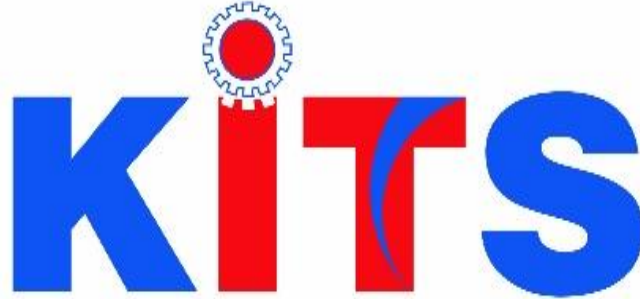


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INSTITUTE OF TECHNOLOGY AND SCIENCES
(AUTONOMOUS)**

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Vinjanampadu, Vatticherukuru Mandal, Guntur, Andhra Pradesh 522017



**BACHELOR OF TECHNOLOGY (B. Tech)
DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE & SYLLABUS HANDOUT**

**R-20 REGULATION
(CHOICE BASED CREDIT SYSTEM)**

(Applicable from the batch admitted in AY: 2020-2021)

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SEMESTER-I

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH1T05	Engineering Chemistry	3	0	0	3	30	70	100
2	20SH1T06	Differential Equations	3	0	0	3	30	70	100
3	20CS1T01	Problem Solving and Programming Using C	3	0	0	3	30	70	100
4	20ME1T01	Engineering Graphics	1	0	4	3	30	70	100
5	20EE1T02	Basics of Electrical and Electronics Engineering	3	0	0	3	30	70	100
PRACTICAL									
6	20SH1L05	Engineering Chemistry Lab	0	0	3	1.5	15	35	50
7	20CS1L01	Problem Solving and Programming Using C Lab	0	0	3	1.5	15	35	50
8	20CS1L02	IT Workshop	0	0	3	1.5	15	35	50
Total Credits						19.5	195	455	650

Theory: BSC-2, ESC-3 Practical: BSC-1, ESC-2

SEMESTER-II

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH2T01	Communicative English	3	0	0	3	30	70	100
2	20SH2T03	Engineering Physics	3	0	0	3	30	70	100
3	20SH2T07	Linear Algebra and Vector Calculus	3	0	0	3	30	70	100
4	20ME2W01	Engineering Workshop	1	0	4	3	30	70	100
5	20ME2T01	Engineering Mechanics	3	0	0	3	30	70	100
6	20GE2M01	Environmental Science	2	0	0	0	---	---	---
PRACTICAL									
7	20SH2L01	Communicative English Skills Lab	0	0	3	1.5	15	35	50
8	20SH2L03	Engineering Physics Lab	0	0	3	1.5	15	35	50
9	20CE2L01	Computer Aided Drawing Lab	0	0	3	1.5	15	35	50
Total Credits						19.5	195	455	650

Theory: BSC-2, HSMC-1, And ESC-2 Practical: BSC-1, HSMC-1, And ESC-1

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SEMESTER-III

S.No	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH3T02	Numerical Methods & Statistics	3	0	0	3	30	70	100
2	20CE3T01	Strength of Materials-I	3	0	0	3	30	70	100
3	20CE3T02	Surveying	3	0	0	3	30	70	100
4	20CE3T03	Building Materials & Construction Planning	3	0	0	3	30	70	100
5	20CE3T04	Fluid Mechanics	3	0	0	3	30	70	100
6	20GE3M02	Professional Ethics & Human Values	2	0	0	0	---	---	---
PRACTICAL									
7	20CE3L01	Strength of Materials Laboratory	0	0	3	1.5	15	35	50
8	20CE3L02	Surveying Laboratory-I	0	0	3	1.5	15	35	50
9	20CE3L03	Building Drawing Practice Laboratory	0	0	3	1.5	15	35	50
10	20CE3S01	Skill Oriented Course	1	0	2	2	---	50	50
Total Credits						21.5	195	505	700

THEORY: BSC-1, PCC-4 PRACTICAL: PCC LAB-3

SEMESTER-IV

S.No	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20CE4T01	Structural Analysis-I	3	0	0	3	30	70	100
2	20CE4T02	Strength of Materials-II	3	0	0	3	30	70	100
3	20CE4T03	Concrete Technology	3	0	0	3	30	70	100
4	20CE4T04	Transportation Engineering-1	3	0	0	3	30	70	100
5	20CE4T05	Hydraulics & Hydraulic Machinery	3	0	0	3	30	70	100
PRACTICAL									
6	20CE4L01	Fluid Mechanics & Hydraulic Machinery Laboratory	0	0	3	1.5	15	35	50
7	20CE4L02	Surveying Laboratory-II	0	0	3	1.5	15	35	50
8	20CE4L03	Concrete Technology Laboratory	0	0	3	1.5	15	35	50
9	20CE4S01	Skill Oriented Course	1	0	2	2	---	50	50
Total Credits						21.5	195	505	700

THEORY: ESC-1, BSC-1, PCC-2, HSC-1 PRACTICAL: PCC LAB-3

Programme: Common to CE & ME

Semester: I

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Course Code	Course Name	L	T	P	C
20SH1T05	ENGINEERING CHEMISTRY	3	0	0	3
Subject Category : BSC					

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1 : Understand the importance of plastics and composites in various fields.
- CO2 : Apply corrosion control methods to protect metals.
- CO3 : Illustrate commonly used engineering materials.
- CO4 : Understand the problems related to impure water and apply methods to avoid them.
- CO5 : Understand the use of conventional and non-conventional energy sources

SYLLABUS

UNIT-I : POLYMER TECHNOLOGY

Polymerisation:- Introduction-methods of polymerization (emulsion and suspension)-physical and mechanical properties.

Plastics: Compounding-fabrication (compression, injection, blown film, extrusion) - preparation, properties and applications of PVC, polycarbonates and Bakelite-mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste.

Elastomers:- Natural rubber-drawbacks-vulcanization-preparation, properties and applications of synthetic rubbers (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics-conducting polymers-biodegradable polymers.

Learning Outcomes: At the end of this unit, the students will be able to outline the properties of polymers and various additives added and different methods of forming plastic materials.

Explain the preparation, properties and applications of some plastic materials.

Interpret the mechanism of conduction in conducting polymers .

Discuss natural and synthetic rubbers and their applications.

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UNIT-II : ANALYTICAL TECHNIQUES AND CORROSION

PART A: ANALYTICAL TECHNIQUES

Conductometric titrations – titrations between strong acid and strong base, strong acid and weak base.

Potentiometric titrations (redox titrations). Complexometric titrations using EDTA

PART B: CORROSION

Definition-theories of corrosion (chemical and electrochemical)-galvanic corrosion, differential aeration corrosion, stress corrosion, waterline corrosion-passivity of metals-galvanic series -factors influencing rate of corrosion-corrosion control (proper designing, cathodic protection)-Protective coatings: Surface preparation, cathodic and anodic coatings, electroplating, electroless plating (nickel). Paints (constituents, functions, special paints).

Learning Outcomes: At the end of this unit, the students will be able to understand the principles of different analytical instruments.

explain the different applications of analytical instruments.

Categorize the reasons for corrosion and study some methods of corrosion control

UNIT III: CHEMISTRY OF MATERIALS

PART- A: NANO MATERIALS:- Introduction- sol-gel method-characterization by BET , Chemical reduction and TEM methods , applications of graphene-carbon nanotubes and fullerenes:Types, preparation and applications.

LUBRICANTS: - Definition, mechanism of lubricants and properties (definition and importance).

PART-B: REFRACTORIES: - Definition, classification, properties (refractoriness, refractoriness under load, porosity and thermal spalling), failure of refractories.

CEMENT: - Constituents, manufacturing, parameters to characterize the clinker formation: lime saturation factor (LSF), silica ratio (SR) and alumina ratio (AR), chemistry of setting and hardening,

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deterioration of cement.

Learning Outcomes: At the end of this unit, the students will be able to

Outline the awareness of materials like nanomaterials and fullerenes and their uses.

Explain the techniques that detect and measure changes of state of reaction.

Illustrate the commonly used industrial materials

UNIT IV: WATER TECHNOLOGY

Hardness of water-determination of hardness by complexometric method-boiler troubles (priming and foaming, scale formation, boiler corrosion, caustic embrittlement)-internal treatments-softening of hard water (zeolite process and related sums, ion exchange process)-treatment of industrial waste water Potable water and its specifications-steps involved in purification of water-chlorination, break point chlorination-reverse osmosis and electro dialysis.

Learning Outcomes: At the end of this unit, the students will be able to

Explain the impurities present in raw water, problems associated with them and how to avoid them are understood.

UNIT V: ENERGIES (CONVENTIONAL & NON CONVENTIONAL ENERGY SOURCES)

PART A: CONVENTIONAL SOURCES OF ENERGY

FUELS- Introduction-calorific value-HCV and LCV-problems using Dulong's formula-proximate and ultimate analysis of coal sample-significance of these analyses-problems-Petroleum -cracking-Synthetic petrol (Fischer Tropsch and Bergius)- Bio-diesel- Natural gas, LPG, CNG

PART B: NON CONVENTIONAL ENERGY SOURCES

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, ocean thermal energy conversion, tidal and wave power.

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Learning Outcomes: At the end of this unit,

At the end of this unit, the students will be able to

Differentiate petroleum, petrol, synthetic petrol and have knowledge how they are produced.

Study alternate fuels

Generation of power by different natural sources.

TEXT BOOKS:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publishing Co.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2019 edition.
2. Engineering Chemistry by Bharathi kumari Yelamanchili, VGS series.

Programme: Common to CSE, CAI, CSD, IT, ECE, EEE, ME, & CE		Semester: I			
Course Code	Course Name	L	T	P	C

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20SH1T06	DIFFERENTIAL EQUATIONS	3	0	0	3
Subject Category : BSC					

Course Outcomes:

At the end of the Course, Student will be able to:

CO1 : Solve the differential equations and apply differential equations related to various engineering fields

CO2 : Solve linear differential equations of second and higher order

CO3 : Calculate Jacobian, maxima and minima of functions of two Variables.

