine the distance and elevations of an object using tacheometer and EDM principles.

(Apply - L3)**UNIT-I**

Introduction: Definition-Uses of Surveying- - Overview of Plane Surveying (Chain, Compass and Plane Table), Objectives, Principles and Classifications.

Linear and Angular Measurements: Linear Measurements Using Tape and Chain— Errors and their adjustment-corrections. Compass Survey - Bearings, Local Attraction and Computation of angle.

UNIT - II

Leveling: Concept and Terminology, Temporary and Permanent Adjustments – Rise-fall method and HI method- Reciprocal Levelling.

Contouring: Characteristics and Uses of Contours- purpose and methods of Conducting Contour Surveys and their Plotting.

UNIT - III**Areas and Volumes:**

Area from Field notes, Computation of Areas along Irregular boundaries and area consisting of regular boundaries by using Simpson's rule-trapezoidal rule- Mid ordinate & Average ordinate rule. Computation of volume using trapezoidal rule and prismoidal rule for roadwork and canal work.

UNIT - IV

Theodolite: Theodolite, Description, Uses and Adjustments – Temporary and Permanent, Measurement of Horizontal and Vertical Angles.

Traversing - Purpose-Types of Traverse-Traverse Computation - Traverse Adjustments -

Tacheometric Surveying: Stadia and Tangential Methods of Tachometry. Distance and Elevation Formulae for Staff Vertical Position.

UNIT - V

Simple Curves and Total Station: Introduction- Types of curves-applications- Elements of a simple circular curve; Degree of curve- Relationship between radius and degree of curve;

Calculation of various elements of Simple curve- Simple problems-Introduction to Total Station- applications and advantages- Introduction to Global Positioning System- applications.

TEXT BOOKS

1. R. Agor “A Text Book of Surveying and Leveling”, Khanna Publishers, New Delhi, 1998.
2. Punmia B.C., “Surveying Vol I and II”, Laxmi Publications 9th, 10th Edition, 1987.

REFERENCES:

1. R. Subramanya “Surveying and Leveling”- Oxford Publication
2. Arora K R, “Surveying Vol 1, 2 & 3”, Standard Book House, Delhi, 2004
3. N.N Basak, “Surveying and Leveling”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1994.
4. Kanetkar T.P and S.V. Kulkarni, “Surveying and Leveling- Part I and II”, Vidyanthi Prakasan, Pune, 1997.

L	T	P	Cr.
3	0	0	3

B.Tech. (I Sem.)

20CE02 - BUILDING MATERIALS AND CONSTRUCTION

Pre-requisites: NIL

Course Educational Objective: This course aims to provide study of the properties, making and applications of basic civil engineering materials such as stones, bricks, lime, cement and wood. The course also provides an insight into the different types masonry work used in construction practice, various building components and building finishing activities.

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

- CO1: Understand the preparation process and the composition of construction materials such as Stones, bricks and timber. (**Understand - L2**)
- CO2: Describe the sources, constituents and storage of lime and cement for their appropriate usage as building materials based on their specific attributes. (**Understand - L2**)
- CO3: Identify the different components in a building and their specific purpose in the building. (**Remember - L1**)
- CO4: Classify the various types of mortars, masonry components and finishings used in the buildings. (**Understand - L2**)
- CO5: Identify the uses, good and faulty characteristics of different building materials. (**Remember - L1**)

UNIT-I: STONES & BRICKS

Introduction- Classification of rocks: Characteristic of good building stone-Dressing of stones-common building stones, their properties- compositions- uses.

Bricks: Composition of brick, constituents of brick earth- manufacturing process of bricks, characteristics of good building bricks, classification of bricks- Fly ash bricks, hollow bricks – uses.

UNIT-II: LIME AND CEMENT:

Lime -Introduction-lime stone- limestone cycle-sources of lime-properties of lime-uses – constituent of lime-classification of lime-precaution in handling of lime-storage of lime.

Cement-Introduction –classification-properties of cements- comparison between cement and lime-constituents of cement-functions of ingredients of cement-out line of manufacture of Portland cement- field tests for cement -types and uses of cements-storage of cements.

UNIT-III: MORTAR AND MASONRY

Introduction- classification of mortars-characteristics of good mortar-Types of mortars - Preparation of mortar-Uses-Precautions in the uses of mortars. Types of masonry-joints in stone masonry, different bonds in bricks-tools for brick laying- English and Flemish bonds-defects in brick masonry- importance of Cavity and Partition walls.

UNIT-IV: BUILDING COMPONENTS:

Components of a building – Substructure and superstructure-Importance of foundation-functions of foundations-requirements of good foundations - different types of foundations –Purposes of foundation. Basic details of Lintels, Arches, walls, stair cases - types of floors - types of roofs -

UNIT-V: TIMBER AND FINISHINGS IN BUILDINGS:

Classification of timber trees, cross section of exogenous tree, seasoning of timber, important types of timber and their uses, plywood and its uses.

Paints: Functions of paints-types of paints - constituents of paints - characteristics of good paint- General precautions-defects in painting.

Damp proofing: Introduction-effects of dampness- methods of damp proofing –material used for D.P.C and treatment in buildings.

TEXT BOOKS

1. Rangwala “Engineering Materials (Material science)” Charotar Publishing House Pvt. ltd., Edition-2012
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain-“Building Construction”- Laxmi Publications (P) Ltd.

REFERENCES

1. S.K. Duggal “Building Materials”- - New age International Publisher, Fourth edition-2012
2. R.K. Rajput “Engineering Materials (Including construction materials)”-, S.Chand Publications.
3. P.C Varghese “Building Construction” Prentice-Hall of India Private Ltd.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (I Sem.)

20FE52 - APPLIED CHEMISTRY LAB

Pre-requisites: Nil**Course Educational Objectives:**

This course enables the students to analyze water samples and perform different types of volumetric titrations. It provides them with an overview of preparation of polymers and properties of fuels.

Course Outcomes: At the end of the course, the students will be able toCO1: Assess quality of water based on the procedures given. (**Understand - L2**)CO2: Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus. (**Understand - L2**)CO3: Acquire practical knowledge related to preparation of polymers. (**Understand - L2**)CO4: Exhibit skills in performing experiments based on theoretical fundamentals. (**Apply - L3**)**List of Experiments**

(Any of the 10 experiments are required to be conducted)

Model Experiment

- 1) Determination of amount of HCl using standard Na_2CO_3 solution.

Water Analysis

- 2) Determination of alkalinity of water sample.
- 3) Determination of total Hardness of water by EDTA method.
- 4) Determination of permanent hardness of water by EDTA method.

Preparation of Polymers

- 5) Nylon Fibers
- 6) Bakelite

Redox Titrations

- 7) Estimation of Mohr's salt by using potassium permanganate.
- 8) Estimation of Mohr's salt by using potassium dichromate.
- 9) Determination of Copper(II) using standard hypo solution.

Demonstration Experiments

- 10) Determination of pH of the given sample solution/ soil using pH meter.
- 11) Determination of Turbidity of the given sample water.

Estimations

- 12) Determination of ferrous content in the given sample of iron ore against potassium dichromate using potassium ferricyanide as external indicator.
- 13) Determination of Iron(III) by colorimetric method.

Fuels

- 14) Determination of flash and fire points of a given fuel/lubricant.

REFERENCES

Lab manual

L	T	P	Cr.
0	0	3	1.5

B.Tech. (I Sem.)

20CE52 - CIVIL ENGINEERING DRAFTING TECHNIQUES

Pre-requisites: Nil

Course Educational Objective:

The course aims to teach fundamental free hand civil engineering drafting techniques using conventional drawing tools. The student is asked to develop and draw simple geometrical constructions used in engineering drawing. The student is then exposed to ArchiCAD fundamentals and is asked to develop and draw few civil engineering elements.

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

CO1: Draw simple objects based on principles of geometry. (**Understand - L2**)

CO2: Sketch the projections of an object based on the angles of projection. (**Understand - L2**)

CO3: Draft simple objects using ArchiCAD software. (**Understand - L2**)

List of Experiments

Part A: BASIC PRINCIPLES OF ENGINEERING DRAFTING

1. **Fundamentals:** Basic tools and instruments used in conventional drawing.
2. **Geometrical construction:** Bisection of a line, draw perpendiculars of line, draw parallel lines, divide a line, divide a circle, bisect an angle, trisecting an angle, finding center of an arc, constructing equilateral triangles, polygons, polygons inscribed in circles, draw tangents, length of arcs, circle and lines in contact, inscribed circles.
3. **Curves and projections in engineering practice:** Ellipse, Parabola. Projections: First and third angle projections, front view, top view, side view of some simple objects

Part B: ARCHICAD FUNDAMENTALS

1. Introduction to ArchiCAD
2. Basic tools (document tools)-line, circle, poly line, dimensional tools, text, fill, etc.
3. Design tools-wall, window, column, beam, slab, stair, roof, sheet, etc.
4. Drawing some simple objects

REFERENCES

1. N.D. Bhatt. "Engineering Drawing", Charotar Publications, 53rd edition, 2014.
2. Lecture material prepared by department faculty.
3. Video material based on topics covered.

L	T	P	Cr.
0	0	2	1

B.Tech. (I Sem.)

20CE51 - SURVEYING LAB

Pre-requisites: Surveying

Course Educational Objective:

The course teaches the basic principles of surveying, various methods of linear and angular measuring instruments through hands-on practice sessions and enable the students to use surveying equipments.

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

CO1: Compute linear and angular measurements in the field using chain and compass. (**Remember - L1**)

CO2: Plot a given area using plane table in the field. (**Understand - L2**)

CO3: Determine the elevations of different points on the ground using principles of leveling. (**Apply - L3**)

List of Experiments

(Any of the 10 experiments are required to be conducted)

CHAIN SURVEYING

1. Chaining of a line using chain/Tape and recording of details along the chain line.
2. Measurement of a given area using Cross staff survey.
3. Determination of Obstacle length.

COMPASS SURVEYING

4. To perform compass traversing and calculate the errors in balancing the traverse.
5. To measure the distance between two inaccessible points.

