COURSE STRUCTURE (R20)

I - SEMESTER

S.No	Course Code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE01	Professional Communication-I	2	0	0	2	30	70	100
2	20FE03	Differential Equations	2	1	0	3	30	70	100
3	20FE05	Applied Chemistry	3	0	0	3	30	70	100
4	20ME01	Engineering Graphics	2	0	4	4	30	70	100
5	20EE02	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
Laboratory Courses									
6	20FE52	Applied Chemistry Lab	0	0	3	1.5	30	70	100
7	20EE52	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
8	20ME51	Engineering Workshop	0	0	3	1.5	30	70	100
Total			**12**	**1**	**13**	**19.5**	**240**	**560**	**800**

II - SEMESTER

S.No	Course Code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE02	Professional Communication-II	2	0	0	2	30	70	100
2	20FE04	Linear Algebra and Transformation Techniques	2	1	0	3	30	70	100
3	20FE08	Engineering Physics	2	1	0	3	30	70	100
4	20CS01	Programming for Problem Solving using C	3	0	0	3	30	70	100
5	20ME02	Engineering Mechanics	2	1	0	3	30	70	100
6	20MC01	Engineer and Society	2	0	0	0	30	70	100
Laboratory Courses									
7	20FE51	Professional Communication Skills Lab	0	0	2	1	30	70	100
8	20FE55	Engineering Physics Lab	0	0	3	1.5	30	70	100
9	20CS51	Programming for Problem Solving using C Lab	0	0	3	1.5	30	70	100
10	20ME52	Engineering Mechanics and Fuel Testing Lab	0	0	3	1.5	30	70	100
Total			**13**	**3**	**11**	**19.5**	**300**	**700**	**1000**

B.Tech. (I Sem.)	20FE01 - PROFESSIONAL COMMUNICATION - I	L	T	P	Cr.
		2	0	0	2

Pre-requisites: Nil

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

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

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

Unit - I

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

Unit – II

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

Unit – III

Working Together-'The Future of Work'

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

Unit – IV

'A.P.J.AbdulKalam'; Grammar & Vocabulary: Direct & Indirect Speech; articles and their Omission; Writing: E-Mail Drafting.

Unit – V

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

Text Books:

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

Reference Books:

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

B.Tech. (I Sem.)	20FE03 - DIFFERENTIAL EQUATIONS	L	T	P	Cr.
		2	1	0	3

Pre-requisites: Nil

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

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

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

UNIT –I

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

UNIT –II
Linear Differential Equations of Higher Order
Homogeneous and Non-Homogeneous Linear differential equations of second and higher order with constant coefficients with R.H.S. functions e^{ax}, sin $(ax+b)$, cos $(ax+b)$, x^m, $e^{ax}V(x)$, $xV(x)$, Method of variation of parameters.

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

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

UNIT – V

Partial Differential Equations

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

Text Books:

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

Reference Books:

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

B.Tech.(I_Sem)	20FE05 - APPLIED CHEMISTRY	L	T	P	Cr.
		3	0	0	3

Pre-requisites: Nil

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

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

CO1: Identify the troubles due to hardness of water and its maintenance in industrial applications. **(Understand - L2)**

CO2: Understand the issues related to conventional fuels, biofuels and photo-voltaic cells in energy production. **(Understand - L2)**

CO3: Apply Nernst Equation for calculating electrode cell potentials and compare batteries for different applications. **(Apply - L3)**

CO4: Apply principles of corrosion for design and effective maintenance of various equipment. **(Apply - L3)**

CO5: Analyse the suitability of engineering materials like polymers, lubricants, nano materials and composites in technological applications**. (Understand – L2)**

UNIT – I

WATER TECHNOLOGY

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

UNIT – II

FUEL TECHNOLOGY

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

UNIT – III

ELECTRO CHEMISTRY & BATTERIES

Types of Electrodes - Calomel Electrode, Glass Electrode**,** Calculation of EMF of Cell**,** Applications of Nernst Equation**,** Applications of Electro chemical Series

Batteries -Lead-acid Battery, Lithium ion Battery, H_2– O_2 Fuel Cell, Mg-Cu reserve battery.