CO4 : Solve first order partial differential equations

CO5 : Solve the higher order partial differential equations

UNIT I: Differential equations of first order and first degree:

Linear differential equations – Bernoulli equations – Exact equations and equations reducible to exact form. Applications: Newton’s Law of cooling - Law of natural growth and decay - Orthogonal trajectories.

UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type eax , $\sin ax$, $\cos ax$, polynomials in x , $eax V(x)$, $x^n V(x)$ - Method of Variation of parameters. Applications: L-R circuit, C-R circuit and L-C-R circuit.

UNIT III: Differential Calculus :

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Taylor's and Maclaurin's series for one & two variables – Functional dependence – Jacobian.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT IV: First order Partial differential equations:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations

UNIT V: Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients – RHS terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$ and Method of separation of Variables.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley- India.
2. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.
3. Peter O'Neil, Advanced Engineering Mathematics, Cengage

Programme: Common to CSE, CAI, CSD, IT, ECE, EEE, ME, & CE				Semester: I			
Course Code	Course Name			L	T	P	C

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20CS1T01	PROBLEM SOLVING AND PROGRAMMING USING C	3	0	0	3
Subject Category : ESC					

Course Objectives:

The objectives of Programming for Problem Solving Using C are

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C
- To learn about the design concepts of arrays, strings, enumerated structure and union types. To learn about their usage.
- To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor.
- To assimilate about File I/O and significance of functions

Course Outcomes:

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

CO 1: Build algorithms and to draw flowcharts for solving problems

CO 2: Convert flowcharts/algorithms to C Programs, compile and debug programs

CO 3: Use different operators, data types and write programs that use two-way/ multi-way selection

CO 4: Select the best loop construct for a given problem

CO 5: Design and implement programs to analyze the different pointer applications

CO 6: Decompose a problem into functions and to develop modular reusable code

UNIT I

Introduction to Computers: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Type Qualifiers. Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs.

UNIT II

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Bitwise Operators: Exact Size Integer Types, Logical, Bitwise Operators, Shift Operators.

Selection & Making Decisions: Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions. Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples.

UNIT III

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages
Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions
String/ Data Conversion, A Programming Example – Morse Code
Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application.

UNIT IV

Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value
Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application.
Processor Commands: Processor Commands.

UNIT V

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Storage Classes, Scope, life time, Passing Array to Functions, Passing Pointers to Functions, Command Line Arguments, Recursion
Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions
Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.

Text Books:

- 1) Programming for Problem Solving, Behrouz A. Forouzan, Richard F. Gilberg, CENGAGE.
- 2) The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, 2e, Pearson.

Reference Books:

- 1) Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill.
- 2) Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson.

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3) Computer Fundamentals and Programming in C, PradipDey, Manas Ghosh, OXFORD.

E-Resources:

1. <https://www.tutorialspoint.com/cprogramming/index.htm>
2. <https://www.programiz.com/c-programming>
3. <https://www.javatpoint.com/c-programming-language-tutorial>
4. <https://www.javatpoint.com/c-programming-language-tutorial6+>

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Course Code	Course Name	L	T	P	C
20ME1T01	ENGINEERING GRAPHICS	1	0	4	3
Subject Category :		ESC			

COURSE OUTCOMES:

At the end of the Course student will be able to:

- CO1:** To illustrate the fundamental Engineering Drawing Standards and discuss about conics and scales.
- CO2:** Ability to draw the projection of points and straight lines.
- CO3:** Ability to draw the projection of planes
- CO4:** Understand the classification of solids and draw the projection of solids.
- CO5:** Ability to draw isometric and orthographic projections.

UNIT-I

Introduction to Engineering graphics: Conventions in drawing-lettering - BIS conventions.

Polygons: Constructing regular Polygon by general methods.

Curves: Conic sections in general method and Cycloid, Involute tangent and normal for the curves Scales: Plain scales, Diagonal scales and vernier scale.

UNIT-II

Introduction to Orthographic Projections; Projections of Points in various quadrants, Projections of Straight Lines parallel to both planes Projections of Straight Lines-Parallel to one and inclined to other plane

Projections of Straight Lines inclined to both planes, determination of true lengths, angle of inclinations and traces.

UNIT-III

Projections of Planes

Regular Planes Perpendicular / parallel to one Reference Plane and inclined to other Reference

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Plane, Planes inclined to both the Reference Planes.

UNIT-IV

Projections of solids: Projections of Prisms, Cylinders, with the axis inclined to one Reference Plane. Projections of Pyramids and Cones with the axis inclined to one Reference Plane

UNIT-V

Conversion of isometric views to orthographic views. Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Elementary Engineering Drawing By N.D.Bhatt, Charotar Publishing House
2. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers.
3. Engineering Drawing, K.L.Narayana & P. Kannaiah, Scitech Publishers.

REFERENCE BOOKS

1. A Text Book of Engineering Graphics By P.J.Shah S.Chand & Company Ltd., New Delhi
2. Engineering Graphics I and II By Arunoday Kumar Tech Max Publication, Pune
3. A text book of Engineering Drawing By P.S.Gill S.K.Kataria & sons, Delhi.

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Programme: Common to CSE, CAI, CSD, IT, ECE, EEE, ME, & CE				Semester: I			
Course Code	Course Name	L	T	P	C		
20EE1T02	BASIC OF ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3		
Subject Category	ESC						

COURSE OUTCOMES:

- CO1** : Recognize the fundamentals of solar energy, simple DC and AC circuits.
- CO2** : Demonstrate the construction, working principles and operating characteristics of DC machines and transformer
- CO3** : Demonstrate the construction, working principles and operating characteristics of AC rotating machines.
- CO4** : Demonstrate the working principles and operations of diode rectifiers and transistors
- CO5** : Comprehend the concept of working principles and operations of operational amplifiers and CRO.

UNIT-I :DC & AC Fundamentals

Electrical Circuit Elements (R, L and C)-Voltage and Current Sources - Ohms Laws - Kirchoff's Laws - Series-Parallel- Series and Parallel Combination (Only Resistances)-Problems in Simple Circuits with DC Excitation - Representation of Sinusoidal Waveforms - Cycle, Time Period, Frequency, Instantaneous Value, Peak, Average and RMS Values- Phase Angle, Power Factor, Real Power, Reactive Power and Apparent Power (Definition and Simple Problems).

UNIT-II:DC Machines & Transformers

DC Machines: Principle of Operation of DC Generator – EMF Equation – Types of DC Machine

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– Torque Equation of DC Motor – Applications – Three-Point Starter, Speed Control Methods – OCC Of DC Generator Transformers: Principle of Operation of Single-Phase Transformers – EMF Equation – Losses – Efficiency and Regulation.

UNIT-III : AC Rotating Machines

Principle of Operation of Alternators – Regulation by Synchronous Impedance Method – Principle of Operation Of 3- Phase Induction Motor – Slip-Torque Characteristics - Efficiency – Applications.

UNIT-IV : Rectifiers and Transistors & Concept of uninterrupted power supply (UPS)

PN Junction Diodes – Diode Applications (Half, Full Wave and Bridge Rectifiers) - Zener Diode- Applications (Voltage Regulator) – LED - Photo Diode – SCR- UJT (Principle of Operation)- BJT FET (Types & Principle of Operation)- Concept of UPS-Introduction-Types-Block diagram- applications- Advantages

UNIT-V : Operational Amplifiers and CRO.

Characteristics of Operation Amplifiers (OP-AMP) – Application Of OP-Amps (Inverting, Non-Inverting, Integrator & Differentiator)- Simple Problems on Operation Amplifiers - Cathode Ray Oscilloscope –Construction and Operation.

TEXT BOOKS:

1. D.P. Kothari and I.J. Nagrath, Basic Electrical Engineering, 4th ed., Tata McGraw-Hill, 2019.
2. J. Millman, C. Halkias, Electronic Devices and Circuits, 2nd ed., Tata Mc-Graw-Hill, 2008
3. D. Roy Choudhury and Shail B. Jain, Linear Integrated Circuits, 2nd ed., New Age International (p) Ltd, 2004.

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REFERENCE BOOKS:

1. P. V. Prasad, S. Sivanagaraju, K. R. Varmah, and Chikku Abraham, Basic Electrical Engineering, 1st ed., Cengage India, 2018.
2. D.C. Kulshreshtha, Basic Electrical Engineering, 1st ed., Revised, Tata McGraw-Hill, 2012.
3. V K Mehta & Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd ed., S Chand Publishers, 2019.
4. S. Salivahanan, N. Suresh Kumar, Electronic Devices and Circuits, Tata Mc-Graw Hill Education, 2018.
5. S. Salivahanan, V.S. Kanchana Bhaaskaran, Linear Integrated Circuits, 3rd ed., McGraw- Hill Education, 2018

e-Resources :

1. <https://www.slideshare.net/GautamMishra5/ups-uninterrupted-power-supply>.

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Programme: Common to CSE, CAI, CSD, IT, ECE, EEE, ME, & CE				Semester: I	
Course Code	Course Name	L	T	P	C
20SH1L05	ENGINEERING CHEMISTRY LAB	0	0	3	1.5
Subject Category : BSC					

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1 : Estimate unknown solutions by using volumetric titration method.
- CO2 : Analyse the quality of water.
- CO3 : Determine the p^H of liquid samples.
- CO4 : Measure the strength of acids by conductometric and potentiometric titrations.
- CO5 : Estimate the acid content in fruit juices and soft drinks.

LIST OF EXPERIMENTS

1. Introduction to Chemistry laboratory – Molarity, normality, primary, secondary standard solutions, volumetric titrations, quantitative analysis
2. Estimation of HCl using standard Na_2CO_3 solution.
3. Estimation of alkalinity of a sample containing Na_2CO_3 and NaOH.
4. Estimation of total hardness of water using standard EDTA solution.
5. Estimation of copper using standard EDTA solution.
6. Estimation of zinc using standard EDTA solution.
7. Estimation of Ferrous iron using standard $K_2Cr_2O_7$ solution.