PLANE TABLE SURVEYING

6. Radiation method of plane table survey.
7. Intersection method of plane table survey.

LEVELING

8. Determination of elevations of given points using Rise and fall Method & HI method.
9. Determination of elevation difference between two points using Reciprocal levelling method.
10. Determination of elevations and plotting of longitudinal Sectioning and Cross Section of a given area.
11. Plotting the contours of a given area using method of blocks.

Text Book/Reference Books:

Laboratory Manual prepared by Civil Engineering Department.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (I Sem.)

20ME51 - ENGINEERING WORKSHOP

PRE-REQUISITES: Nil**COURSE EDUCATIONAL OBJECTIVE:**

The objective of this course is to get familiarized with various trades used in Engineering Workshop and learn the safety precautions to be followed in the workshops while working with the different tools.

COURSE OUTCOMES: After completion of the course students will be able to:

CO1: Develop different prototypes in the carpentry section. (**Understand - L2**)

CO2: Fabricate various basic prototypes in fitting trade. (**Understand - L2**)

CO3: Demonstrate various operations related to plumbing, tinsmithy and black smithy. (**Understand - L2**)

CO4: Perform various basic house wiring techniques. (**Apply - L3**)

(Conduct at least 4 Trades with 2 exercises from each Trade and demonstrate about 2 Trades)

Trade –1: CARPENTRY SHOP

Introduction to various types of wood such as Teak, Sal, Oak, Beach, Neam, Walnut Mango, Shisham, Deodar, Babul. demonstration, function and use of carpentry hand-tools and their safety precautions. Introduction to various types of wooden joints, their relative advantages and uses.

Job I - Marking, sawing, planing and chiselling operations.

Job II - Preparation of half lap-joint

Job III – Preparation of Mortise and Tenon Joint

Trade –2: FITTING SHOP

Introduction to fitting shop tools, common materials used in fitting shop, description, demonstration, care, use of tools and safety precautions.

Job I- Making a L-Fit from a rectangular piece of Mild Steel Flat (MS).

Job II-Making a T-Fit from a rectangular piece of MS Flat.

Job III-Making a V-Fit from a rectangular piece of MS Flat

Job IV-Making a Half round fit from a rectangular piece of MS flat.

Trade -3: TIN- SMITHY SHOP

Introduction to tin-smithy, specification and use of hand tools, accessories and the safety precautions.

Job I - Preparation of a rectangular tray using GI sheet.

Job II- Preparation of an open scoop/ funnel using GI sheet.

Job III - Preparation of a Single Seam Joint and Double Seam Joint using GI sheet.

Job IV - Preparation of a Corner Seam Joint using GI sheet.

Trade –4: PLUMBING SHOP

Introduction to plumbing – demonstration, use of hand tools, accessories and safety precautions.

Job I – preparation of pipe layout.

Job II – Pipe threading.

Trade -5: BLACK SMITHY

Introduction–demonstration of tools, equipment, and safety precautions.

Job I – Preparation of S–Hook.

Job II – Preparation of Chisel

Trade -6: HOUSE WIRING

Demonstration and identification of common electrical materials such as wires, cables, switches, fuses, PVC Conduits. Study of electrical safety measures and demonstration about use of protective devices such as fuses, and relays including earthing.

Job I – One lamp controlled by one-way switch.

Job II – Two lamps in series and parallel connection with one-way switch.

Job III- Florescent lamp and calling bell circuit.

Job IV - One lamp connection with two 2- way switches (stair case connection).

Job V -- House wiring circuit.

REFERENCES

1. LBRCE Workshop Lab Manual.
2. S.K.Hajra Choudary and A.K.Choudary, -Workshop Technology-Ill, Media Promoters and Publishers Pvt.Ltd., Mumbai,2012.
3. B.S.Raghuvamsi, -Workshop Technology-Ill, Dhanpatrai and Company, New Delhi, 2014.
4. P.Kannaiah, K.L.Narayana, -Workshop Mnual, Scitech Publications India Pvt. Ltd, 2015.

L	T	P	Cr.
2	0	0	2

B.Tech. (II Sem.) 20FE02 - PROFESSIONAL COMMUNICATION-II

Pre-requisites: Nil

Course Educational Objective: To improve English language proficiency of the students on various aspects like vocabulary, grammar, communication skills, listening skills, Reading & Writing skills.

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

- CO1:** Produce a coherent paragraph interpreting a figure/graph/chart/table (**Understand – L2**)
- CO2:** Comprehend the given texts thoroughly by guessing the meanings of the words contextually (**Understand – L2**)
- CO3:** Use language appropriately for describing/comparing/contrasting/giving directions & suggestions (**Remember – L1**)
- CO4:** Write formal/informal dialogues with an understanding of verbal/non-verbal features of communication. Guess meanings of the words from the context (**Understand – L2**)
- CO5:** Write well-structured essays; Reports & Résumé (**Apply – L3**)

UNIT - I

Fabric of Change- ‘H.G. Wells and the Uncertainties of Progress – Peter J. Bowler’; Reading: Studying the use of Graphic elements in texts; Grammar & Vocabulary: Quantifying Expressions; Adjectives and adverbs; Comparing and Contrasting; Degrees of Comparison Writing: Information Transfer.

UNIT - II

Tools for Life - ‘Leaves from the Mental Portfolio of a Eurasian – Sui Sin Far’; Reading: Global Comprehension; Detailed Comprehension; Grammar & Vocabulary: Active & Passive Voice; Idioms & Phrases; Writing: Structured Essays using suitable claims and evidence.

UNIT - III

‘Homi Jahangir Bhabha’;

Grammar & Vocabulary: Words often confused; Common Errors; Writing: Incident & Investigation Reports.

UNIT - IV

‘Jagadish Chandra Bose’; Grammar & Vocabulary: Use of antonyms; Correction of Sentences; Writing: Dialogue Writing.

UNIT - V

‘Prafulla Chandra Ray’; Grammar & Vocabulary: Analogy; Sentence Completion; Writing: Writing a Résumé

TEXT BOOKS:

1. Prabhavati. Y & et al, “English All Round – Communication Skills for Undergraduate Learners”, Orient Black Swan, Hyderabad, 2019.
- 2 “The Great Indian Scientists” published by Cengage Learning India Pvt. Ltd., Delhi, 2017

REFERENCE BOOKS:

1. Swan,M., “Practical English Usage”, Oxford University Press, 2016.
2. Kumar,S and Latha, P, “Communication Skills”, Oxford University Press, 2018.
3. Rizvi Ashraf M., “Effective Technical Communication”, Tata Mc Graw Hill, New Delhi, 2008.
4. Baradwaj Kumkum, “Professional Communication”, I.K. International Publishing House Pvt. Ltd., New Delhi, 2008.
5. Wood, F.T., “Remedial English Grammar”, Macmillan, 2007.

L	T	P	Cr.
2	1	0	3

B.Tech. (II Sem.)

20FE04 - LINEAR ALGEBRA AND TRANSFORMATION TECHNIQUES

Pre-requisites: Nil

Course Educational Objective: In this course, students learn Matrix Algebra and introduced with transformation techniques such as Laplace Transforms and Z – Transforms.

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

CO1: Investigate the consistency of the system of equations and solve them (Apply – L3)

CO2: Determine the eigen vectors and inverse, powers of a matrix using Cayley – Hamilton Theorem (Apply - L3)

CO3: Use the concepts of Laplace Transforms to various forms of functions (Understand – L2)

CO4: Solve ordinary differential equations by using Laplace Transforms (Apply – L3)

CO5: Apply Z - Transforms to solve difference equations (Apply – L3)

UNIT – I

System of Linear Equations

Matrices - Rank- Echelon form, Normal form, PAQ form– Solution of Linear Systems – Homogeneous system of equations and Non-Homogeneous system of equations.

UNIT – II

Eigen Values and Eigen Vectors

Eigen values – Eigen Vectors – Properties – Cayley-Hamilton Theorem – Inverse and Powers of a matrix by using Cayley-Hamilton Theorem.

UNIT – III

Laplace Transforms

Laplace transforms of standard functions –Linear Property - Shifting Theorems, Change of Scale Property
Multiplication and Division by 't' - Transforms of derivatives and integrals – Unit step function – Dirac's delta function.

UNIT – IV

Inverse Laplace Transforms

Inverse Laplace transforms– Linear Property - Shifting Properties - Convolution theorem, Applications of Laplace transforms to ordinary differential equations.

UNIT – V

Z-Transforms

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse Z –transform - Convolution theorem – Solution of difference equation by Z-transforms.

Text Books:

1. B.S. Grewal, “*Higher Engineering Mathematics*”, 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, “*Higher Engineering Mathematics*”, 1st Edition, TMH Publications, New Delhi, 2010.

Reference Books:

1. M. D. Greenberg, “*Advanced Engineering Mathematics*”, 2nd Edition, TMH Publications, New Delhi, 2011.
2. Erwin Kreyszig, “*Advanced Engineering Mathematics*”, 8th Edition, John Wiley & sons, New Delhi, 2011.
3. W.E. Boyce and R. C. DiPrima, “*Elementary Differential Equations*”, 7th Edition, John Wiley & sons, New Delhi, 2011.

L	T	P	Cr.
2	1	0	3

B.Tech. (II Sem.)

20FE08 - ENGINEERING PHYSICS

Pre-requisites: Nil

Course Educational Objectives: It enables the students to understand the fundamental concepts of elastic behavior of materials, lasers, optical fibers, acoustics, ultrasonics, magnetic, dielectric, superconducting and nano materials.

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

CO1: Analyse the different mechanical properties of materials (Understand – L2).

CO2: Apply the lasers and optical fibres in different fields (Apply - L3).

CO3: Summarize the properties of sound waves (Understand – L2).

CO4: Classify the different types of magnetic and dielectric materials (Understand - L2).

CO5: Identify the properties of superconducting and nano materials (Understand – L2).

UNIT – I**Elasticity**

Stress, Strain, Hooke's Law, Elastic behavior of a material, Factors affecting elasticity, Classification of elastic modulus, relation between Young's, bulk and rigidity modulus, bending of beam – bending moment of a beam and Cantilever (qualitative treatment).