UNIT – IV

SCIENCE OF CORROSION

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

UNIT – V

CHEMISTRY OF ENGINEERING MATERIALS

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

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

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

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

TEXT BOOKS:

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

REFERENCE:

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

20ME01 - ENGINEERING GRAPHICS

B.Tech. (I Sem.)

L	T	P	Cr.
2	0	4	4

Pre-requisites **:** Nil

Course Educational Objective:
To recognize the Bureau of Indian Standards of Engineering Drawing and develop an ability to get familiarized with orthographic projections and isometric views of solid objects.

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

CO1: Identify the geometrical objects considering BIS standards. **(Remember-L1)**
CO2: Comprehend the basics of orthographic projections and deduce orthographic projections of a point and a line at different orientations. **(Understand-L2)**
CO3: Represent graphically the geometrical planes at different positions and orientations. **(Understand-L2)**
CO4: Analyze and draw solid objects at different positions and orientations. **(Apply- L3)**
CO5: Visualize isometric and orthographic views of geometrical objects and convert one form to another. **(Understand-L2)**

UNIT – I
INTRODUCTION TO ENGINEERING DRAWING:
Introduction: Introduction**,** Principles of Engineering Drawing and their significance - Drawing Instruments and their use-Conventions in Drawing- Lettering and Dimensioning – BIS conventions – Geometrical Constructions.
Engineering Curves: Conic Sections- Ellipse, Parabola, Hyperbola and Rectangular Hyperbola- General method and other methods; Cycloid, Epi-Cycloid and Hypo-Cycloid; Involutes.

UNIT – II
ORTHOGRAPHIC PROJECTIONS:
Introduction, Principle of Orthographic Projection-Method of Projections – First and third angle projection methods- Projections of Points – Projections of straight lines of different orientations - True lengths and traces.

UNIT – III
PROJECTIONS OF PLANES: Introduction, Planes parallel to one of the reference planes- Inclined to one reference plane and perpendicular to other-Oblique planes.

UNIT – IV
PROJECTIONS OF SOLIDS: Introduction, Regular Polyhedral, Solids of Revolution**,** Projection of solids in simple position - Axis inclined to one of the reference planes and parallel to the other- Axis inclined to both Principle Planes.

UNIT – V

ISOMETRIC VIEWS: Introduction-theory of isometric projection, isometric views, isometric axes, scale, lines and planes-Isometric view of prism, pyramid, cylinder and cone-non isometric lines-methods to generate an isometric drawing.

TRANSFORMATION OF PROJECTIONS: Conversion of Orthographic Projections to Isometric Views of composite objects, Conversion of Isometric Views to Orthographic Projections**.**

TEXT BOOKS:

1 N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar publishers, 2012

BOS APPROVED REFERENCE BOOKS:

1 Narayana K L, Kannaiah P, Textbook on Engineering Drawing, 2nd Edition, SciTech publishers.
2 R.K.Dhawan, Engineering Drawing, S.Chand Company LTD.
3 Venugopal, Engineering Drawing and Graphics, New Age publishers
4 Dhananjay A. Jolhe, Engineering Drawing, Tata McGraw Hill Publishers
5 N.S.Parthasarathy, Vela Murali, Engineering Drawing, Oxford Higher Education

20EE02 - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech. (I_Sem.)

L	T	P	Cr.
3	0	0	3

Prerequisite: Physics

Course Educational Objective: This course enables student to illustrate the basics of applied electricity and electronics.