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8. Estimation of KMnO_4 using standard Oxalic acid solution.
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base.
11. Conductometric Titrations between strong acid and Weak base.
12. Preparation of Bakelite.
13. Estimation of acid content in soft drinks.
- . Potentiometric Titrations between ferrous iron with potassium dichromate.
15. Estimation of copper (II) using standard hypo solution.
16. Estimation of iron (III) by colorimetric method

The above experiments at least 10 assessment experiments should be completed in a semester.

Outcomes: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Bharathi Kumari Yelamanchili - Laboratory Manual of Engineering Chemistry, VGS Techno Series

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Programme: Common to CSE, CAI, CSD, IT, ECE, EEE, ME, & CE				Semester: I			
Course Code	Course Name	L	T	P	C		
20CS1L01	PROBLEM SOLVING AND PROGRAMMING USING C LAB	0	0	3	1.5		
Subject Category : ESC							

Course Objectives:

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers & functions.
- To review the file operations, preprocessor commands.

Course Outcomes:

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

CO 1: Gains Knowledge on various concepts of a C language.

CO 2: Draw flowcharts and write algorithms.

CO 3: Design and development of C problem solving skills.

CO 4: Design and develop modular programming skills.

CO 5: Trace and debug a program

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.

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3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r and s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.

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2. Write a program in C to find transpose of a given matrix.

Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:

1. Write a program in C to show how a function returning pointer.

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2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16: 1. Write a program in C to append multiple lines at the end of a text file.

2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk

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Programme: Semester I: Common to CSE, CSD, CSI, ME & CE					
Semester: II: Common to ECE, EEE & IT					
Course Code	Course Name	L	T	P	C
20CS1L02	IT WORKSHOP	0	0	3	1.5
Subject Category : ESC					

Course Objectives:

The objective of IT Workshop is to

- Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
- Demonstrate basic command line interface commands on Linux
- Teach the usage of Internet for productivity and self paced lifelong learning
- Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools

Course Outcomes:

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

CO1: Describe evolution of computers, storage devices, networking devices, transmission media and peripherals of a computer .

CO2: Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems

CO3: Construct a fully functional virtual machine, Summarize various Linux operating system commands.

CO4: Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTeX .

Computer Hardware:

Experiment 1:

Identification of peripherals of a PC, Laptop, Server and Smart Phones: Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output

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devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Operating Systems:

Experiment 2: Virtual Machine setup:

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

Experiment 3: Operating System installation:

- Installing an Operating System such as Linux on Computer hardware.

Experiment 4: Linux Operating System Commands

- General command syntax, Basic help commands, Basic File system commands, Date and Time
- Basic Filters and Text processing, Basic File compression commands
- Miscellaneous: apt-get, vi editor

Networking and Internet

Experiment 5: Networking Commands

ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp.

Internet Services:

Experiment 6:

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/ plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Email creation and usage, Creating a Digital Profile on LinkedIn

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Productivity Tools:

Office Tools

Experiment 7:

Demonstration and Practice on Text Editors like Notepad ++, Sublime Text, Atom, Brackets, Visual code, etc

Experiment 8:

Demonstration and practice on Microsoft Word, Power Point

Experiment 9:

Demonstration and practice on Microsoft Excel.

Experiment 10:

Demonstration and practice on LaTeX and produce professional PDF documents.

Experiment 11:

Internet of Things (IoT): IoT fundamentals, applications, protocols, Architecture, IoT Devices communication models.

Introduction to HTML:

Experiment 12:

Understanding HTML tags and creation of simple web pages.

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Text Books:

1. Computer Fundamentals, Anita Goel, Pearson Education, 2017
2. PC Hardware Trouble Shooting Made Easy, TMH

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3. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand.
4. HTML & CSS ,The Complete Reference , Fifth Edition , Thomas A. powell
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.

Reference Text Books:

1. B. Govindarajulu, “IBM PC and Clones Hardware Trouble shooting and Maintenance”, 2nd edition, Tata McGraw-Hill, 2002
2. “MOS study guide for word, Excel, Powerpoint& Outlook Exams”, Joan Lambert, Joyce Cox, PHI.
3. “Introduction to Information Technology”, IITL Education Solutions limited, Pearson Education.
4. Bigelows, “Trouble shooting, Maintaining& Repairing PCs”, TMH.
5. Excel Functions and Formulas, Bernd held, Theodor Richardson, Third Edition

E-Resources:

1. https://explorersposts.grc.nasa.gov/post631/20062007/computer_basics/ComputerPorts.doc
2. https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc
3. <https://www.thegeekstuff.com/2009/07/linux-ls-command-examples>
4. <https://www.pcsuggest.com/basic-linux-commands/>
5. <https://www.vmware.com/pdf/VMwarePlayerManual10.pdf>
6. <https://gsuite.google.com/learning-center/products/#!/>
7. <https://www.raspberrypi.org>

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Programme: Common to CSE, CAI, CSD, IT, ECE, EEE, ME, & CE				Semester: II		
Course Code	Course Name	L	T	P	C	
20SH2T01	COMMUNICATIVE ENGLISH	3	0	0	3	
Subject Category : BSC						

COURSE OUTCOMES :

- CO1** : Recall life in one's past which had fine balancing act.
- CO2** : Decide the qualities required to take up a promising career.
- CO3** : Evaluate the obstacles hinder of students progress and find the ways to overcome them.
- CO4** : Explain the environment activism and empowerment of women
- CO5** : Interpret the efforts of successful persons to keep idealistic approach in achieving goals.

UNIT-I: A Drawer full of happiness

Speaking: Asking and answering general questions on familiar topics such as home, family, work, Study and interests. Self introduction and introduce others.

Vocabulary: Technical vocabulary from a cross technical branches, GRE Vocabulary

(Antonyms and Synonyms, Word applications).

Grammar: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns- Countable and uncountable; singular and plural, basic sentence structures; simple question form – „who questions; word order in sentences.

Writing: Note Making and Note Taking.

Employability Skills: Teamwork

UNIT-II: Nehru's letter to daughter Indira on her Birthday

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Speaking: Discussion in pairs, small groups on specific topics followed by short structured talks.

Functional English: Greetings and leave takings.

Vocabulary: Technical vocabulary from across technical branches. GRE Vocabulary, Analogies (Antonyms and Synonyms, Word applications)

Grammar: Use of articles and zero article; prepositions.

Writing: Resume, Cover Letter.

Employability Skills: Time Management

UNIT-III: Stephen Hawking-Positivity 'Benchmark'

Speaking: Discussing specific topics in pairs or in small groups and reporting what is discussed. Functional

English: Complaining and Apologizing. Reading: Reading a text in detail by making basic inferences- recognizing and interpreting Specific context clues; strategies to use text clues for comprehension.

Critical reading. Vocabulary : Technical vocabulary from a cross technical branches, GRE Vocabulary (Antonyms and

Synonyms, Word applications) Association, sequencing of words- Grammar: Verbs-Tenses; subject-verb agreement. Writing: Letter Writing: -Formal, Business, Editorial, Complaints, Applications,

Permissions. Employability Skills: Leadership skills.

UNIT-IV: Like a Tree, Unbowed: Wangari Maathai-biography

Reading: Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

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Vocabulary: Technical vocabulary from across technical branches, GRE Vocabulary, (Antonyms and Synonyms, Word applications) Cloze Encounters.

Writing: Essay Writings: - Paragraph Writing, Precis Writing,

Employability Skills: Management skills.

UNIT-V: Stay Hungry-Stay Foolish

Reading: RAP Strategy Intensive reading and Extensive reading techniques.

Reading for Writing: Writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches, GRE Vocabulary (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

Grammar: Editing short texts—identifying and correcting common errors in grammar and usage (Articles, prepositions, tenses, subject verb agreement)

Writing : E- Mail, Reports, Reporting to media.

Employability Skills: Creative Thinking.

TEXTBOOKS:

01. "InfotechEnglish", Maruthi Publications.

REFERENCEBOOKS:

01. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
02. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
03. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
04. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

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Programme: Common to CSE, CAI, CSD, IT, ECE, EEE, ME, & CE					Semester: II	
Course Code	Course Name	L	T	P	C	
20SH2T03	ENGINEERING PHYSICS	3	0	0	3	
Subject Category : BSC						

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1** : Explain the need of coherent sources and the conditions for sustained interference.
- CO2** : Understand the basic concepts of LASER light Sources
- CO3** : Analyze the physical significance of wave function.
- CO4** : Identify the type of semiconductor using Hall effect.
- CO5** : Apply the concept of magnetism to magnetic devices

UNIT-I : WAVE OPTICS

INTERFERENCE: Principle of superposition – Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

DIFFRACTION: Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits (Qualitative) – Grating - Dispersive power and resolving power of Grating (Qualitative).

POLARIZATION: Introduction - Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism - Half wave and Quarter wave plates.

UNIT-II LASERS & FIBER OPTICS

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LASERS: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation- Einstein's coefficients – Population inversion – Lasing action- Pumping mechanisms – Ruby laser – He-Ne laser - Applications of lasers.

FIBER OPTICS: Introduction – Principle of optical fiber- Acceptance Angle- Numerical Aperture- Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers - Applications.

UNIT-III MAGNETISM & DIELECTRICS

MAGNETISM: Introduction - Magnetic dipole moment - Magnetization- Magnetic susceptibility and permeability- Origin of permanent magnetic moment - Bohr magneton- Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism – Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material.

DIELECTRICS: Introduction - Dielectric polarization- Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (Quantitative), Orientation Polarizations (Qualitative) - Lorentz Internal field- Clausius – Mossotti's equation- Frequency dependence of polarization - Applications of dielectrics.

UNIT-IV : QUANTUM MECHANICS , FREE ELECTRON THEORY & BAND THEORY OF SOLIDS

Introduction – matter waves – de Broglie's hypothesis, Heisenberg's Uncertainty Principle Schrödinger time independent and time dependent wave equations – physical significance of Schrödinger wave function – Particle in a potential box (determination of energy).

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FREE ELECTRON THEORY : Introduction - Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory- Equation for electrical conductivity based on quantum free electron theory-Fermi-Dirac distribution- Density of states (3D) – Fermi energy

BAND THEORY OF SOLIDS:

Introduction - Bloch theorem, krong-Penney model, E vsK diagram, effective mass of electron, classification of c solids –concept of hole.