UNIT – II**Lasers and Optical fibers**

Lasers: Introduction- Principle of laser (absorption, spontaneous and stimulated emission of radiation), Einstein Coefficients, Nd - YAG laser, Helium Neon laser - applications.

Optical Fibers: Optical Fiber principle, Structure of optical fiber, numerical aperture and acceptance angle, types of optical fibers - applications.

UNIT – III**Acoustics & Ultrasonics**

Acoustics: Introduction – Reverberation - Reverberation time - Sabine's formula (Derivation using growth and decay method) – absorption coefficient and its determination.

Ultrasonics: Production of ultrasonics by Magnetostriction - Detection of ultrasonics - acoustic grating – Non - Destructive Testing - Through transmission method and pulse echo method - Applications.

UNIT – IV**Magnetic & Dielectric materials**

Magnetic parameters, Classification of magnetic materials-Diamagnetic, paramagnetic and ferromagnetic materials, Hysteresis loop, soft and hard magnetic materials, Applications of Ferro magnetic materials.

Dielectric polarization - Electronic and ionic polarization, orientation polarization (Qualitative), Local field, Clausius Mosotti equation, Applications of dielectric materials.

UNIT – V

Superconducting and nanomaterials

Introduction - Meissner effect, Type I and Type II super conductors, Josephson Effect, Applications of super conductors.

Nanomaterials: Introduction, classification, properties, different methods of preparation and applications.

TEXT BOOKS

1. V. Rajendran, “*Engineering Physics*”, TMH, New Delhi, 6th Edition, 2011.
2. M.N. Avadhanulu, P.G. Kshirsagar, “*Engineering Physics*”, S. Chand & Co., 2nd Edition, 2014.

REFERENCE BOOKS

1. M.N. Avadhanulu, TVS Arun Murthy, “*Applied Physics*”, S. Chand & Co., 2nd Edition, 2007.
2. P.K. PalaniSamy, “*Applied Physics*”, Sci. Publ. Chennai, 4th Edition, 2016.
3. P. Sreenivasa Rao, K Muralidhar, “*Applied Physics*”, Him. Publi. Mumbai, 1st Edition, 2016.
4. Hitendra K. Mallik , AK Singh “ *Engineering Physics*”, TMH, New Delhi, 1st Edition, 2009.

L	T	P	Cr.
3	0	0	3

B.Tech. (II Sem.) **20CS01 - PROGRAMMING FOR PROBLEM SOLVING
USING C**

Pre-requisite : Nil

Course Educational Objective: The Objective of the course is to make learn the basic elements of C programming, control structures, derived data types, Modular programming, user defined structures, basics of files and its I/O operations.

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

- CO1:** Familiar with syntax and semantics of the basic programming language constructs. (**Understand - L2**)
- CO2:** Construct derived data types like arrays in solving problem (**Apply - L3**)
- CO3:** Decompose a problem into modules and reconstruct it using various ways of user-defined functions. (**Apply - L3**)
- CO4:** Use user-defined data types like structures and unions and its applications to solve problems. (**Apply- L3**)
- CO5:** Discuss various file I/O operations and its application. (**Understand - L2**)

UNIT – I

Introduction to Problem solving through C-Programming: Problem Specification, Algorithm / pseudo code, flowchart, examples.

C-Programming: Structure of C program, identifiers, basic data types and sizes, Constants, variables, Input-output statements, A sample c program, operators, expressions, type conversions, conditional expressions, precedence of operators and order of evaluation.

Control statements: if, if else, else if ladder and switch statements, while, do-while and for statements, break, continue, go to and labels.

UNIT – II

Arrays- concept, declaration, definition, accessing elements, storing elements, two dimensional and multi-dimensional arrays.

Character Arrays: declaration, initialization, reading, writing strings, string handling functions, pre-processor Directives, and macros.

Applications of Arrays: Linear search, Binary search, Bubble Sort.

UNIT – III

Pointers- concepts, declaring & initialization of pointer variables, pointer expressions, pointer arithmetic, pointers and arrays, pointers and character arrays, pointers to pointers.

Functions: basics, category of functions, parameter passing techniques, recursive functions-comparison with Iteration, Functions with arrays, Standard library functions, dynamic memory management functions, command line arguments.

Storage classes - auto, register, static and extern.

UNIT – IV

Derived types- structures- declaration, definition, and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef.

UNIT – V

Files – concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations, error handling.

Textbook:

1. Reema Thareja, Programming in C, Oxford University Press, 2nd Edition, 2015

Reference books:

1. Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, Pearson Publishers, 7th Edition, 2013
2. E Balagurusamy, Computer Programming, McGraw Hill Education, 8th Edition.
3. C: The Complete Reference, McGraw Hall Education, 4th Edition.
4. Pradeep Dey, Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition, 2011.
5. Stephen G.Kochan, Programming in C, Pearson Education, 3rd Edition, 2005.

L	T	P	Cr.
2	1	0	3

B.Tech. (II Sem.)

20CE03 - APPLIED MECHANICS

Pre-requisites: Physics**Course Educational Objective:**

This course comprises the basic knowledge on equilibrium of planar force systems, determination of sectional properties of various cross sections / composite sections. It describes motion of bodies under frictional forces. In this course the process of finding the internal forces in members aroused from the applied loads using equilibrium conditions is also expounded.

Course Outcomes: At the end of the course, the student will be able to:**CO1:** Determine the resultant force and moment for a given system of forces. (Apply - L3)**CO2:** Calculate the unknown forces in members of planar systems by constructing free body diagrams and applying static equilibrium conditions. (Apply - L3)**CO3:** Examine the motion/ impeding the motion of bodies on horizontal/inclined planes associated with frictional forces. (Apply - L3)**CO4:** Analyze for the internal forces in the members of a pin jointed perfect frames subjected to horizontal, vertical and inclined loads. (Apply - L3)**CO5:** Determine the centroid and second moment of area of simple and composite areas. (Apply - L3)**UNIT – I: Basic Concepts**

Resultant of Systems Of Forces : Parallelogram law-forces and components- Resultant of Coplanar Concurrent Forces– Moment of Force- principle of moments-Varignon's theorem-Application – Couples and Resultant of Force Systems.

UNIT – II: Equilibrium of Systems Of Forces

Free Body Diagrams- Equations of Equilibrium- Lami's Theorem - equilibrium of planar systems

UNIT-III: Friction

Introduction-Theory of Friction-Angle of friction-Laws of friction-coefficient of friction-cone of friction-impending motion of connected bodies-Ladder friction –Wedge friction

UNIT –IV: Analysis of Perfect Frames

Types of Frames-Assumptions for forces in members of a perfect frame, Method of joints, Method of sections, Force table, Cantilever Trusses, Structures with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads.

UNIT: V: Centroid and Moment of Inertia

Centroid: Centroids of simple figures (from basic principles)– Centroids of Composite Figures.

Centre of Gravity: Centre of gravity of simple bodies (from basic principles) - Centre of gravity of composite plane figures- Pappus theorem.

Area Moment of Inertia: Definition-Polar Moment of Inertia- Transfer Theorem, Moments of Inertia of composite figures.

Mass Moment of Inertia: Moment of inertia of masses-Transfer formula for mass moment of inertia-simple problems.

TEXT BOOKS

1. RK Rajput “Engineering. Mechanics” DhanpatRai and Sons, NewDelhi
2. S.S. Bhavikatti and K.G. Rajashekarappa “Engineering Mechanics”, New Age International Publishers, NewDelhi.

REFERENCES

1. RK Bansal “Engineering. Mechanics” Laxmi Publishers, New Delhi.
2. Ferdinand L. Singer, “Engineering Mechanics” Published by Harper Collins Publishers, Singapore
3. S. Timoshenko, D.H. Young and J.V. Rao “Engineering Mechanics” TATA McGraw Hill, New Delhi, Revised Fourth Edition.

L	T	P	Cr.
2	0	0	0

B.Tech. (II Sem.)

20MC01 - CONSTITUTION OF INDIA

Pre-requisites: Nil**Course Educational Objectives**

- To enable the student to understand the importance of constitution.
- To understand the structure of Executive, Legislature and Judiciary.
- To understand Philosophy of fundamental rights and duties.
- To understand the autonomous nature of constitution bodies like Supreme Court and High Court Controller and Auditor General of India and Election Commission of India.
- To understand the Central and State relation, financial and administrative.

Course Outcomes: *At the end of the course, the student shall be able to*CO1: Understand history and philosophy of constitution with reference to Preamble, Fundamental Rights and Duties (**Understand – L2**).CO2: Understand the concept of Unitary and Federal Government along with the role of President, Prime Minister and Judicial System (**Understand – L2**).CO3: Understand the structure of the state government, Secretariat, Governor and Chief Minister and their functions (**Understand – L2**).CO4: learn local administration viz. Panchayat, Block, Municipality and Corporation (**Understand – L2**).CO5: learn about Election Commission and the process and about SC, ST, OBC and women (**Understand – L2**).**UNIT – I:**

Introduction to Indian Constitution: ‘Constitution’ meaning of the term, Indian Constitution – Sources and Constitutional History, Features – Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT – II:

Union Government and its Administration Structure of the Indian Union: Federalism Centre – State relationship, President: Role, Power and Position. Prime Minister (PM) and Council of Ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha. The Supreme Court and High Court: Powers and Functions.

UNIT – III:

State Government and its Administration Governor – Role and Position – Chief Minister (CM) and Council of Ministers. State Secretariat: Organization, Structure and Functions.

UNIT – IV:

A Local Administration -- Role and Importance, Municipalities – Mayor and Role of Elected Representative, Panchayati Raj: Functions of Panchayati Raj Institution, Zilla Panchayat, Elected Officials and their roles, Village level – Role of Elected and Appointed officials.

UNIT – V:

Election Commission: Election Commission – Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions and Commissions for the welfare of SC/ST/OBC and Women.

Reference Books

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd., New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government and Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai. Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication).
6. J.C. Johari, Indian Government and Politics Hans.
7. J.Raj, Indian Government and Politics.
8. M.V. Pylee, Indian Constitution, Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd., New Delhi.
9. Noorani, A.G. (South Asia Human Rights Documentation Centre), Challenges to Civil Right). Challenges to Civil Rights Guarantees in India, Oxford University Press 2012.