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

CO1: Apply network reduction techniques to simplify electrical circuits. **(Apply-L3)**
CO2: Illustrate the working principle of DC machines and transformers. **(Understand-L2)**
CO3: Understand V-I characteristics of semiconductor devices. **(Understand-L2)**
CO4: Illustrate the configuration of Transistors and their applications. **(Understand-L2)**

UNIT – I: Electrical Circuit Fundamentals

Basic definitions, Types of elements-active and passive, Ohm's Law, Kirchhoff's Laws-Network reduction techniques- series, parallel, star to delta, delta to star transformations, source transformation (for resistive networks), mesh analysis, nodal analysis (Basic problems).

UNIT – II: DC Network Theorems and AC Fundamentals

Theorems-Superposition, Thevenin's, Norton's and Maximum Power Transfer (Basic problems in DC excitation only)

Peak, R.M.S, average, instantaneous values, form factor and peak factor– periodic waveforms – Phase and Phase difference –concepts of reactance, impedance, susceptance and admittance, real, reactive and apparent powers, Power Factor- resonance-bandwidth-quality factor.

UNIT – III: DC Machine Fundamentals and Single-Phase Transformers

DC generator principle, constructional details, emf equation, types of generators (Theory only).
DC motor principle, Back emf, types of motor (Theory only).
Construction and Principle of operation of single-phase transformers-Emf equation

UNIT–IV: P-N Junction Diode and Zener Diode

P-N Junction Diode: Operation and V-I characteristics of PN junction diode, Rectifiers-Half Wave Rectifier, Full Wave Rectifier-Bridge type, Zener Diode-Voltage Regulator.

UNIT – V: Transistors

Construction, Principle of Operation, Symbol, CB, CE configurations, JFET, MOSFET and application of transistor as an amplifier (Theory only).

TEXT BOOKS:

1. A.Sudhakar and Shyammohan S Palli, "Electrical Circuits" Tata McGraw-Hill, 3rd Edition.2017
2. M.S.Sukhija, T.K.Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford University Press, 2016 Edition.

REFERENCE:

1. Kothari and Nagarath, "Basic Electrical Engineering", TMH Publications, 3rd Edition.2013
2. G.S.N.Raju, "Electronic Devices and Circuits", I.K.International.2006

B.Tech.(I_Sem) **20FE52 - APPLIED CHEMISTRY LAB**

L	T	P	Cr.
0	0	3	1.5

Pre-requisites: Nil

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

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

CO1: Assess quality of water based on the procedures given. **(Understand - L2)**

CO2: Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus. **(Understand - L2)**

CO3: Acquire practical knowledge related to preparation of polymers. **(Understand - L2)**

CO4: Exhibit skills in performing experiments based on theoretical fundamentals. **(Understand - L2)**

List of Experiments

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

Model Experiment

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

Water Analysis

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

Preparation of Polymers

5) Nylon Fibers
6) Bakelite

Redox Titrations

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

Demonstration Experiments

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

Estimations

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

Fuels

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

B.Tech. (I Sem.)	20EE52 - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L	T	P	Cr.
		0	0	3	1.5

Pre-requisites : Nil

Course Educational Objective: This lab course enables the student to demonstrate the knowledge of electrical and electronic equipment and analysis of electric circuits. It also deals with plotting characteristics of basic semiconductor devices.

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

CO1: Examine electrical circuits using network theorems. **(Apply-L3)**
CO2: Analyze VI characteristics of semiconductor devices. **(Understand-L2)**
CO3: Analyze electrical circuits. **(Understand-L2)**
CO4: Design Resonance circuits. **(Apply-L3)**

List of Experiments

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

1. V-I relations of passive elements (R, L, C).
2. Verification of Kirchhoff's Laws (KCL and KVL.).
3 Measurement of active power, reactive power and power factor of AC circuits.
4. Calculation of Resonant frequency, Bandwidth and Quality factor of resonant circuits.
5. Verification of Superposition theorem.
6. Verification of Thevenin's and Norton's theorems.
7. Verification of Maximum power transfer theorem.
8. Plot the V-I characteristics of a p-n junction diode.
9. Plot the V-I characteristics of Zener diode.
10. Plot the V-I characteristics of BJT.
11. Calculation of ripple factor and regulation of Full Wave Rectifier with and without filters .
12. Plot the V-I characteristics of MOSFET.