UNIT – V : SEMICONDUCTOR PHYSICS

Introduction – Intrinsic semiconductors - density of charge carriers – Electrical conductivity - Fermi level - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Drift and Diffusion currents - Einstein's equation. Hall effect- Hall coefficient - Applications of Hall effect.

TEXT BOOKS:

1. B. K. Pandey, S. Chaturvedi ., “Engineering Physics” - Cengage Publications, 2012
2. M.N. Avadhanulu, P.G.Kshirsagar., “A Text book of Engineering Physics” - S.Chand, 2017.
3. D.K.Bhattacharya and Poonam Tandon., “Engineering Physics”, Oxford press (2015).
4. R.K Gaur. and S.L Gupta., “Engineering Physics” - Dhanpat Rai publishers, 2012.

REFERENCE BOOKS:

1. M.R.Srinivasan, “Engineering Physics”, New Age international publishers (2009).
2. Ajoy Ghatak “Optics”, 6th Edition McGraw Hill Education, 2017.
3. A.J.Dekker “Solid State Physics”, Mc Millan Publishers (2011).

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Programme: Common to CSE, CAI, CSD, IT, ECE, EEE, ME, & CE				Semester: II	
Course Code	Course Name	L	T	P	C
20SH2T07	LINEAR ALGEBRA & VECTOR CALCULUS	3	0	0	3
Subject Category : BSC					

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 :** Solve simultaneous linear equations numerically using various matrix methods.
- CO 2:** Find the Eigen values and Eigen vectors of a given matrix and nature of quadratic form.
- CO 3 :** Determine double integral over a region and triple integral over a volume.
- CO 4 :** Calculate gradient of a scalar function, divergence and curl of a vector function.
- CO 5:** Determine line, surface and volume integrals and apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:

Rank - Echelon form – Normal form – Solving system of homogeneous and Non- Homogeneous equations – Gauss elimination – Gauss Jordan. Applications: Finding the current in electrical circuits.

UNIT II: Eigen values - Eigen vectors and Quadratic forms:

Eigen values – Eigen vectors – Properties (without proof) – Cayley-Hamilton theorem (Without of proof) – Inverse and powers of a matrix by using Cayley-Hamilton theorem – Diagonalisation – Reduction of quadratic form to canonical form by Orthogonalisation – Rank – Positive, negative and semi definite – Index – Signature.

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UNIT III: Multiple integrals:

Double and Triple integrals – Change of order of integration – Change of variables. Applications: Finding Areas.

UNIT IV: Vector Differentiation:

Gradient – Directional derivative – Divergence – Curl – Scalar Potential – Laplacian and second order operators - Vector identities.

UNIT V: Vector Integration

Line integral – Work done – Potential function – Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) .

Text Books:

1. **B. S. Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana**, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **Dass H.K., Rajnish Verma. Er.**, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi

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Programme: Common to MECH & CE ,					Semester: II	
Course Code	Course Name	L	T	P	C	
20ME2W01	ENGINEERING WORK SHOP	1	0	4	3	
Subject Category : Engineering Science Course						

COURSE OBJECTIVE **To impart knowledge and hands-on practice on basic engineering trades and skills.**

COURSE OUTCOMES:

At the end of the Course student will be able to:

- CO1** Understand the use of various hand tools used in the basic mechanical engineering workshop sections-smithy, carpentry, assembling, welding etc.
- CO2** Ability to design and model different prototypes in the carpentry trade
- CO3** Ability to design and model various basic prototypes in the trade of fitting
- CO4** Ability to make various basic prototypes in the trade of Tin smithy
- CO5** Ability to perform various basic House Wiring techniques and welding

WORKSHOP PRACTICE

Trade/Division	No.of Experiments	Title of the job
Carpentry	2	1. T-Lap Joint 2. Dovetail Joint
Fitting	2	1. Square Fit 2. V-Fit
Tin Smithy	4	1. Taper Tray 2. Square Box without lid 3. Open Scoop 4. Funnel
House Wiring	3	1. Parallel / Series Connection of three bulbs 2. Stair Case wiring 3. Florescent Lamp Fitting
Welding Technology	4	Metal arc welding
		Gas welding:
		1. Lap joint 2. Butt joint

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2. Butt
joint

Reference Books

1. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
3. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay.

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Programme: Common to ME, & CE			Semester: II			
Course Code	Course Name	L	T	P	C	
20ME2T01	ENGINEERING MECHANICS	3	0	0	3	
Subject Category : ESC						

Course Objectives:

- To study Concurrent force systems in plane & Space.
- To study Non concurrent force system in plane. & Space.
- To study friction & its Applications.
- To understand Concurrent & Non concurrent force systems in space.
- To study Principle of virtual work.
- To study Kinematic & kinetics of bodies in motion.
- To Understand work-Energy & Impulse-momentum principles.

Course Outcomes:

Course Outcome	Blooms Taxonomy
Describe the basic concepts of Statics.	Understand
Apply the knowledge of Statics	Apply
Describe the basic concepts of centroid, Centre of gravity and moment of inertia.	Understand
Solve the centroid, center of gravity & moment of inertia problems.	Apply
Describe the basic concepts of dynamics.	Understand
Apply the knowledge of dynamics.	Apply

UNIT-I: Concurrent Force System

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Introduction-Basic concepts, Effect of force, classification of system of forces, Composition & Resolution of concurrent forces in a plane, Resultant of concurrent force System-basic concepts, coplanar force systems, non-coplanar force system.

Equilibrium-Free Body Diagram, Degrees of freedom, Conditions of Equilibrium of concurrent force system, Equilibrium of concurrent force System-Coplanar force systems, non-coplanar force system.

Friction- Introduction & basic concepts of friction, Impending motion of connected bodies, Relative Motion, application of friction-wedges.

UNIT-II: Non Concurrent force system

Resultant of Non Concurrent force system-Coplanar & general force system.

Equilibrium- Conditions of Equilibrium of non-concurrent force system, Equilibrium of- Coplanar non concurrent forces system, Friction- Ladder friction.

Centroid & Center of Gravity: Expressions for centroid & center gravity from basic principle, Centroids of simple figures-Lines & Areas, Axis of symmetry, Centroids of composite figures. Centre of gravity of simple solid bodies, Centre of gravity of composite bodies.

UNIT-III: Moment of Inertia

Area moment of Inertia: Introduction, Transfer theorem & perpendicular axis theorem, Area moment of inertia of simple plane figures, Area moment of inertia of composite figures.

Mass moment of inertia- Mass moment of inertia of single & system of particles, mass moment of inertia of simple plates and Solids.

Virtual Work: Equilibrium of Ideal systems-Virtual displacement, virtual work, principle of virtual work.

UNIT-IV: Dynamics

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Introduction, Classification of Motions and Basic terms in dynamics.

Kinematics: Kinematics of particles—Rectilinear motions, uniformly accelerated motion, and curvilinear motions, projectiles.

Kinetics: Kinetics of a particle—In rectangular coordinates, connected bodies, D'Alembert's principle for rectilinear motion.

UNIT-V: Work-Energy & Impulse-Momentum Principles

Work-energy principle: Energy, classification of mechanical energies, Principle of conservation of energy, work-energy principle for-rectilinear motions of particles.

Impulse-momentum principle: Impulse & momentum, Impulse-momentum principle for-rectilinear motion of particles.

Text books:

1. Engineering Mechanics - S. Timoshenko & D. H. Young., 4th Edition, Mc Graw Hill publications.
2. Engineering Mechanics, dynamics, Bhavikatti S.S – New Age International Publishers.

References:

1. Engineering Mechanics, A. K Tayal, 13th Edition, Umesh Publications.
2. Engineering Mechanics, R. K Bansal, Laxmi publications.
3. Engineering Mechanics statics and dynamics, A Nelson, Mc Graw Hill publications.
4. Engineering Mechanics, statics and Dynamics, J. L. Meriam, 6th Edition – Wiley India Pvt Ltd.

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Programme: Common to ECE, CSE, EEE, IT, ME & CE				Semester: II			
Course Code	Course Name	L	T	P	C		
20GE2M01	ENVIRONMENTAL SCIENCE	2	0	0	0		
Subject Category : Basic Science Course							

COURSE OUTCOMES:

After successful completion of this course, students will be able to

- CO1 : Identify the fundamental concepts and the first global initiatives towards sustainable development and the possible means to combat the challenges
- CO2 : Examine the natural resources, their availability for the sustenance of the life and recognize the need to promote the green technologies to conserve the natural resources
- CO3 : Assess the concepts of the ecosystem, its function in the environment and the need for protecting various ecosystems
 Discuss the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- CO4 : Explain various attributes of the pollution and their impacts and measures to control the pollution along with waste management practices
- CO5 : Outline the social issues including the environmental legislations of India and environmental assessment and also to investigate the industrial, urban and rural conditions in the surroundings.

SYLLABUS

UNIT-I : Scope and Importance of Environmental Studies

Definition and components of environment, Scope and Importance: Sustainability: Stockholm and Rio Summit: Global Environmental Challenges: Global warming and climate change- Acid rains, Ozone layer depletion, Population Explosion and effects, Role of IT in environmental protection and human health.

UNIT-II : Natural Resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams

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and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

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

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems,

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

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification.

UNIT-III : Ecosystems and Biodiversity and its conservation

Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem – Bio geo chemical cycles-Ecological succession. –

Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

Green Campus and Green Energy. Identification of species by involving in activities like plantation inside or outside the campus.

Biodiversity and its conservation: Definition: genetic, species and ecosystem

diversity- classification - Value of biodiversity: consumptive use, productive use, social-

India as a mega-diversity nation - Hot-spots of biodiversity- Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

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UNIT-IV : Environmental Pollution

Definition, Cause, effects and control measures of **Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards**. Role of an individual in prevention of pollution. - Pollution case studies,

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

Industrial Disasters and Pollution Case studies:

-Bhopal Disaster, Chernobyl accident, Love canal Disaster.

UNIT-V : Environmental Legislation and the Environmental Management

Environmental Protection Act –Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act- Issues involved in enforcement of environmental legislation. -Public awareness

Impact Assessment and its significance-various stages of EIA, preparation of EMP and EIS, Eco-tourism.