E-Resources:

1. [nptel.ac.in/courses/109104074/8](https://www.nptel.ac.in/courses/109104074/8).
2. [nptel.ac.in/courses/109104045](https://www.nptel.ac.in/courses/109104045).
3. [nptel.ac.in/courses/101104065](https://www.nptel.ac.in/courses/101104065).
4. www.hss.iitb.ac.in/en/lecture-details.
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indianconstitution.

* * *

L	T	P	Cr.
0	0	2	1

B.Tech. (II Sem.) 20FE51 - PROFESSIONAL COMMUNICATION SKILLS
LAB

Pre-requisites : Nil

Course Educational Objective: To improve the proficiency of students in English with an emphasis on better communication in formal and informal situations; Develop speaking skills required for expressing their knowledge and abilities and to face interviews with confidence.

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

- CO1:** Introduce oneself and others using appropriate language and details (**Understand – L2**)
- CO2:** Comprehend short talks and speak clearly on a specific topic using error free English (**Understand – L2**)
- CO3:** Report effectively after participating in informal discussions ethically (**Remember –L1**)
- CO4:** Interpret data aptly, ethically & make oral presentations (**Apply – L3**)

Syllabus: Professional Communication Lab (PCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems, LAN facility and English language software for self- study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorder etc.

Exercise – I

CALL Lab: Understand - Sentence structure.

ICS Lab: Practice - Listening: Identifying the topic, the context and specific information
Speaking: Introducing oneself and others.

Exercise – II

CALL Lab: Understand - Framing questions.

ICS Lab: Practice - Listening: Answering a series of questions about main idea and supporting ideas after listening to audio text.
Speaking: Discussing in pairs/small groups on specific topics; Delivering short structured talks using suitable cohesive devices (JAM)

Exercise – III

CALL Lab: Understand - Comprehension practice – Strategies for Effective Communication

ICS Lab: Practice - Listening: Listening for global comprehension and summarizing
Speaking: Discussing specific topics in pairs/small groups, reporting what is discussed

Exercise – IV

CALL Lab: Understand- Features of Good Conversation – Strategies for Effective Communication.

ICS Lab: Practice -Listening: making predictions while listening to conversations/transactional dialogues with/without video Speaking: Role – plays – formal & informal – asking for and giving information/directions/instructions/suggestions

Exercise – V

CALL Lab: Understand - Features of Good Presentation, Methodology of Group Discussion

ICS Lab:Practice - Introduction to Group Discussions.

Listening: Answering questions identifying key terms and understanding concepts.

Speaking: Formal Oral & Poster presentations on topics from academic contexts without the use of PPT.

Lab Manual:

1. Prabhavati. Y & et al, “English All Round – Communication Skills for Undergraduate Learners”, Orient Black Swan, Hyderabad, 2019.

Suggested Software:

1. Digital Mentor: Globarena, Hyderabad, 2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley, USA, 2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, The Learning Company, USA, 2002
6. Learning to Speak English - 4 CDs. The Learning Company, USA, 2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi, 2008.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (II Sem.)

20FE55 - ENGINEERING PHYSICS LAB

Pre - requisites: Nil

Course Educational Objectives: This course enables the students to acquire theoretical ideas, analytical techniques, and graphical analysis, by completing a host of experiments with the procedures and observational skills for appropriate use of simple and complex apparatus.

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

CO1: Analyze the wave characteristics of light (**Understand – L2**).

CO2: Determine the wavelength of laser source and width of slit (**Apply - L3**).

CO3: Estimate the magnetic field using Stewart's and Gee's apparatus and the rigidity modulus of material using Torsional Pendulum (**Understand - L2**).

CO4: Identify the phenomena of resonance in strings (**Understand – L2**).

CO5: Improve report writing skills and individual teamwork with ethical values (**Understand – L2**)

List of Experiments

(Any of the 10 experiments are required to be conducted)

General experiments:

1. Determine the frequency of AC supply by using Sonometer.
2. Verification of Laws of vibrations in stretched strings - Sonometer.
3. Determine the frequency of a tuning fork by using Melde' s arrangement.
4. Study the magnetic field along the axis of a current carrying circular coil using Stewart's& Gee's apparatus and to verify Biot - Savart's law.
5. Determine the rigidity modulus of a given material using Torsional pendulum.
6. Determination of Young's modulus by the method of single Cantilever oscillations.
7. Measurement of magnetic susceptibility by Gouy's method.
8. Determination of ultrasonic velocity in Liquid.
9. Determination of dielectric constant by charging and discharging method.
10. Determination of velocity of sound by Volume resonator method.

Optics lab experiments:

11. Determine the wavelength of a laser radiation.
12. Determine the width of a single slit by forming diffraction pattern.
13. Determine the acceptance angle and numerical aperture of a fiber.
14. Measure the bending losses in the optical fiber cable at different wavelengths.

B.Tech. (II Sem.)

20CS51 - PROGRAMMING FOR PROBLEM SOLVING USING C LAB

L	T	P	Cr.
0	0	3	1.5

Pre-requisite : NIL

Course Educational Objective: The objective of the course is to learn the basic elements of C Programming Structures like Data Types, Expressions, Control Statements, and Various I/O Functions and to solve simple mathematical problems using control structures. Design and implementation of various software components, which solve real world problems.

Course Outcomes (CO): *At the end of this course, the student will be able to:*

CO1: Apply control structures of C in solving computational problems. (**Apply - L3**)

CO2: Implement derived data types & use modular programming in problem solving (**Apply- L3**)

CO3: Implement user defined data types and perform file operations. (**Apply- L3**)

CO 4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

of modules at most 10 can be taught and all the modules should be in line with theory.

Module 1: Introduction to Raptor Tool.

Module 2: Problem solving using Raptor Tool.

Module 3: Exercise Programs on Basics of C-Program.

Module 4: Exercise Programs on Control Structures.

Module 5: Exercise Programs on Loops & nesting of Loops.

Module 6: Exercise Programs on Arrays & Strings.

Module 7: Exercise Programs on Pointers.

Module 8: Exercise Programs on Functions.

Module 9: Exercise Programs on user defined data types.

Module 10: Exercise Programs on Files.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (II Sem.)

20ME54 - COMPUTER AIDED ENGINEERING GRAPHICS

PRE-REQUISITES: Engineering Graphics, Mathematics

Course Educational Objective: The course aims to teach developing and drawing of engineering objects using AutoCAD. The student will be taught the fundamentals of AutoCAD and then asked to develop the projections of objects related to straight lines, planes, solids, orthographic and isometric views, development of surfaces using principles of engineering drawing.

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

CO1: Draw simple objects using functional tools in AutoCAD. (**Understand-L2**)

CO2: Develop and draw the positions and views of points, lines, planes and solids using AutoCAD. (**Understand-L2**)

CO3: Develop and draw the orthographic and isometric projections of simple objects using AutoCAD. (**Understand-L2**)

CO4: Develop and draw the projections of the solids by developing the surfaces using AutoCAD. (**Understand-L2**)

BASIC AUTOCAD COMMANDS

1. Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).
2. Edit commands (copy, move, erase, zoom).
3. Array commands (polar array, rectangular array, P-edit, divide, pline, offset).
4. Hatching & line commands (hatching with different angles and different types of lines).
5. Mirror and trim commands (mirror an object, trim, extend a line, chamfer & fillet, explode).
6. Dimensioning & text commands (linear, angular, radius, diameter and text).

PROJECTION OF POINTS, LINES AND PLANES

1. Projection of points (I, II, III, & IV quadrants).
2. Projection of lines parallel to both reference planes.
3. Projection of lines parallel to one reference plane & inclined to other reference plane.
4. Projection of planes: Single stage projections.

PROJECTION OF SOLIDS

1. Projection of solids in simple position and transfer of points.
2. Projection of solids with axes inclined to one reference plane & parallel to other.
3. Sections of solids: Simple sections

ORTHOGRAPHIC PROJECTIONS

1. Conversion of plane figures to orthographic views.
2. Conversion of circular figures to orthographic views.
3. Conversion of combination of plane figures and circular figures to orthographic views.

ISOMETRIC PROJECTIONS

1. Conversion of plane figures to isometric views.
2. Conversion of circular figures to isometric views.
3. Conversion of combination of plane figures and circular figures to isometric views.

DEVELOPMENT OF SURFACES

1. Parallel-line development (prism, cylinder) for objects in simple position.
2. Radial-line development (cone, pyramid) for objects in simple position.

TEXTBOOK

1. D.M. Kulkarni, A.P Rastogi, and A.K. Sarkar, “Engineering Graphics with AutoCAD”, PHI Learning Private Limited, New Delhi, 2009.

REFERENCE

1. N. D. Bhatt, “Engineering Drawing”, 51st Revised and Enlarged Edition, Charotar Publishers, 2012.

**20FE10 - NUMERICAL METHODS AND INTEGRAL
CALCULUS**

(Common to AE, CE, EEE, ECE, MECH)

L	T	P	Cr.
2	1	0	3

B.Tech.(III Sem.)

Pre-requisites : None

Course Educational Objective: The main objective of this course is to enable the students learn Numerical Techniques for solving the equations and apply interpolation techniques. They will also learn about the Fourier analysis of single valued functions, Multiple Integrals in different coordinate systems and Vector differentiation.

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

- CO1:** Estimate the best fit polynomial for the given tabulated data using Interpolation.(Understand – L2)
- CO2:** Apply numerical techniques in solving of equations and evaluation of integrals. (Apply – L3)
- CO3:** Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes. (Apply – L3)
- CO4:** Generate the single valued functions in the form of Fourier series and obtain Fourier series representation of periodic function. (Apply – L3)
- CO5:** Evaluate the directional derivative, divergence and angular velocity of a vector function. (Apply – L3)

UNIT – I

Interpolation and Finite Differences

Interpolation: Introduction – Finite differences- Forward Differences- Backward Differences- Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formula for interpolation – Lagrange's Interpolation formula.

UNIT – II

Numerical Solution of Equations and Numerical Integration

Solutions of Algebraic and Transcendental Equations – Regula Falsi method and Newton Raphson Method in one variable.