20ME51 - ENGINEERING WORKSHOP

B.Tech. (I Sem.)

L	T	P	Cr.
0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVE:

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

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

CO1: Develop different prototypes in the carpentry section. **(Understand-L2)**
CO2: Fabricate various basic prototypes in fitting trade. **(Understand-L2)**
CO3: Demonstrate various operations related to plumbing, tin smithy and black smithy. **(Understand-L2)**
CO4: Perform various basic house wiring techniques. **(Apply-L3)**

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

Trade –1: CARPENTRY SHOP

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

Job I - Marking, sawing, plaining and chiselling operations.
Job II - Preparation of half lap-joint
Job III – Preparation of Mortise and Tenon Joint

Trade –2: FITTING SHOP

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

Job I- Making a L-Fit from a rectangular piece of Mild Steel Flat (MS).
Job II-Making a T-Fit from a rectangular piece of MS Flat.
Job III-Making a V-Fit from a rectangular piece of MS Flat
Job IV-Making a Half round fit from a rectangular piece of MS flat.

Trade -3: TIN- SMITHY SHOP

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

Job I - Preparation of a rectangular tray using GI sheet.
Job II- Preparation of an open scoop/ funnel using GI sheet.
Job III - Preparation of a Single Seam Joint and Double Seam Joint using GI sheet.
Job IV - Preparation of a Corner Seam Joint using GI sheet.

Trade –4: PLUMBING SHOP

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

Job I – preparation of pipe layout.

Job II – Pipe threading.

Trade -5: BLACK SMITHY

Introduction–demonstration of tools, equipment and safety precautions.

Job I – Preparation of S–Hook.

Job II – Preparation of Chisel

Trade -6: HOUSE WIRING

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

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

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

Job III- Florescent lamp and calling bell circuit.

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

Job V -- House wiring circuit.

REFERENCES

1. LBRCE Workshop Lab Manual.
2. S.K.HajraChoudary and A.K.Choudary, –Workshop Technology-I& II, MediaPromotersand Publishers Pvt.Ltd., Mumbai,2012.
3. B.S.Raghuvamsi, –Workshop Technology-I& II, Dhanpatrai and company, New Delhi, 2014.
4. P.Khannaiah, K.L.Narayana, –Workshop Manual‖,Scitech Publications India Pvt.Ltd, 2015.

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

L	T	P	Cr.
2	0	0	2

Pre-requisites: Nil

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

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

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

UNIT - I

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

UNIT - II

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

UNIT - III

'Homi Jahangir Bhabha';
Grammar & Vocabulary: Words often confused; Common Errors; Writing**:** Incident & Investigation Reports.

UNIT - IV

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

UNIT - V

'**Prafulla Chandra Ray'**; Grammar & Vocabulary: Analogy; Sentence Completion; Writing**:** Writing a Résumé

TEXT BOOKS:

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

REFERENCE BOOKS:

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

B.Tech. (II Sem.)	20FE04 - LINEAR ALGEBRA AND TRANSFORMATION TECHNIQUES	L	T	P	Cr.
		2	1	0	3

Pre-requisites: Nil

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

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

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

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

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

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

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

UNIT – I

System of Linear Equations

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

UNIT – II

Eigen Values and Eigen Vectors

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

UNIT – III

Laplace Transforms

Laplace transforms of standard functions –Linear Property - Shifting Theorems, Change of Scale Property

Multiplication and Division by‘t’ - Transforms of derivatives and integrals – Unit step function – Dirac’s delta function.