Visit to an Industry / Urban/Rural/Agricultural Ecosystem and submit a report individually on any issues or Documentation of Plants and Animals (Field work Equal to 3 lecture hours).

TEXT BOOKS:

1. Environment Studies, Fourth Edition, Anubha Kaushik, C P Kaushik, New Age International Publishers.

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2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi.
3. Fundamentals of Environment Studies, Mahua Basu and S. Xavier,

Cambridge Publishers, 2014.

4. Textbook of Environmental Science, M. Anji Reddy, B S Publications, Hyderabad.

REFERENCE BOOKS:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

Programme: Common to CSE, CAI, CSD, IT, ECE & CE		Semester: II			
Course Code	Course Name	L	T	P	C
20SH2L01	COMMUNICATIVE ENGLISH SKILL LAB	0	0	3	1.5

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Subject Category : ESC

Module - I:

Introduction to Phonetics.

- a) Brief Introduction to Consonants
- b) Brief Introduction to Vowels & Diphthongs

Module - II:

Listening Comprehension

- a) Comprehending Spoken material in British English.
- b) Comprehending Spoken material in American English.
- c) Intelligent Listening in Situations.

Module - III:

Role – Play / Dialogue Writing

- a) Introducing one and others.
- b) Asking for and giving information.
- c) Asking for and responding to give directions.
- d) Seeking permission, requests.
- e) Apologizing.

Module - IV:

Communication Skills

- a) Verbal and Non – verbal communications
- b) Barriers of communication.
- c) Body Language – Voluntary and Involuntary.

Module - V:

Presentation Skills.

- a) Extempore
- b) JAM Sessions
- c) Paper Presentation

Module - VI:

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- a) Group Discussions: Dos and Don'ts- Types, Modalities

Resume Preparation

References:

1. Infotech English, Maruthi Publications (with Compact Disc).
2. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
3. English Pronunciation in use- Mark Hancock, Cambridge University Press.
4. English Phonetics and Phonology- Peter Roach, Cambridge University Press.
5. English Pronunciation in use- Mark Hewings, Cambridge University Press.
6. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
7. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.
8. Technical Communication- Meenakshi Raman, Sangeeta Sharma, Oxford University Press.
9. Technical Communication- Gajendra Singh Chauhan, Smita Kashiramka, Cengage Publications.

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Programme: Common to CSE, CAI, CSD, IT, ECE & CE		Semester: II			
Course Code	Course Name	L	T	P	C
20SH2L03	ENGINEERING PHYSICS LAB	0	0	3	1.5
Subject Category : ESC					

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1 : **Memorize** the conditions for sustained Interference and Diffraction.
- CO2 : **Understand** the basic concepts of LASER.
- CO3 : **Identify** the properties of various materials.
- CO4 : **Apply** the concept of dielectrics on the materials.
- CO5 : **Analyze** the acoustic properties of sound.

List of Experiments:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
4. Energy Band gap of a Semiconductor p - n junction
5. Characteristics of Thermistor – Temperature Coefficients
6. Determination of dielectric constant.
7. LASER - Determination of wavelength by plane diffraction grating
8. Rigidity modulus of material by wire-dynamic method (Torsional pendulum)
9. Verification of laws of vibrations in a stretched string – Sonometer
10. LASER - Determination of particle size using laser.
11. Determination of moment of inertia of a fly wheel.
12. Melde's Experiment – Transverse and longitudinal waves

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13. Determination of time constant – C- R Circuit.
14. I/V Characteristics of ZENAR diode.
15. Determination of Young's Modules of the given Beam – Cantilever.

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Programme: Common to M.E & C.E					Semester: II	
Course Code	Course Name	L	T	P	C	
20CE2L01	COMPUTER AIDED DRAWING LAB	0	0	3	1.5	
Subject Category : Engineering Science Course LAB						

COURSE OBJECTIVE: To develop skill to use software to create 2D and 3D models.

COURSE OUTCOMES:

- CO1: Understand the basic concept of product design.
- CO2: Ability to use the software packers for drafting and modeling
- CO3: Ability to create 2D and 3D models of Engineering Components

LIST OF EXPERIMENTS

1. Introduction to AutoCAD
2. AutoCAD – BASICS
 - Starting with AutoCAD
 - Layout and sketching
 - Drawing environment
3. Model given objects using basic Drawing commands in AutoCAD
4. Model given objects employing basic Modifying commands in AutoCAD
5. Give Dimensioning to given objects using basic Annotation commands in AutoCAD
6. Perform Two-dimensional Wireframe modeling of given object using AutoCAD
7. Perform Three-dimensional Wireframe modeling of given object using AutoCAD
8. Isometric Drawing of connecting rod using AUTOCAD.
9. Isometric Drawing of V block using AUTOCAD
10. Generate Orthographic Projections for Isometric Drawing of connecting rod.
11. Generate Orthographic Projections for Isometric Drawing of V Block.
12. Model a simple Three-Dimensional object using AutoCAD

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13. Model a Gear using AutoCAD
14. Model a Bolt and Nut in AutoCAD
15. Generate Sectional Isometric View of a Joint using AutoCAD
16. Model a thread profile using AutoCAD

REFERENCE BOOKS

1. Engineering Graphics, K.C. John, PHI Publications
2. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishes
3. Engineering Drawing and Graphics, Venugopal
4. Engineering Drawing & Graphics using Auto CAD 2000 By T. Jeyapoovan Vikas Publishing House Pvt. Ltd., New Delh

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Year & Semester: II-I	L	T	P	C
Category: Basic Science Course	3	0	0	3
Course: Numerical Methods And Statistics				
Subject Code: 20SH3T02				

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals

CO2: Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations

CO3: Apply discrete and continuous probability distributions CO4: Design the components of a classical hypothesis test

CO5: Infer the statistical inferential methods based on small and large sampling Tests

UNIT-I (12)

Introduction – Bisection method – Newton-Raphson method (One variable) – Finite differences

Forward differences – Backward differences – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula

UNIT-II (12)

Trapezoidal rule – Simpson's 1/3rd and 3/8th rule – Solution of ordinary differential equations by

Taylor's series – Picard's method of successive approximations – Euler's method – Runge-Kutta method (second and fourth order).

UNIT-III (12)

Probability and Distributions: Probability (Introduction) – Random variables – Discrete and Continuous random variables – Distribution function – Mean and Variance – Binomial, Poisson, Normal distributions.

UNIT-IV (10)

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Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to distributions – estimate. (chi-square) and F-Point and Interval estimations – Maximum error of

UNIT-V (14)

Tests of Hypothesis: Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples) – Tests on proportion (Single and two).

Text Books:

B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

Miller and Freund's, Probability and Statistics for Engineers, 7/e, Pearson, 2008.

Reference Books:

Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

S. C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

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Year & Semester: II-I	L	T	P	C
Category: Professional Core Course (PCC)	3	0	0	3
Course: Strength of Materials - I				
Subject Code: 20CE3T01				

Course Objectives:

- □ To understand the concepts of stresses and nature of stress development in simple objects.
- □ To Demonstrate the principal stresses and strains system
- □ To sketch shear force and bending moment diagrams of beams.
- □ Estimate bending and shear stresses in beams
- □ To calculate slopes and deflections in different beams under various loadings

Course Outcomes:

Course Outcome	Blooms Taxonomy
Discuss the basic materials behavior under the influence of different external loading conditions	Understand
Will be able to determine principle planes and stresses and apply the results to combined loading cases	Analyze
Sketch the diagrams indicating the variation of the key performance features like bending moment and shear forces.	Apply
Calculate stresses developed in beams due to bending and shearing	Apply
Determine slopes and deflections of different beams	Apply

UNIT-I

Simple Stresses And Strains : Material Properties (Elasticity, 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 constants & relations – Bars of varying section – stresses in composite bars – Thermal stresses. **Strain Energy** – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT-II

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Principal Stresses and Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Mohr's circle of stresses – Principal Stresses and strains – Analytical and graphical solutions. **Theories of Failures:** Introduction – Various Theories of failures like Maximum Principal Stress theory – Maximum Principal Strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT-III

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

UNIT-IV

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation, Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections. **Shear Stresses:** Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections.

UNIT-V

Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic curve of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to different loading conditions and combinations. Mohr's theorems – Moment area method – application to simple cases of cantilever.

Text books:

Strength of Materials by R.K Bansal, Lakshmi Publications

Strength of Materials by Strength of materials, R. K. Rajput, S. Chand & Co, New Delhi

References: Strength of Materials by S. Ramamrutham.

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Year & Semester: II-I	L	T	P	C
Category: Professional Core Course (PCC)	3	0	0	3
Course: Surveying				
Course Code: 20CE3T02				

Course Objectives:

- To make understand the importance of surveying in civil engineering field
- To create awareness on various types of surveying and their instruments
- To familiarize with different types of curves and curve setting

Course Outcomes:

Course Outcome	Blooms Taxonomy
• Classify various types of surveying and explain the concept of chain survey.	Understand
• Determine the included angles using compass.	Application
• Illustrate the principles of levelling and develop contours from it.	Application
• Apply the principles of theodolite and trigonometric levelling to compute angles and heights of objects.	Application
• Identify various features of total station & minor instruments and explain their applications.	Analyse
• Design simple and compound curves for highways.	Create

UNIT- I: Introduction and Chain Surveying

Introduction –primary divisions of surveying, classification of surveying, principles of surveying, basic measurements in surveying, plan and map- Brief about linear measurements and instruments-Errors in chaining.

Principles of chain surveying, basic definitions, selection of survey stations and survey lines, recording measurements, offsets, cross staff survey, obstacles in chaining and ranging, chain traversing.

UNIT - II: Compass Survey

Introduction, types of compass, prismatic compass, included angles, types of bearings, types of meridians, compass traverse, Magnetic declination & dip, local attraction and corrections

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UNIT - III: Levelling and Contouring

Levelling principles, basic definitions, Parts of dumpy level, temporary adjustments, methods of levelling, theory of differential levelling, profile levelling, reciprocal levelling, levelling problems, contouring, contour

Interval, characteristics of contours, direct and indirect methods of contouring, uses of contour maps.