Numerical Integration

Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – III

Multiple Integrals

Multiple integrals - double and triple integrals (Cartesian, polar, spherical coordinates) – Changing the order of Integration.

UNIT IV

Fourier series

Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series

UNIT – V

Vector Differentiation

Vector Differentiation: Gradient- Directional Derivatives -Divergence – Solenoidal fields- Curl – Irrotational fields-potential surfaces - Laplacian and second order operators

Text Books:

1. B.S. Grewal, “Higher Engineering Mathematics”, 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, “Higher Engineering Mathematics”, 1st Edition, TMH Publications, New Delhi, 2010.
3. S. S. Sastry, “Introductory Methods of Numerical Analysis” 5th Edition, PHI Learning Private Limited, New Delhi, 2012.

Reference:

4. M. D. Greenberg, “ Advanced Engineering Mathematics”, 2nd Edition, TMH Publications, New Delhi, 2011.
5. Erwin Krezig, “Advanced Engineering Mathematics” , 8th Edition, John Wiley & sons, New Delhi, 2011.
6. W.E. Boyce and R. C. DiPrima, “ Elementary Differential Equations” , 7th Edition, John Wiley & sons, New Delhi, 2011.

L	T	P	Cr.
3	0	0	3

B.Tech. (III Sem.)

20CE04- MECHANICS OF FLUIDS

Pre-requisites: Applied Mechanics

Course Educational Objective: The course teaches the fluid properties and fundamental relations based on conservation of mass, energy and momentum in fluid flow. Applications of these basic equations are highlighted for flow measurements through orifice meter, venturi meter, Pitot tube, notches etc. Energy losses and Dimensional analysis are also discussed along with applications.

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

CO1: Understand the basic properties of fluids, and fundamental aspects of fluid mechanics such as pressure, types of flow, conservation of mass, energy, momentum, energy losses, dimensionless numbers & model laws (**Understand – L2**)

CO2: Determine the pressure at a point using pressure measuring devices and by applying hydrostatic pressure principles, and compute center of pressure for thee given conditions. (**Apply-L3**)

CO3: Determine the flow parameters using Continuity equation, Bernoulli equation and compute the forces acting on pipe bends. (**Apply – L3**)

CO4: Compute the energy losses in pipes and estimate the flow parameters in viscous flows using Hagen – Poiseuille equation. (**Apply – L3**)

CO5: Apply dimensional analysis as a tool in solving problems in the field of fluid mechanics and apply the laws of similarity. (**Apply – L3**)

UNIT – I: PROPERTIES OF FLUIDS

Fundamental properties: Mass density, Specific weight, Specific volume, Specific gravity, Viscosity, Compressibility, Surface tension- capillarity and their influences on fluid motion.

Pressure Measurement: Pressure at a point, Absolute, Atmospheric, gauge and vacuum pressure, Measurement of pressure- Manometers, Simple and Differential manometers.

UNIT-II: FLUID STATICS AND KINEMATICS

FLUID STATICS:

Hydrostatic Forces: Hydrostatic forces on submerged plane- Horizontal, Vertical, Inclined surfaces-Centre of pressure-Derivations and simple problems.

FLUID KINEMATICS:

Flow patterns: 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, Stream and Velocity potential functions

Continuity Equation: Equation of continuity for one, two, three dimensional flows in Cartesian coordinates

UNIT- III: FLUID DYNAMICS

Energy Equation: Euler's equation of motion, Bernoulli's equation, simple applications of Bernoulli's equation,

Momentum equation: Flow through pipe bends

Measurement of Flow: Pitot tube, Venturi meter and Orifice meter, Flow over notches.

UNIT- IV: ENERGY LOSSES AND CLOSED CONDUIT FLOW

Energy losses: Reynold's experiment -Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line.

Laminar Flow: Hagen – Poiseuille equation for viscous flow

UNIT-V: DIMENSIONAL ANALYSIS AND HYDRAULIC SIMILITUDE

Dimensional Analysis: Dimensional analysis-Rayleigh's method and Buckingham's π theorem-Applications

Hydraulic similitude: Geometric, Kinematic and Dynamic similarities, Dimensionless numbers, Model laws, Model and prototype relations using Reynolds and Froude Model laws.

TEXT BOOKS

1. R.K. Bansal, "A Textbook of Fluid Mechanics and Hydraulic Machines", Laxmi Publications (p) Ltd.
2. R.K. Rajput "Textbook of Fluid Mechanics and Hydraulic Machinery", Revised edition, S. Chand & Company, Ltd., New Delhi, 2005.

REFERENCES

1. K.R. Arora, "Fluid Mechanics, Hydraulic and Hydraulic Machines", Standard Publishers and Distributors, New Delhi, 2005.
2. A.K. Jain, Fluid Mechanics 2nd edition, Khanna Publishers, Delhi.2001 revised edition, Standard Book Home, New Delhi, 2005.
3. P.N. Modi, and S.M. Seth, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Rajson Publications Pvt Ltd., Standard Book House, New Delhi, 2009.

L	T	P	Cr.
3	0	0	3

B.Tech. (III Sem.)

20CE05 - SOLID MECHANICS

Pre-requisites: NIL**Course Educational Objective:**

The course teaches about mechanical properties of engineering materials such as tensile, compression strength, torsion & bending strength. The behaviour of beam / Column elements with different support conditions and loading system will be discussed.

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

CO1: Recall the terminology associated with the structural members viz. bars, beams, column, shafts which are subjected to practical loads (**Remember-L1**)

CO2: Relate the required input parameters for finding the reactions / internal forces in the structural elements subjected to axial, shear, bending and torsional forces (**Understand-L2**)

CO3: Solve for the axial, shear, bending and twisting moment in columns/ Beams/ Shafts/ subjected to longitudinal, transverse and twisting loads and their combinations. (**Apply-L3**)

CO4: Construct the shear, bending moment and stress variation diagrams at every cross section along the length of determinate structures subjected to applied loads. (**Apply-L3**)

CO5: Identify the maximum values of stresses/ moments in structural members of various cross sections subjected to axial/ transverse/ torsional loads. (**Apply-L3**)

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

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.

UNIT – III

Shear Force and Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these Loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a Section of a beam.

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis – Determination bending stresses – section modulus of Rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections.

UNIT- IV

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like Rectangular, circular, triangular, I, T angle sections.

Torsion of Circular Shafts: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = G\theta/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion.

UNIT – V

Columns: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler’s theorem for long columns assumptions derivation of Euler’s critical load formulae for various end conditions– Equivalent length of a column – slenderness ratio – Euler’s critical stress – Limitations of Euler’s theory

Direct and Bending Stresses: Stresses under the combined action of direct loading and B.M 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 B.M. about both axis.

TEXT BOOKS

1. R.K.Bansal, “Introduction to Strength of Materials”, Laxmi publications, 6th edition, 2018.
2. B.C. Punmia, A.K. Jain, A. K. Jain. “Strength of Materials and Theory of Structures”, Vols. I & II”, 9th Edition, Laxmi Publications (P) Ltd, New Delhi, 2004.

REFERENCES:

1. Bhavikatti. S. S., “Strength of Materials”, Vikas Publishing House (P) Ltd., New Delhi, Third Edition, 2013
2. Gere and Timoshenko. “Mechanics of Materials”, 6th, PWS Publishing Company, 2009
3. R.K.Rajput, “Mechanics of Structures”, S. Chand Publication Revised Edition, 2007.

B.Tech. (III Sem.)

20CE06 - CONCRETE TECHNOLOGY

L	T	P	Cr.
3	0	0	3

Pre-requisites: Building Materials

Course Educational Objective:

The course aims to teach the basic properties of concrete making materials, various tests on concrete and different admixtures to be used in concrete. The course also provides insight on various types of special concrete and their usage, determination of mix proportions as per IS codes.

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

CO1: Understand the basic ingredients of concrete, their role in the production of concrete and its behavior in the field. **(Understand-L2)**

CO2: Differentiate the fresh and hardened properties of concrete. **(Understand-L2)**

CO3: Describe the main operations of concreting i.e., selection of materials and its proportional mixing towards mixing, placing, compaction, curing and finishing. **(Understand-L2)**

CO4: Perceiving & broadening the knowledge of new concrete types and concrete mix design methods. **(Understand-L2)**

UNIT-I: CONCRETE MAKING MATERIALS

Portland cement –Chemical composition- Hydration – types of cement-tests & specifications. Aggregates – Classification of aggregate –gradation of aggregate – fineness modulus – Bulking of sand-tests & specifications – Alkali aggregate reaction-Quality of mixing water.

UNIT – II: PROPERTIES OF CONCRETE

Properties of fresh concrete –workability –slump test –compaction factor test –flow table test – segregation – bleeding. Properties of hardened concrete-Water / Cement ratio – Abram’s Law – Gel space ratio –strength development –elastic properties of concrete-durability – Creep and Shrinkage – types of shrinkage thermal properties.

UNIT – III: QUALITY CONTROL AND ADMIXTURES IN CONCRETE

Quality Control of concrete-Control techniques –batching –mixing – transporting –placing – compacting –finishing curing–acceptance criteria. Admixtures- Accelerators – retarders – plasticizers- super plasticizers- air entraining agents–workability agents –bonding admixtures – Mineral admixtures – silica fume – fly ash –blast furnace slag.

UNIT – IV: SPECIAL CONCRETES

Light weight concrete – light weight aggregate concrete –no fines concrete –high density concrete – sulphur infiltrated concrete –fibre reinforced concrete –polymer concrete –ready mixed concrete – high strength concrete –High performance concrete- Self compacting concrete-Bacterial concrete – Shotcrete – pre packed concrete-Ferrocement.

UNIT – V: MIX DESIGN

Concept of mix design – objects of mix design- Factors in the choice of mix proportions- Introduction to different methods of mix design- concrete mix design by I. S method.

TEXT BOOKS

1. M.S. Shetty, “Concrete Technology” S. Chand & Co., Ltd., Revised Edition - New Delhi, 2003.
2. Rangwala “Engineering Materials (Material science)” Charotar Publishing House Pvt Ltd., Edition-2012.
3. M.L. Gambhir, “Concrete Technology”, Revised Edition - Tata McGraw Hill Publishing Co., New Delhi 1998.