UNIT – IV

Inverse Laplace Transforms

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

UNIT – V

Z-Transforms

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

Text Books:

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

Reference Books:

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

B.Tech.(II Sem.)	20FE08 - ENGINEERING PHYSICS	L	T	P	Cr.
		2	1	0	3

Pre-requisites: Nil

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

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

CO1: Analyse the different mechanical properties of materials **(Understand – L2).**
CO2: Apply the lasers and optical fibres in different fields **(Apply - L3).**
CO3: Summarize the properties of sound waves **(Understand – L2).**
CO4: Classify the different types of magnetic and dielectric materials **(Understand - L2).**
CO5: Identify the properties of superconducting and nano materials **(Understand – L2).**

UNIT – I

Elasticity

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

UNIT – II

Lasers and Optical fibers

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

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

UNIT – III

Acoustics &Ultrasonics

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

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

UNIT – IV

Magnetic & Dielectric materials

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

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

UNIT – V

Superconducting and nanomaterials

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

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

TEXT BOOKS

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

REFERENCE BOOKS

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

B.Tech. (II Sem.)	20CS01 - PROGRAMMING FOR PROBLEM SOLVING USING C	L	T	P	Cr.
		3	0	0	3

Pre-requisite : Nil

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

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

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

UNIT – I

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

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

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

UNIT – II

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

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

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

UNIT – III

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

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

Storage classes - auto, register, static and extern.

UNIT – IV

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

UNIT – V

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

Textbook:

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

Reference books:

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

B.Tech. (II Sem.) **20ME02- ENGINEERING MECHANICS**

L	T	P	Cr.
2	1	0	3

PRE-REQUISITES : Physics, Mathematics

COURSE EDUCATIONAL OBJECTIVE:

The main objective of this course is to develop the ability to predict the behaviour of rigid solid bodies under the action of external forces in real world scenario.

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

CO1: Apply free body diagram concepts to analyze rigid bodies in static conditions. **(Apply-L3)**
CO2: Apply the equilibrium Equations of rigid bodies associated with frictional forces. **(Apply-L3)**
CO3: Identify the location of centroid / centre of gravity and evaluate the moment of inertia of plane sections/solids. **(Apply-L3)**
CO4: Understand the behavior of moving bodies in rectilinear motion using kinematic equations or motion curves. **(Understand-L2)**
CO5: Examine the behavior of moving bodies using dynamic equilibrium conditions. **(Apply-L3)**

UNIT-I

SYSTEM OF FORCES: Introduction, Basic terminology in Mechanics, laws of Mechanics, characteristics of force, system of forces-types, Resolution and Composition of forces, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system-moment of a force and couple.

EQUILIBRIUM OF SYSTEM OF FORCES: Free Body Diagram, Lami's theorem, Equilibrium of a rigid body subjected to coplanar concurrent forces and non-concurrent forces, Equilibrium of connected bodies.

UNIT-II

FRICTION: Introduction**,** Frictional force, laws of Coulomb friction, angle of friction, limiting friction and angle of repose, problems on blocks resting on horizontal and inclined planes.

UNIT - III

CENTROID AND AREA MOMENT OF INERTIA: Introduction, centroid, axis of symmetry, centroid of simple figures from first principles, centroid of simple composite sections, area moment of inertia, polar moment of inertia, theorems of moment of inertia, moment of inertia of rectangle, circle, semi-circle, I and T cross sections.

CENTRE OF GRAVITY AND MASS MOMENT OF INERTIA: Centre of gravity, centre of gravity of solid cylinder, right circular cone, hemi sphere, mass moment of inertia, radius of gyration, mass moment of inertia of uniform rod, rectangular plate, circular plate and solid cylinder only.

UNIT –IV

KINEMATICS: Introduction, **g**eneral principles in dynamics, types of motion, rectilinear motion, motion curves, motion with uniform velocity, motion with uniform acceleration, motion with varying acceleration, angular motion, relationship between linear and angular motions.