Trigonometrical Levelling: Determination of height of an object when base is accessible and inaccessible

UNIT - IV: Theodolite Survey & Tacheometry,

Main parts of a theodolite, basic definitions, temporary adjustments, horizontal angles- repetition and reiteration methods, vertical angles, direct angles, deflection angles

Systems of Tacheometric measurements, Stadia methods-fixed hair method, movable hair method-

Tangential System, Principle of stadia method.

UNIT -V Curves & Total Station

Basic definitions and designation of a curve, relationship between radius and degree of curve, elements of a simple circular curve and location of the tangent points, methods of setting out curves, tape methods, method of offsets from the chords produced, tape & theodolite method, two theodolite method, problems in setting out curves.

Total station: Features & functions, uses and applications of total station.

Text Books

1. Surveying Vol - I & II, KR Arora, 11th edition, Standard Book House.
2. Surveying Vol – I&II, B.C. Punmia, 16th (Vol I) & 12th (Vol II) edition, Laxmi Publications.

Reference Books

1. Surveying Vol. III, KR Arora, 15th edition, Standard Book House.
2. Fundamentals of Surveying, S K Roy, Eastern Economy Edition, Prentice Hall of India Private Ltd.
3. Surveying and Levelling, T. P. Kanetkar, S.V.Kulkarni Vidyarthi Griha Prakashan, 24th edition, Anuradha Publishers.

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Year & Semester: II-I	L	T	P	C
Category: Professional Core Course (PCC)	3	0	0	3
Course: Building Materials, Construction and Planning				
Subject Code: 20CE3T03				

Course Objectives:

- To initiate the knowledge of basic building materials and their properties.
- □ To demonstrate various types of masonry works including types of bonds and their finishing.
- □ To give knowledge about various building elements and their specifications.
- □ To study about the types of form work and rehabilitation work of building.
- □ To understand the basics of planning strategies, building bye laws and acoustics of building.

Course Outcomes:

Course Outcome	Blooms Taxonomy
Identify different building materials and their importance in building construction	Remember
Differentiate brick masonry, stone masonry construction and bonds used in construction of walls of buildings.	Understand
Discuss the importance of different building components used in construction practices.	Understand
Explain about the form work, scaffolding and shoring and regarding acoustics of building	Understand
Describe capable of understanding building plan and have knowledge about building rules, bye-laws and building elements	Understand

UNIT-I: Stones, Bricks, Tiles and Plastics

Stones- Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone

Bricks- composition of good brick earth, various methods of manufacturing of bricks, Comparison between clamp burning and kiln burning

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Tiles- Characteristics of good tile - manufacturing methods, types of tiles.

Plastics- Classification of plastics, Properties of plastics, Fabrication of plastic articles, some plastics in common use, Reinforced plastics.

UNIT-II: Masonry, Wood and Paints

Masonry-Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and Partition walls.

Wood- Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber.

Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel and Aluminum

Paints- Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. white washing and distempering

UNIT-III: Building Components

Lintels, Arches and Vaults – Staircases, Lifts – Types. Different types of flooring-Concrete, Mosaic, Terrazo floors; Different types of roofs- Pitched, Flat and Curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs - King and Queen Post Trusses. Doors & Windows- Types and Specifications.

UNIT-IV: Construction Practices

Damp Proofing and water proofing materials and uses – Plastering and Pointing. Scaffolding -Types of scaffolding; Formwork for columns, beams, slab; Shoring, Types of shores; Underpinning - Pit method, Pile method;

Acoustics: Basic theory, Reverberation and echoes, Sound isolation, Acoustical materials, Recommendations for different types of buildings.

UNIT-V: Building Planning

An Approach to Planning : Site planning, Space requirement, Establishing areas for different units, Furniture requirements, Roominess, Flexibility, Sanitation, Lighting, Ventilation, Space for equipment

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for air conditioning, Space for machinery etc.; Circulation, Orientation, Aspect and prospect, Privacy, Elegance and economy; Climatic considerations; Architectural composition-Unity, Mass composition, Contrast, Proportion, Scale, Accentuation and rhythm, Materials for the exterior and Expression, Colour.

Building Rules and Bye-Laws: Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index. Building Information System – Green building concepts.

Text books:

3. Engineering Materials by Rangawala, Charotar Publications, Fortieth Edition: 2013
4. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Building Construction" - Laxmi Publications (P) Ltd., New Delhi.
5. Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGraw-Hill, New Delhi, 2009.

References:

5. P.C. Varghese, "Building Materials and Construction" by Prentice-Hall of India Private Ltd, 3rd Edition, New Delhi.
6. Building Materials, S. K. Duggal, New Age International Publications
7. N.Kumaraswamy, A.Kameswara Rao, building planning and drawing, 7th Ed, Charotar
8. Building Materials and Construction, S. S. Bhavikatti, Vices publications House private ltd

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Year & Semester: II-I	L	T	P	C
Category: Professional Core Course (PCC)	3	0	0	3
Course: Fluid Mechanics				
Subject Code: 20CE3T04				

Course Objectives:

- To understand the properties of fluids and fluid statics.
- □ To derive the equation of conservation of mass and its application.
- □ To solve kinematic problems such as finding particle paths and stream lines.
- □ To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems.
- □ To analyze laminar and turbulent flows.
- □ To understand the various flows measuring devices.

Course Outcomes:

Course Outcome	Blooms Taxonomy
Discuss the various properties of fluids, influences and related problems.	Understanding
Evaluate the forces that act on submerged planes and curves.	Evaluating
Distinguish various types of fluid flows and forces in a pipe bend.	Analyzing
Evaluate the quantities of fluid flowing in pipes, tanks and channels.	Evaluating
Determine the head loss, power loss and discharge in laminar & turbulent flow through pipes.	Analyzing

UNIT-I: Introduction

Introduction-Dimensions and units – Physical properties of fluids - specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law -atmospheric, gauge and vacuum pressures- measurement of pressure by manometers.



UNIT-II: Fluid Statics & Fluid Kinematics

Fluid Statics- Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. **Fluid Kinematics:** Description of fluid flow, Stream line, path line and streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, flow net analysis.

UNIT-III: Fluid Dynamics

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line - Momentum equation and its application – forces on pipe bend.

UNIT-IV: Measurement of Flow

Measurement of Flow: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and Stepped notches, Broad crested weirs and Ogee weirs.

UNIT-V: Flow through pipes

Flow through pipes: Reynolds experiment- Characteristics of Laminar & Turbulent flows, Laws of Fluid friction, Energy losses in pipelines: Darcy-Weisbach equation, Minor losses, Pipes in series and parallel, Total energy line and hydraulic gradient line, Resistance to flow of fluid on smooth and rough pipes, Moody's diagram.

Text Books:

1. Modi P.N and Seth S.M.(2018), —Fluid mechanics, Standard book house, New Delhi.
2. A text of Fluid mechanics and hydraulic machines, R.K.Bansal-Laxmi Publications (P) Ltd., New Delhi.

References:

1. K.Subramanyam, Fluid mechanics and hydraulic machines Mc graw hill education, IIInd edition
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.
3. Principle of fluid mechanics and fluid machines III edition, university press.

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Year & Semester: II-I	L	T	P	C
Category: Mandatory Course (MC)	2	0	0	0
Course: Professional Ethics & Human Values				
Course Code: 20GE3M02				

Course Objectives:

- *To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
- *Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

Outcome:

- *It gives a comprehensive understanding of a variety of issues that are encountered by every professional in discharging professional duties.
- *It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

UNIT I: Human Values & Principles for Harmony: Morals, Values and Ethics – Integrity - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty – Courage – Value Time – Co-operation – Commitment – Self-confidence – Spirituality - Character. Truthfulness – Customs and Traditions - Value Education – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence.

UNIT II: Engineering Ethics and Social Experimentation:

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics - Profession and Professionalism – Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical

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Theories - Deontology- Types of Inquiry –Kohlberg’s Theory - Gilligan’s Argument –Heinz’s Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT III: Engineers’ Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/s Involuntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/s Immediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis- Accidents.

UNIT IV: Engineers’ Duties and Rights:

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality - Professional and Individual Rights –Confidential and Proprietary Information - Conflict of Interest- Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving- Occupational Crimes- Industrial Espionage- Price Fixing-Whistle Blowing.

UNIT V: Global Issues:

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

References:

Professional Ethics, R. Subramaniam – Oxford Publications, New Delhi.

Ethics in Engineering, Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.

Professional Ethics and Morals, A. R. Aryasri, Dharanikota Suyodhana - Maruthi Publications.

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Engineering Ethics, Harris, Pritchard and Rabins, Cengage Learning, New Delhi.

Human Values & Professional Ethics, S. B. Gogate, Vikas Publishing House Pvt.Ltd., Noida.

Engineering Ethics & Human Values, M. Govindarajan, S. Natarajan and V. S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.

Professional Ethics and Human Values, A. Alavudeen, R.Kalil Rahman and M.Jayakumaran – University Science Press.

Professional Ethics and Human Values, D. R. Kiran-Tata McGraw-Hill - 2013

Human Values And Professional Ethics, Jayshree Suresh and B. S. Raghavan, S.Chand Publication.

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Year & Semester: II-I	L	T	P	C
Category: Professional Core Course Lab (PCC Lab)	-	-	3	1.5
Course: Strength of Materials Laboratory				
Course Code: 20CE3L01				

List of Experiments

1. Tension test on Mild steel bar
2. Compression test on wood or concrete
3. Torsion test
4. Impact test (Charpy and Izod impact test)
5. Hardness test (Rockwell and Brinell test)
6. Spring test
7. Bending test on simply supported beam.
8. Bending test on Cantilever beam.
9. Verification of Maxwell's Reciprocal theorem on beams
10. Continuous beam – deflection test.
11. Use of Electrical resistance strain gauges
12. Shear test (on UTM)

List of Major Equipment:

1. Universal Testing Machine
2. Torsion testing machine
3. Brinnell's / Rock well's hardness testing machine
4. Setup for spring tests
5. Compression testing machine
6. Izod Impact machine

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7. Shear testing machine
8. Beam setup for Maxwell's theorem verification.
9. Electrical Resistance gauges
10. Simply Supported beam setup
11. Cantilever beam setup

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Year & Semester: II-I	L	T	P	C
Category: Professional Core Course Lab (PCC Lab)	-	-	3	1.5
Course: Surveying Field Work - I				
Course Code: 20CE3L02				

List of Field Works:

1. Survey in an area by chain survey (Closed circuit)
2. Determination of distance between two inaccessible points by using compass.
3. Finding the area of the given boundary using compass (Closed Traverse)
4. Plane table survey; finding the area of a given boundary by the method of Radiation
5. Plane table survey; finding the area of a given boundary by the method of intersection.
6. Fly leveling : Height of the instrument method (differential leveling)
7. Fly leveling; rise and fall method.
8. Fly leveling; closed circuit/ open circuit.
9. Fly leveling; Longitudinal Section and Cross sections of a given road profile.
10. Fly leveling and Fly chaining (complete field work).
11. Plot an already drawn building plan on the ground.