REFERENCES:

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain. “Building Construction”- Laxmi Publications (P) Ltd.
2. K.T. Krishnaswamy, “Concrete Technology” Dhanpat Rai Publications.

Code book: IS 10262-2019 “Concrete Mix Design”

L	T	P	Cr.
3	0	0	3

B.Tech. (III Sem.)

20CE07 - ENGINEERING GEOLOGY

Prerequisite: Nil**Course Educational Objective:**

The course introduces the concepts of Geology in civil engineering perspective. The student is exposed to properties of different minerals and rocks. The importance of structural geological features and geophysical principles will be addressed for their interpretation in civil engineering designs.

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

CO1: Understand and interpret fundamental geological processes and geological formations. **(L2-Understand)**

CO2: Differentiate various properties of minerals and rocks. **(L2-Understand)**

CO3: Illustrate geological structural features. **(L3-Apply)**

CO4: Apply geological principles in civil engineering applications. **(L3-Apply)**

UNIT – I: GENERAL GEOLOGY

Geology in Civil Engineering – Branches of geology – Earth's structure and composition – Continental drift, Plate tectonics, Weathering – types, products and soil profile,– Geological work of Rivers, Wind and Sea -Seismic zones of India.

UNIT – II: MINEROLOGY

Physical properties of Minerals – Crystallographic systems – Silicate structures - Study of following families of rock forming minerals- Quartz, Feldspar, Pyroxene, Amphibole, Mica, Calcite, Gypsum and Clay.

UNIT – III: PETROLOGY

Classification of Rocks – Igneous, Sedimentary and Metamorphic Rocks – Origin, Structure, texture and Classification – Study of physical properties, distribution and occurrence of important rock types viz. Granite, Diorite, Gabbro, Dolerite, Basalt, Limestone, Conglomerate, Breccia, Sandstone, Quartzite, Marble, Gneiss, and Schist etc.

UNIT – IV: STRUCTURAL GEOLOGY

Outcrop, Dip and Strike, Study of common structures associated with rocks such as Folds, Faults, Unconformities and Joints, their classification, types, their relevance, and importance in civil engineering.

UNIT - V: ENGINEERING APPLICATIONS IN GEOLOGY

Importance of Geophysical studies, Brief introduction of principles of geophysical studies - Gravity method, Magnetic methods, Electrical methods, Seismic methods, Radio metric methods and geothermal method.

Geological considerations in construction of Dam, Reservoir, Tunnel.

TEXT BOOKS

1. Parbin Singh., “Engineering and General Geology”, Katson Publication House, 2009.
2. ChennaKesavulu N., “Text book of Engineering Geology”, Macmillan India Ltd, 2003.

REFERENCES

1. Legget., “Geology and Engineering”, 2nd Edition, McGraw Hill Book Company, 2006.
2. Blyth. “Geology for Engineers”, 7th Edition, ELBS, 1995.
3. KVGK Gokhale, “Principles of Engineering Geology”, B.S Publications, 2005
4. F.G. Bell, “Fundamental of Engineering Geology”, Butterworths Publications, Aditya Books Pvt. Ltd., New Delhi, 1992.
5. Krynine& Judd, “Principles of Engineering Geology & Geotechnics”, CBS Publishers & Distribution, First Edition, 1998.

L	T	P	Cr.
2	0	0	0

B.Tech. (III Sem.)

20MC02 - ENVIRONMENTAL SCIENCE

Pre-requisites: Nil**Course Objectives:**

In this course the student will learn about

- Environmental issues like over population, human health etc related to local, regional and global levels.
- The necessity of resources, their exploitation and sustainable management.
- The interactions of human and ecosystems and their role in the food web in the natural world.
- The global biodiversity, threats to biodiversity and its conservation.
- Environmental problems like pollution, disasters and possible solutions.
- The importance of environmental decision making in organizations through audits.

Course Outcomes:

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

- CO1:** Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions. (Remember - L1)
- CO2:** Evaluate local, regional and global environmental issues related to resources and their sustainable management. (Understand – L2)
- CO3:** Realize the importance of ecosystem and biodiversity for maintaining ecological balance. (Understand – L2)
- CO4:** Acknowledge and prevent the problems related to pollution of air, water and soil. (Apply – L3)
- CO5:** Identify the significance of implementing environmental laws and abatement devices for environmental management. (Understand – L2)

Unit I**Nature and scope of Environmental Problems**

- Introduction to Environmental Science
- Population explosion, variations among nations
- Resettlement and Rehabilitation - Issues and possible solutions
- Environmental hazards – causes and solutions. Biological hazards – AIDS, Malaria, Chemical hazards- BPA, PCB, Phthalates, Mercury, Nuclear hazards- Risk and evaluation of hazards.
- Role of Information Technology in environmental management and human health

Unit II**Natural Resources and Conservation**

Introduction and classification of Natural Resources

- Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people
- Water resources: Use and over-utilization of surface and ground water, conflicts over water, interlinking of rivers, dams-benefits and problems, Rain water harvesting
- 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, soil salinity

- Energy resources: Growing energy needs renewable, non-renewable and alternate energy resources

Unit III

Ecology and Biodiversity

- Structure and functions of an Ecosystem, Food chains and Food webs, Ecological succession, Ecological pyramids, Biogeochemical cycles
- Biodiversity, Values of biodiversity, Bio geographical classification of India. Endangered and endemic species of India, Threats to biodiversity; Man and wild life conflicts, Conservation of biodiversity: In-situ and Ex-situ conservation methods

Unit IV

Environmental Pollution

Introduction to Environmental Pollution Causes, effects and control measures of:

Air pollution, Water pollution, Noise pollution, Solid Waste Management – Sources, Classification, effects and control measures of Municipal solid waste, Biomedical waste & Hazardous and e-waste, Disaster Management.

Unit V

Environmental Management

- Sustainable development and unsustainability
- Climate disruption, Green house effect, Ozone layer depletion and Acid rain. Stockholm Conference
- Environmental Impact Assessment (EIA)
- Green building
- Environmental Law- Air, Water, Wild life, Forest, and Environmental protection act

Text Books:

1. Anubha Kaushik, C.P.Kaushik, “Perspectives in Environmental Studies”, 5nd edition, New age international publishers, Delhi, 2016.
2. G. Tyler Miller, Scott Spoolman, “Introduction to Environmental Studies”, 13th Edition, Cengage Learning, New Delhi, 2009.

Reference Books:

1. M. Anji Reddy, “Textbook of Environmental Sciences and Technology”, 2nd Edition, BS Publications, Delhi 2011.
2. Deeshita Dave, P. Udaya Bhaskar, “Environmental Studies”, 2nd Edition, Cengage Learning, New Delhi, 2012.
3. S.Deswal, A. Deswal, “A Basic course in Environmental Studies”, 2nd Edition, Educational & Technical Publishers, Delhi, 2014.
4. R. Rajagopalan, “Environmental Studies (From Crisis to Cure)”, 3rd Edition, Oxford University Press, New Delhi, 2012.
5. De, A.K, “Environmental Chemistry”, 5th Edition, New Age International (P) Limited, New Delhi, 2003.
6. Dr.K.V.S.G. Murali Krishna, “Environmental Studies”, 1st Edition, VGS Techno Series, Vijayawada, 2010.
7. Mahua Basu, S.Xavier, “Fundamentals of Environmental Studies”, 1st edition, Cambridge University Press, Delhi, 2016.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (III Sem.)

20CE53 - SOLID MECHANICS LAB

Pre-requisites: Building Materials, Strength of Materials

Course Educational Objective:

The course aims at providing hands on practice to observe the behaviour and failure patterns of commonly used construction materials subjected to tensile, compressive, torsion and shear loadings. The course also deals with the relative hardness and impact resistance of metals.

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

CO1: Estimate compressive strength of wood, concrete, brick materials and decide their suitability for the construction purpose (**Evaluate-L5**)

CO2: Determine the tensile strength, hardness/ impact resistance of metals used in construction works comment on their usage (**Evaluate-L5**)

CO3: Determine the Rigidity /Young's modulus of wood/steel materials (**Apply-L3**)

List of Experiments

(Any of the 10 experiments are required to be conducted)

List of Experiments

1. Study of stress-strain characteristics of mild steel bars by UTM.
2. Study of stress-strain characteristics of HYSD bars by UTM.
3. Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam.
4. Determination of modulus of elasticity of the material of the beam by conducting bending test on Cantilever beam.
5. Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam with one end overhang.
6. Determination of modulus of rigidity by conducting torsion test on solid circular shaft.
7. Determination of hardness of the given material by Brinell's/Vicker's Method.
8. Determination of hardness of the given material by Rockwell hardness test.
9. Determination of impact strength of the given material by conducting Charpy/Izod test
10. Determination of ultimate shear strength of steel by conducting direct shear test.
11. Determination of modulus of rigidity of the material of closely coiled helical spring.
12. Determination of compressive strength of wood/ brick with grain parallel / perpendicular to loading.

TEXT BOOK/REFERENCE Laboratory manual prepared by Civil Engineering Department.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (III Sem.) 20CE54 - BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB

Pre-requisites: Building materials, Concrete technology

Course Educational Objective:

The course aims to train the students in performing laboratory experiments to find the basic properties of bricks, tiles, cement, aggregates and concrete.

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

CO1: Differentiate bricks and tiles based on physical properties. (**Understand-L2**)

CO2: Determine the properties of concrete making materials. (**Apply-L3**)

CO3: Identify the properties of concrete. (**Remember-L1**)

List of Experiments

(Any of the 10 experiments are required to be conducted)

Tests on Bricks and Tiles:

1. Classification of bricks by determination of Water absorption, shape test, soundness, warping, colour and compressive strength.
2. Determination of Water absorption, soundness, compressive strength of clay tiles.

Tests on Cement:

1. Determination of (a) Normal consistency of cement (b) Fineness of cement using 90 microns IS sieve.
2. Determination of Initial setting and final setting time of cement.
3. Determination of (a) Specific gravity of cement (b) soundness of cement.
4. Determination of Compressive Strength of cement.

Tests on Aggregates:

1. Determination of Fineness modulus of (a) Fine aggregate (b) Coarse aggregate.
2. Determination of Bulk density and Specific gravity of (a) fine aggregate (b) coarse aggregates.
3. Determination of Bulking of fine aggregate.

Tests on Concrete:

1. Determination of workability of concrete by conducting Slump cone test.
2. Determination of workability of concrete by conducting Compaction factor/Vee-Bee consist meter test.
3. Determination of (a) Cube compressive strength (b) Split tensile strength of concrete.
4. Determination of modulus of elasticity of concrete by conducting compression test on concrete cylinder.
5. Non-destructive test on concrete using Rebound Hammer / Ultrasonic Tester

Text Book/Reference Books:

Laboratory Manual prepared by Civil Engineering Department.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (III Sem.)

20CE55 - ENGINEERING GEOLOGY LAB

Pre-requisites: NIL**Course Educational Objective:**

The laboratory course is intended to impart skills in identifying minerals and rocks based on physical properties. Through these practical sessions a student is equipped to interpret geological structural features in civil engineering perspective.

Course Outcomes: At the end of the course, the student will be able to**CO1:** Demonstrate the importance of geological principles. **(L3-Apply)****CO2:** Distinguish various types of minerals and rocks based on physical properties and physical observations. **(L2-Understand)****CO3:** Interpret structural patterns of various geological structures. **(L2-Understand)****LIST OF EXPERIMENTS**

1. Description of Minerals by physical properties.
2. Description and Engineering uses of Rocks
3. Description and engineering consideration of Structural Models
4. Microscopic study of minerals and Microscopic study of rocks
5. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.

LAB EXAMINATION PATTERN

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Interpretation of a Geological map along with a geological section.

Text Book/Reference Books

Laboratory Manual prepared by Civil Engineering Department.

20FE09 - PROBABILITY AND STATISTICS
(Common to AI&DS, CSE, ME & IT)

L	T	P	Cr.
3	0	0	3

B.Tech (IV Sem.)

Pre-requisite(s) : None

Course Educational Objective: The objective of this course is to provide students with the foundations and applications of probabilistic and statistical methods mainly used in varied applications in engineering and science.

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

- CO1:** Understand various probabilistic situations using the various laws of probability and random variables. (**Understand – L2**)
- CO2:** Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems. (**Apply – L3**)
- CO3:** Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on the sample data. (**Apply – L3**)
- CO4:** Analyse the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis. (**Analyze – L4**)
- CO5:** Construct the regression lines to predict the dependent variables and calculate the Correlation Coefficient for a bivariate statistical data. (**Apply – L3**)

Unit-1:

Probability and Random variables

Probability, Sample space and events, Additive Rule, Conditional probability, Multiplicative rule, Baye's theorem.

Random variables – Discrete and continuous Random Variables, distribution function. Mathematical Expectation of one-dimensional Random Variable.

Unit-2:

Probability Distributions

Binomial distribution , Poisson distribution , Poisson approximation to Binomial distribution, Exponential distribution, Normal distribution , Normal approximation to Binomial distribution.

Unit-3:

Sampling distribution & Estimation

Population, sample, parameter, statistic, sampling distribution, Standard error, Types of sampling, Sampling distribution of means and sampling distribution of variance,

Parameter estimations –point estimation and interval estimation for mean and proportions.

Unit-4:

Tests of Hypothesis

Hypothesis, Null and Alternate Hypothesis, , Type I and Type II errors, level of significance.

Z-test for means and proportions, t-test for single mean, difference of means, paired t-test, F-test for equality of population variances, χ^2 - test for goodness of fit and independence of attributes.

Unit-5:

Correlation & Regression

Karl Pearson's coefficient of correlation, linear Regression, Regression lines, Regression coefficients, Spearman's Rank correlation coefficient, Spearman's Rank correlation for repeated ranks.

Text books

1. Jay L.Devore "Probability and Statistics for engineering and the sciences.", 8th edition, Cengage Learning India, 2012.
- 2.S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 11thEdition, Sultan Chand and sons, New Delhi,2014.

Reference Books

1. Miller & Freund's "Probability and Statistics for Engineers",8th edition. PHI, New Delhi,2011.
2. B.V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010

B.Tech. (IV Sem.)

**20CE08 - HYDRAULICS AND HYDRAULIC
MACHINERY SYSTEMS**

L	T	P	Cr.
3	0	0	3

Pre-requisites: Applied Mechanics, Mechanics of Fluids

Course Educational Objectives:

The course allows the student to get insight into open channel hydraulics, and the various theories dealing with the flow phenomenon of fluid in an open channel. The student is exposed to the basics, components, and working of the hydro machinery, applications of different types of turbines and pumps.

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

- CO1:** Understand the various types of flows, specific energy curves, hydraulic jumps and working of hydraulic machines in fluid flows. **(Understand-L2)**
- CO2:** Apply the basic principles to design the open channels and determine the energy losses due to formation of hydraulic jump. **(Apply-L3)**
- CO3:** Apply the impulse-momentum equation to determine the force exerted by a jet on different configurations of vanes. **(Apply-L3)**
- CO4:** Apply the working principle to draw the velocity triangles and determine the efficiencies of hydraulic machines. **(Apply-L3)**

UNIT – I: UNIFORM FLOW

Introduction to open channel flow, Classification of flows in channels; Chezy, Manning's, Bazin, Kutter's formulae- problems. Most economical sections of channels - Rectangular, Trapezoidal and Circular sections-problems.

UNIT – II: NON – UNIFORM FLOW

Concept of specific energy: Specific energy curves; - critical depth, critical velocity, minimum specific energy- problems. Critical flow in rectangular channels - problems.

Gradually Varied Flow: Dynamic equation; Surface Profiles; Computation of surface profiles by single step method; Back water Curves and Draw down curves; Examples of various types of water surface profiles.

Rapidly Varied Flow: Hydraulic jump; Elements and characteristics of hydraulic jump; Types of hydraulic jumps; Location and applications of hydraulic jump; Energy loss in a hydraulic jump.

UNIT-III: BASICS OF TURBO MACHINERY

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

UNIT-IV: HYDRAULIC TURBINES

Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines - Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency. Unit and

specific turbines - unit speed - unit quantity - unit power - specific speed performance characteristics-geometric similarity- cavitation.

UNIT-V: PUMPS

Centrifugal Pumps: Classification, work done, minimum starting speed, losses and efficiencies, specific speed, multistage pumps, specific speed, characteristic curves, NPSH, Cavitation in pumps.

Reciprocating Pumps: Types, working, Work done, coefficient of discharge and slip, effects of acceleration and frictional resistance, indicator diagrams, separation.

TEXT BOOKS

1. R.K. Bansal, "A Textbook of Fluid Mechanics and Hydraulic Machines", Laxmi Publications (p) Ltd.
2. R.K. Rajput "Textbook of Fluid Mechanics and Hydraulic Machinery", Revised edition, S. Chand & Company, Ltd., New Delhi, 2005.

REFERENCES

1. A.K. Jain, Fluid Mechanics 2nd edition, Khanna Publishers, Delhi.2001 revised edition, Standard Book Home, New Delhi, 2005.
2. P.N. Modi, and S.M. Seth, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Rajsons Publications Pvt Ltd., Standard Book House, New Delhi, 2009.
3. K.R. Arora, "Fluid Mechanics, Hydraulic and Hydraulic Machines", Standard Publishers and Distributors, New Delhi, 2005.

L	T	P	Cr.
3	0	0	3

B.Tech. (IV Sem.)

20CE09 - GEO TECHNICAL ENGINEERING

Pre-requisites: NIL

Course Educational Objective: The course aims to teach the different properties and classifications of soil. The course coverage includes the various procedures for determining index and engineering properties of soils.

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

CO1: Understand the engineering and index properties of soil. (**Understand-L2**)

CO2: Classify the soils based on ISC system and grain size distribution. (**Understand-L2**)

CO3: Evaluate the permeability, shear strength and consolidation properties of soil. (**Apply-L3**)

CO4: Illustrate the stress distribution of soil subjected to different loading conditions. (**Apply-L3**)

UNIT –I**Types and physical properties of soil**

Types of soil – Physical properties of soil and their determination – Important definitions related to three phase diagram and relationships – Field identification of soils – Classification of soils based on grain size distribution – Hydrometer analysis.

UNIT –II**Consistency and plasticity characteristics of Soil**

Determination of consistency limits and their significance to the field behaviour of soil – Classification of soils based on grain size and plasticity characteristics of soils.

Soil Compaction

Concept of compaction – Methods of laboratory compaction of soils – Factors affecting compaction – Zero air voids curve and its significance – Field compaction control.

UNIT –III**Permeability characteristics of soils**

Darcy's Law and its validity – Factors affecting permeability – Laboratory determination of permeability for cohesive and cohesion less soils – Permeability of layered deposits

Concept of effective stress in soils

Terzaghi's effective stress concept for saturated soil deposits – seepage flow and seepage pressure – Quick sand condition and critical hydraulic gradient

UNIT- IV**Shear strength of soils**

Analysis of shear failure – shear and normal stress at a point – Mohr's stress circle – Relationship that can be obtained from Mohr's circle – Mohr's strength theory – Mohr's coulomb failure criterion Laboratory methods of determination of shear strength parameters of cohesive and non-cohesive soils – Direct shear test – Triaxial shear test – Unconfined compression test and Laboratory vane shear test – Advantages of triaxial test over other tests – Classification of shear test based on drainage conditions.

UNIT-V

Stress Distribution in soils

Boussinesq's and Westergaard's theories for point loads and their comparison – Approximate methods of determination of stresses and its validity – Computation of stresses beneath circular and square loaded areas – Concept of pressure bulb – Newmark's chart and its applications.

Compressibility characteristics of soils

Terzaghi's theory of one-dimensional consolidation – Concept of consolidation – Determination of coefficient of consolidation from consolidometer test data by Square root of time method and log time method – Calculation of consolidation settlement.