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Year & Semester:II-I	L	T	P	C
Category: Professional Core Course Lab (PCC Lab)	0	0	3	1.5
Course: Building drawing practice Laboratory				
Course Code: 20CE3L03				

List of Drawings

1. Symbols
2. Odd/Even course English bond
3. Odd/Even course Flemish bond
4. Doors – Paneled/Glazed
5. Windows- Paneled/Glazed
6. .Roofs
7. King/queen post truss
8. Building Plan C/S Elevation – Single room building
9. Building Plan C/S Elevation – Double room building
10. Building Plan, C/S Elevation – Residential building
11. Building Plan, C/S Elevation – Office building
12. Building Plan, C/S Elevation – Commercial building
13. Building Elevation – By AUTO CADD
14. Building Plan – By AUTO CADD

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Year & Semester:II-I	L	T	P	C
Category: Skill Oriented Course (SC)	1	0	2	2
Course: Skill Oriented Course				
Course Code: 20CE3S01				

Topographic Survey with contour map (Total station/ DGPS) or
Masonry 3' height with different bonds and different thickness

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Year & Semester: II-II	L	T	P	C
Category: Professional Core Course (PCC)	3	0	0	3
Course: Structural Analysis-1				
Course Code: 20CE4T01				

Course Objectives:

- To understand structural behaviour before and after application of loads
- To be able to analyze various structures
- To impart the principles of elastic structural analysis and behaviour of indeterminate structures
- To impart knowledge about various methods involved in analysis of indeterminate structures

Course Outcomes:

Course Outcome	Blooms Taxonomy
Able to calculate shear force, bending moment and deflections in propped cantilever conditions	Analyze
Able to calculate shear force, bending moment and deflections in fixed beams	Analyze
Able to calculate shear force, bending moment and deflections in continuous beams and can analyze through slope deflection method	Analyze
Able to understand the energy theorems	Apply
Able to sketch influence lines diagrams under different loadings.	Apply

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UNIT-I

Propped Cantilevers: Analysis of propped cantilevers-shear force and Bending moment diagrams-

Deflection of propped cantilevers.

UNIT-II

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 including effect of sinking of support, effect of rotation of a support.

UNIT-III

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, derivation of slope deflection equation, Application to continuous beams with and without settlement of supports.

UNIT-IV

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.

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UNIT-V : Moving Loads And Influence Lines: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load, U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads- Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a sections, single point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

Text books:

1. Basic Structural Analysis, K U Muthu et. al., IK International Publishing house pvt. Ltd.
2. Theory of Structures, B. C Punmia, A. K Jain & Arun K. Jain, Lakshmi Publications
3. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna

Publishers, New Delhi.

References:

1. Indeterminate Structural Analysis, K U Muthu et. al., IK International Publishing house pvt. Ltd
2. Basic Structural Analysis, C. S. Reddy Tata Mc.Graw-Hill, New Delhi.
3. Theory of Structures, R.S. Khurmi, S. Chand Publishers.

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Year & Semester: II-II	L	T	P	C
Category: Professional Core Course (PCC)	3	0	0	3
Course: Strength of Materials-II				
Course Code: 20CE4T02				

Course Objectives:

- □ To understand the concepts of buckling in columns.
- □ To estimate torsion in members and deflections in springs .
- □ To Demonstrate symmetrical and unsymmetrical bending .
- □ To analyze the forces in trusses by different methods
- □ Estimate stresses in thin and thick cylinders

Course Outcomes:

Course Outcome	Blooms Taxonomy
Can calculate critical loads & effective lengths of columns with different end conditions using different methods	Apply
Can determine deflection and stresses in springs and shafts due to torsion and can determine power transmission	Apply
Will be able to examine stresses in chimneys, retaining walls & dams due to direct loads and bending moments and under unsymmetrical bending	Apply
Is able to assess forces in different types of trusses used in construction	Analyze

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Analyze stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure	Analyze
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UNIT-I

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

UNIT-II:

Torsion of Circular Shafts and Springs: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N \phi/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure. **Springs:** Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

UNIT-III

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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.

Un-symmetrical Bending: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis – Shear centre for I, T, L sections.

UNIT-IV

ANALYSIS OF PIN-JOINTED PLANE FRAMES: Determination of Forces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections

UNIT-V

Thin and Thick Cylinders: Thin cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders. **Thick cylinders:** Introduction: Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders-distribution of stresses.

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Text books:

Strength of Materials by R.K Bansal, Lakshmi Publications

Strength of Materials by Strength of materials, R. K. Rajput, S. Chand & Co, New Delhi

References: Strength of Materials by S. Ramamrutham.

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Year & Semester: II-II	L	T	P	C
Category: Professional Core Course (PCC)	3	1	0	3
Course: Concrete Technology				
Course Code: 20CE4T03				

Course Objectives:

1. To know about the composition, manufacturing process, types and testing of cement and properties of materials used for making concrete.
2. To study the properties and behaviour of concrete during fresh state and hardened state by various theories, concepts and tests.
3. To understand the composition and effects of admixtures and construction chemicals used to improve the properties of concrete.
4. To know about special concretes and studying the design mix procedure as per IS10262 code

Course Outcomes:

Course Outcome	Blooms Taxonomy
1. Know about the composition, manufacturing process, types and testing of cement and properties of materials used for making concrete.	Understand
2. Understand the properties and behaviour of concrete during fresh state and hardened state by various theories, concepts and tests.	Knowledge
3. Understand the composition and effects of admixtures and construction chemicals used to improve the properties of concrete.	Knowledge
4. Knowledge about special concretes and able to design concrete mix as per IS10262-2019 code.	Create

UNIT I

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Cement : General, Manufacture of Portland cement by dry process, chemical composition of cement, Bogue's compounds, heat liberation from a setting cement, structure of hydrated cement, water requirements for hydration,

Testing Of Cement: Fineness of cement using sieve test and air-permeability method, Normal consistency and setting times using Vicat apparatus, Soundness test using Le-chatlier apparatus, Compressive strength of cement.

Aggregates: Classification, source, size and shape texture and influence of texture on strength, specific gravity of aggregates, moisture in aggregates, bulking of fine aggregate, grading of aggregates, sieve analysis of fine and coarse aggregates, alkali-aggregate reaction, aggregate crushing test, Impact test, Deval's attrition test, Los Angeles Abrasion test.

Water: Permissible limit for solids as per IS456-2000, use of sea water for mixing concrete.

UNIT II

Fresh Concrete: Workability, factors affecting workability, slump test, Kelly ball test, V-B test, compaction factor test, segregation, bleeding, volume batching and weigh batching, hand mixing, machine mixing, mixing time, compaction of concrete, hand compaction, compaction by vibration, internal vibrator, form work vibrator, table vibrator, platform vibrator, surface vibrator, curing.—

Admixtures and Construction Chemicals: Chemical Admixtures: Plasticizers and super plasticizers, Retarders, Accelerators, Air-entraining admixtures. Effect of mineral admixtures on fresh and hardened concrete.

Mineral admixtures: Fly ash, silica fume, Slag, Effect of mineral admixtures on strength and durability of concrete.

UNIT III

Hardened Concrete: General, Effect of water-cement ratio on strength, Gain of strength with age, Compressive strength, Effect of height/diameter ratio on compressive strength; Flexural strength of

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concrete; Tensile strength of concrete; Non-destructive testing methods. Elastic properties of aggregate, Factor's affecting modulus of elasticity, Poisson's ratio.

Durability of Concrete: Factors contributing to cracks in concrete, Sulphate attack and methods of controlling sulphate attack, Chloride attack, Corrosion of steel and its control.

UNIT IV

Special Concretes: Fiber reinforced concrete, Ferrocement, High strength concrete, Light-weight concrete, High-performance concrete, self compacting concrete, polymer concrete, SIFCON, Cellular/aerated concrete, no fines concrete.

UNIT V

Proportioning of Concrete Mixes: Concept of mix design, Variables in proportioning, Different methods of mix design, Nominal mix and design mix, Indian standard method of mix design as per IS-10262:2009.

LEARNING RESOURCES:

TEXT BOOK(S):

1. Concrete Technology By A.R.Santha Kumar, Ist Edition, Oxford Universitypress,2006.
2. Concrete Technology By M.S.Shetty, S.Chand & Company Pvt. Ltd., Newdelhi,2005

REFERENCE BOOK(S):

1. Properties of concrete by A.M.Neville, Pearson Education, 2007
2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill, 2009.
3. IS 456:2000 Plain and Reinforced Concrete - Code of Practice.
4. IS 10262:2019 Mix Design Code
5. IS 2386 (PART: I to VIII)Properties and tests on aggregate.
6. IS 383-1970- Quality Standards on Aggregate

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Year & Semester: II-II	L	T	P	C
Category: Professional Core Course (PCC)	3	0	0	3
Course: Transportation Engineering				
Course code: 20CE4T04				

Course Objectives:

1. To understand the importance of transportation, characteristics of road transport, highway planning, Alignment and surveys
2. To know the geometric design of highways
3. To study traffic characteristics, principles of intersection and design of pavements
4. To acquire design principles of airport runway geometrics and pavements.
5. To know the planning, construction and maintenance of docks and harbours.