TEXT BOOKS

1. Arora. K.R, “**Soil Mechanics and Foundation Engineering**”, Standard Publishers & Distributors, NaiSarak, Delhi, 1987
2. Murthy.V.N.S, “**A Text book of Soil Mechanics and Foundation Engineering**”, KripaTechnical Consultants, Bangalore, 1992

REFERENCES

1. Venkataramaiah, “Geotechnical Engineering”, Wiley Eastern Ltd., Madras, 1993.
2. Punmia. B.C, “Soil Mechanics and Foundation Engineering”, A.Saurabh and Co.,(P) Ltd., Madras, 1988.
3. Taylor. D.W, “Fundamentals of Soil Mechanics”, Asia Publishing house, 1948.
4. Terzaghi and Peck, “Soil Mechanics in Engineering”, Asia Publishing house,

L	T	P	Cr.
3	0	0	3

B.Tech. (IV Sem.)

20CE10 - STRUCTURAL ANALYSIS

Pre-requisites: Applied Mechanics, Strength of materials.

Course Educational Objectives: In this course, the student is exposed about analytical approach for finding the internal forces, different structural components and their structural behaviour due to applied external loads

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

CO1: Show the reactions at the supports and joints as well as interior forces of Members subjected to different loads and Boundary Conditions (**Understand-L2**).

CO2: Solve for the internal forces in determinate structures viz/ namely arches, cables. (**Apply-L3**)

CO3: Identify the appropriate method for determining the deflections of beams (**Apply-L3**)

CO4: Solve for the internal forces in indeterminate structures viz/ namely propped cantilevers/ fixed and continuous beams (**Apply-L3**)

CO5: Identify the appropriate method of analysis for computing internal forces, stresses in beams/ Trusses subjected to all practical load combinations (**Apply-L3**)

UNIT - I ARCHES: Three hinged arches, Elastic theory of arches – Eddy’s theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear– Effect of temperature.

CABLES: Introduction- General Cable Theorem- Uniformly Loaded Cable- Anchor Cable

UNIT – II DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential Equation for the elastic line of a beam – Double integration and Macaulay’s methods– Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. uniformly varying load.-Mohr’s theorems – Moment Area method – application to simple cases including overhanging beams.

UNIT-III INTRODUCTION TO INDETERMINATE STRUCTURES– Determinacy of static and kinematic indeterminacies for beams, Frames, Trusses

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano’s first theorem-Deflections of simple beams and pin jointed trusses-application of Castigliano’s second theorem

UNIT-IV FIXED BEAMS – Introduction to statically indeterminate beams with U.D.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 a support.

PROPPED CANTILEVERS: Analysis of propped cantilevers-shear force and bending moment diagrams-Deflection of propped cantilevers.

UNIT-V 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 overhang, continuous beams with different moment of inertia for different Spans Effects of sinking of supports-Shear Force and Bending moment diagrams.

SLOPE DEFLECTION METHOD: Introduction-Sign Conventions-Fundamental Equations-Continuous Beams with and without Sinking of Supports.

TEXT BOOKS

1. R.Vaidyanathan, Dr.P.Perumal, A Text Book on "Structural Analysis-Volume I& II" Laxmi Publications, Forth Edition ,2016
2. S.Ramamrutham, R.Narayan, A Text Book on "Theory of Structures" Dhanpat Rai Publications, Ninth Edition, 2018

REFERENCES

1. Punmia. B. C., Jain, A. K., and Jain, A. K., A Text Book on " Theory of Structures" Laxmi Publications, New Delhi, 2004
2. R.C.Hibbeler, A Text Book on " Structural Analysis" Pearson Publications, Ninth Edition, 2018
3. T.S. Thandavamoorthy, A Text Book on " Structural Analysis" Oxford Publications, Second Edition, 2012
4. Bhavikatti S.S., A Text book on "Analysis of Structures"-Vol. I & 2, Vikas publications, Fourth Edition, 2013.

L	T	P	Cr.
3	0	0	3

B.Tech. (IV Sem.)

**20HS01 – UNIVERSAL HUMAN VALUES 2:
UNDERTANDING HARMONY**

Pre-requisites: Nil

Course Educational Objective: To become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

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

CO1: Apply the value inputs in life and profession (**Apply – L3**)

CO2: Distinguish between values and skills, happiness and accumulation of physical facilities, the self, and the Body (**Understand – L2**)

CO3: Understand the role of a human being in ensuring harmony in society (**Understand – L2**)

CO4: Understand the role of a human being in ensuring harmony in the nature and existence. (**Understand – L2**)

CO5: Distinguish between ethical and unethical practices (**Apply – L3**)

UNIT-I: Need, Basic Guidelines, Content and Process for Value Education

‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration; Continuous Happiness and Prosperity- A look at basic Human Aspirations; Right understanding, Relationship and Physical Facility, Understanding Happiness and Prosperity

UNIT-II: Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’; Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility; Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer);

Understanding the characteristics and activities of ‘I’ and harmony in ‘I’; Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

UNIT-III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship;

Understanding the harmony in the society: Resolution, Prosperity, fearlessness and co-existence as comprehensive Human Goals; Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family, Gratitude as a universal value in relationships.

UNIT-IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature; Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self regulation in nature; Understanding Existence as Co-existence of mutually interacting units in all-pervasive space; Holistic perception of harmony at all levels of existence.

UNIT-V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics, Strategy for transition from the present state to Universal Human Order

Text Book:

Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books:

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

L	T	P	Cr.
0	0	3	1.5

B.Tech. (IV Sem.)

20CE56 - FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Pre-requisites: Mechanics of Fluids, Hydraulics and Hydraulic Machinery Systems

Course Educational Objective:

The student is given hands on training in working on fluid flow hydraulic machinery equipment and performs experiments to verify the principles of fluid mechanics and hydraulics based on laws of conservation of mass, energy, and momentum.

Course Outcomes:

CO1: Develop knowledge on the fundamental principles of fluid flow. **(Apply-L3)**

CO2: Apply the laws of conservation of mass, energy, and momentum to solve practical problems in fluid mechanics. **(Apply-L3)**

CO3: Practically visualize the functioning and performance of hydraulic turbines and pumps. **(Understand-L2)**

List of Experiments

(Any of the 10 experiments are required to be conducted)

1. Verification of Bernoulli's theorem.
2. Venturimeter: Determination of Coefficient of discharge.
3. Orificemeter: Determination of Coefficient of discharge.
4. Mouthpieces: Determination of Coefficient of discharge by steady flow method.
5. Determination of friction factor of Pipes.
6. Determination of Coefficient of discharge for rectangular notch / V – notch.
7. Determination of Manning's and Chezy's coefficients in open channel.
8. Measurement of force due to impact of jets on vanes of different types.
9. Performance studies on Pelton turbine.
10. Performance studies on Kaplan turbine.
11. Performance studies on single stage centrifugal pump.
12. Performance studies on Reciprocating pump.

TEXT BOOK/REFERENCES

1. Laboratory manual developed by Civil Engineering Department.

B.Tech. (IV Sem.) 20CE57 - GEO TECHNICAL ENGINEERING LAB

L	T	P	Cr.
0	0	3	1.5

Pre-requisites: Geotechnical Engineering

Course Educational Objective: The course aims to train the students in performing laboratory experiments to find the basic properties soil. The course coverage includes the various field applications of soil.

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

CO1: Identify the tools, equipment required, and experimental procedures used in soil investigations (**Understand-L2**)

CO2: Determine the index and engineering properties of soils (**Apply-L3**)

CO2: Perform field and laboratory tests for soil investigations to compute desired parameters (**Apply-L3**)

CO3: Apply field conditions for computing and analyzing the experimental data. (**Understand-L2**)

List of Experiments

(Any of the 10 experiments are required to be conducted)

1. Determination of water content by oven drying method.
2. Determination of specific gravity by Density bottle method
3. Determination of specific gravity by Pycnometer method.
4. Particle size distribution curve by Mechanical Sieve analysis
5. Particle size distribution curve by Hydrometer analysis.
6. Determination of Atterberg limits
7. Determination of free swell index
8. Determination field unit weight of soil by Core cutter method.
9. Determination field unit weight of soil by Sand replacement method.
10. Determination of coefficient permeability of Coarse-grained soil by Constant head permeameter.
11. Determination of coefficient permeability of Fine-grained soil by Variable head permeameter.
12. Determination of MDD and OMC of given soil by Standard proctor test.
13. Determination of MDD and OMC of given soil by Modified proctor test.
14. Determination of shear strength parameters of given soil by Direct shear test.
15. Determination of shear strength of given soil by Vane shear test.
16. Determination of undrained shear strength of soil by Unconfined compression test

TEXT BOOK/REFERENCES

Laboratory manual developed by Civil Engineering Department.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (IV Sem.)

20CE58 - ADVANCED SURVEY LAB

Pre-requisites: Surveying, Survey Field Work Lab

Course Educational Objective:

The course allows the student to gain practical exposure in taking angular measurements, horizontal distances and vertical heights of objects by using advanced surveying equipment.

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

CO1: Obtain angular measurements in the field using theodolite. **(Apply-L3)**

CO2: Determine the coordinates/elevations/distances of different points in the field using theodolite and total stations. **(Apply-L3)**

CO3: Operate the total station to take out the measurements for desired objectives. **(Apply-L3)**

List of Experiments

(Any of the 10 experiments are required to be conducted)

THEODOLITE

1. Determining the Horizontal and Vertical Angles by the method of repetition method.
2. Finding the distance between two inaccessible points.
3. Determination of Height and distances – Single plane method & Double plane method.

TACHEOMETRY

1. To determine the distance and elevation of a point using tacheometric stadia system.
2. To determine the distance and elevation of a point using tangential tacheometric system.
3. Tacheometric contouring – Radial method

TOTAL STATION

1. Study of Instrument – Determination of Distances, Directions and Elevations.
2. Determination of Boundaries of a Field and computation of area.
3. Finding the distance between two inaccessible points.

SETTING OUT

1. Setting of simple circular curve using tape and theodolite.
2. Setting of a simple circular curve using Total Station.
3. Setting out for Building.

TEXT BOOK/REFERENCE

Laboratory Manual prepared by Civil Engineering Department