Course Outcomes:

S.No	Course Outcome	TL	Blooms Taxonomy
1	Identify the highway development in India and various drawings, and alignment of highway	1	Remember
2	Design the Geometric Features of a Highway	6	Creating
3	Defend the basic concepts of traffic engineering.	5	Analysis
4	Investigate the various components of Airport and design of runway	6	Creating
5	Describe the Plan, construct and maintain Docks and Harbour.	2	Understanding

UNIT-I: HIGHWAY PLANNING AND ALIGNMENT

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Different modes of transportation, Characteristics of Road Transportation, Highway Development in India, Classification of Roads, Network patterns. Different Road Development Plans— First, second, third road development plans Principles of highway alignment – requirements and controlling factors. Engineering surveys for alignment - conventional and modern methods. Typical cross sections of Urban and Rural roads - cross sectional elements.

UNIT-II: HIGHWAY GEOMETRIC DESIGN

Factors affecting geometric design. Sight distance - stopping sight distance, overtaking sight distance, sight distance at intersections. Traffic capacity by speed, density and volume. Design of horizontal alignment - super elevation, extra widening of pavements, transition curves. Design of vertical alignment - gradients, summit and valley curves.

UNIT-III: TRAFFIC ENGINEERING

Road user, vehicle and highway characteristics – Principles of traffic volume studies – concept of PCU – Level of service. Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams.

Traffic signs and road markings - objectives, classification and uses. At-Grade Intersections. Types of Intersections – Design of Traffic Signals by Webster Method. Factors influencing the design of pavements - Design of flexible and rigid pavements as per IRC code.

UNIT-IV AIRPORT ENGINEERING

Airport Planning & Design: Airport Master plan – Airport site selection – Air craft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway design.

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Runway Design: Various Design factors – LCN system of Pavement Design – Airfield Pavement Failures – Maintenance and Rehabilitation of Airfield pavements – Evaluation & Strengthening of Airfield pavements – Airport Drainage – Design of surface and subsurface drainage.

UNIT – V HARBOURS & DOCKS

Planning, Layout, Construction and Maintenance Of Docks and Harbours: Classification of ports – Requirement of a good port – classification of Harbours – Docks - Dry & wet docks – Transition sheds and workhouses – Layouts; Quays – construction of Quay walls – Wharves – Jetties – Tides - Tidal data and Analysis – Break waters – Dredging – Maintenance of Ports and Harbours – Navigational aids.

Text books:

1. Khanna, S. K., Justo, C. E. G. and Veeraragavan A., Highway Engineering, Nem Chand and Bros, Roorkee, 2014.
2. Kadiyali, L.R, Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi, 2011.
3. Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi
4. Airport Engineering by Khanna & Arora - Nemchand Bros, New Delhi.
5. Docks and Harbour Engineering by Bindra S.P. - Dhanpathi Rai & Sons, New Delhi.

References:

9. Highway Engineering by ASCE publication
10. NPTEL Video Lecture by <https://nptel.ac.in/course>.
11. Highway, Railway, Airport and Harbour Engineering' by Subramanian KP, SciTech Publications (India) Pvt Limited, Chennai
12. A Text book of Transportation Engineering by S.P.Chandola, S. Chand & Company pvt. Ltd., New Delhi.

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Year & Semester: II-II	L	T	P	C
Category: Professional Core Course (PCC)	3	0	0	3
Course: Hydraulics & Hydraulic Machinery				
Course Code: 20CE4T05				

Course Objectives:

- To study about uniform and non-uniform flows in open channel and also to learn about the characteristics of hydraulic jump
- □ To understand the working principles of various types of hydraulic machines and Pumps
- □ To solve kinematic problems such as finding particle paths and stream lines.

Course Outcomes:

Course Outcome	Blooms Taxonomy
Define the types of flow in an open channel and also to design open channel in a most economical sections with minimum wetted perimeter and learn about critical flows.	Understanding
Describe about non uniform flows in open channels and longitudinal slopes in open channel and also to learn about the characteristics of hydraulic jump.	Evaluating
Identify insights to the open channel hydraulics and introduce dimensional analysis for fluid flow problems.	Analyzing
Explain the application of momentum principle of impact of jets on plane and curved surfaces.	Evaluating
Sketch the specific speed and performance characteristics of different types of turbines.	Analyzing
Differentiate the types of centrifugal pumps, workdone, efficiency and performance of characteristics curves.	Analyzing

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UNIT-I Uniform & Non Uniform Flow in Open Channels

Uniform flow: Types of channels – Types of flows – Chezy's and Manning's formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth – computation of critical depth.

Non-Uniform flow: Steady Gradually Varied flow-Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT-II Hydraulic Similitude

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

UNIT-III Basics of Turbo Machinery

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

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, draft tube – theory and efficiency. Governing of turbines, unit and specific quantities, selection of turbines, performance characteristics, cavitation.

UNIT-V Centrifugal Pumps

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

Reciprocating Pumps: Introduction, classification, components, working, discharge, work done and slip.

Text Books:

1. Open Channel flow, K. Subramanya, Tata McGraw Hill Publishers.
2. A text of Fluid mechanics and hydraulic machines, R. K. Bansal, Laxmi Publications New Delhi.
3. Fluid Mechanics, Modi and Seth, Standard book house.

References:

1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS.
2. Fluid Mechanics and Machinery, C.S.P. OJHA, R. BERNDTSSON and P.N. Chandramouli, Oxford Higher Education.
3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher Education.

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Year & Semester: II-II	L	T	P	C
Category: Professional Core Course (PCC)	0	0	3	1.5
Course: Fluid Mechanics & Hydraulic Machinery Laboratory				
Course Code: 20CE4L01				

COURSE OBJECTIVES:

- 1 To determine the Darcy's friction factor for the pipes.
- 2 To determine the coefficient of discharge of venturimeter, orifice, orifice meter, mouth piece and v- notch/rectangular notch.
- 3 To determine the efficiency of jet of vane.
- 4 To determine the loss of head in pipes due to sudden contraction and sudden expansion.
- 5 To study the performance and determine the efficiencies of pelton turbine and Francis turbine.
- 6 To study the performance characteristics and efficiency of centrifugal pump.

COURSE OUTCOMES:

By the end of the course the students will be able

- 1 To understand the determination of discharge for hydraulic equipments.
- 2 To understand the minor and major losses in pipes.
- 3 To understand the performance of turbines and pumps with varying speed.

List of Experiments:

1. Determination of Coefficient of discharge of Venturimeter.
2. Determination of Coefficient of discharge of Orifice meter.

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3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction/sudden expansion.
7. Determination of friction factor of Pipes.
8. Characterization of laminar and turbulent flows by Reynold's apparatus.
9. Verification of Bernoulli's equation.
10. Impact of jet on vanes.
11. Study of Hydraulic jump.
12. Performance test on Pelton wheel turbine.
13. Performance test on Francis turbine.
14. Efficiency test on Centrifugal pump.
15. Efficiency test on Reciprocating pump.

List of Equipment:

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Reynold's apparatus.
6. Rectangular and Triangular notch setups.
7. Friction factor test setup.
8. Bernoulli's theorem setup.

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9. Impact of jets.
10. Hydraulic jump test setup.
11. Pelton wheel and Francis turbines.
12. Centrifugal and Reciprocating Pumps.

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Year & Semester: II-II	L	T	P	C
Category: Professional Core Course Laboratory (PCC Lab)	0	0	3	1.5
Course: Surveying Field Laboratory-II				
Course Code: 20CE4L02				

List of Field Works:

List of Experiments

1. Theodolite Survey: Determining the Horizontal and Vertical angles by the method of repetition method.
2. Theodolite Survey: Finding the distance between two inaccessible points.
3. Theodolite Survey: Finding the height of object.
4. One Exercise on Curve setting.
5. One Exercise on contours.
6. Total Station: Introduction to total station and practicing setting up, levelling up and elimination of parallax error.
7. Total Station: Determination of area using total station.
8. Total Station: Traversing
9. Total Station: Contouring
10. Total Station: Determination of Remote height.
11. Total Station: distance between two inaccessible points.

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Note: Any 10 field work assignments must be completed.

Year & Semester: II-II	L	T	P	C
Category: Professional Core Course Laboratory (PCC Lab)	0	0	3	1.5
Course: Concrete Technology Laboratory				
Course Code: 20CE4L03				

COURSE OBJECTIVES:

Course Objectives

1. To conduct tests to find the quality of concrete making materials like cement fine aggregate and coarse aggregates.
2. To determine the fresh and hardened concrete properties.
3. To estimate the quality and strength of concrete using non-destructive testing on concrete
4. To understand the flow properties of Self Compacting Concrete fibre reinforced concrete.

COURSE OUTCOMES:

After the successful completion of the course, students are able to

1. Finding the properties of concrete making materials like cement, fine aggregate and coarse aggregate for design mix of concrete
2. Properties and behavior of concrete in fresh and hardened states
3. Using nondestructive testing methods to estimate quality of concrete
4. Know the properties of self-compacting concrete and fibre reinforced concrete

EXPERIMENTS:

1. Determination of (a) Normal consistency of cement (b) Fineness of cement using 90 microns IS sieve.

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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 Fineness modulus of (a) Fine aggregate (b) Coarse aggregate
5. Determination of workability of concrete by conducting Slump cone test
6. Determination of workability of concrete by conducting Compaction factor test
7. Determination of (a) Cube compressive strength (b) Cylinder compressive strength
8. Determination of Split tensile strength of concrete
9. Determination of Bulk density and Specific gravity of (a) fine aggregate (b) coarse aggregates
10. Determination of Bulking of fine aggregate
11. Study of the effect of Super plasticizer on workability of concrete
12. Study on flow properties of self-compacting concrete
13. Non-destructive test on concrete using Rebound Hammer & UPV.
14. Demonstration of concrete design mix as per IS 10262:2009.

Note:**

A minimum of 10(Ten) experiments have to be Performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

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Year & Semester: II-II	L	T	P	C
Category: Skill Oriented Course (SC)	1	0	2	2
Course: Skill Oriented Course				
Course Code: 20CE4S01				

Environmental Audit and compliance report or
Road safety audit with 1 or 2 KM length or
Water related leakage field studies