UNIT – V

KINETICS: Introduction, Newton's second law of motion-inertia force, D-Alembert's principle, bodies in rectilinear translation, fixed axis rotation of rigid bodies.

TEXT BOOKS

1. S.S. Bhavikatti and K.G. Rajashekarappa, Engineering Mechanics, New Age, 2012.
2. N.H. Dubey, Engineering Mechanics, Mc Graw Hill, 2013.

REFERENCES

1 F. L. Singer, Engineering Mechanics, Harper – Collins, 1994
2. B. Bhattacharya, Engineering Mechanics, Oxford University Press, 2008
3. A.K.Tayal, Engineering Mechanics, Umesh Publications, 2012.
4. R.K.Bansal, Engineering Mechanics, Laxmi Publications, 1996.
5. R.K.Rajput, A Text book of Applied Mechanics, Laxmi Publications, 2011.

B.Tech. (II Sem.) **20MC01 - CONSTITUTION OF INDIA**

L	T	P	Cr.
2	0	0	0

Pre-requisites: Nil

Course Educational Objectives

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

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

CO1: Understand history and philosophy of constitution with reference to Preamble, Fundamental Rights and Duties (**Understand – L2**).

CO2: Understand the concept of Unitary and Federal Government along with the role of President, Prime Minister and Judicial System (**Understand – L2**).

CO3: Understand the structure of the state government, Secretariat, Governor and Chief Minister and their functions (**Understand – L2**).

CO4: learn local administration viz. Panchayat, Block, Municipality and Corporation (**Understand – L2**).

CO5: learn about Election Commission and the process and about SC, ST, OBC and women (**Understand – L2**).

UNIT – I:

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

UNIT – II:

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

UNIT – III:

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

UNIT – IV:

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

UNIT – V:

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

Reference Books

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

E-Resources:

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

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B.Tech. (II Sem.)	20FE51 - PROFESSIONAL COMMUNICATION SKILLS LAB	L	T	P	Cr.
		0	0	2	1

Pre-requisites : Nil

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

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

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

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

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

Exercise – I

CALL Lab: Understand - Sentence structure.

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

Exercise – II

CALL Lab: Understand - Framing questions.

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

Exercise – III

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

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

Exercise – IV

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

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

Exercise – V

CALL Lab: Understand - Features of Good Presentation, Methodology of Group Discussion
ICS Lab:Practice - Introduction to Group Discussions.
Listening: Answering questions identifying key terms and understanding concepts.
Speaking: Formal Oral & Poster presentations on topics from academic contexts without the use of PPT.

Lab Manual:

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

Suggested Software:

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

L	T	P	Cr.
0	0	3	1.5

B.Tech.(II Sem.) **20FE55 - ENGINEERING PHYSICS LAB**

Pre - requisites: Nil

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

Course Outcomes: At the end of the course, the student will be able to,
CO1: Analyze the wave characteristics of light **(Understand – L2).**
CO2: Determine the wavelength of laser source and width of slit **(Apply - L3).**
CO3: Estimate the magnetic field using Stewart's and Gee's apparatus and the rigidity modulus of material using Torsional Pendulum **(Understand - L2).**
CO4: Identify the phenomena of resonance in strings **(Understand – L2).**
CO5: Improve report writing skills and individual teamwork with ethical values **(Understand – L2)**

List of Experiments

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

General experiments:

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

Optics lab experiments:

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

B.Tech. (II Sem.)	20CS51 - PROGRAMMING FOR PROBLEM SOLVING USING C LAB	L	T	P	Cr.
		0	0	3	1.5

Pre-requisite : NIL

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

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

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

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

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

CO 4: Improve individual / teamwork skills, communication & report writing skills with ethical values. **(Apply- L3)**

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

Module 1: Introduction to Raptor Tool.

Module 2: Problem solving using Raptor Tool.

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

Module 4: Exercise Programs on Control Structures.

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

Module 6: Exercise Programs on Arrays & Strings.

Module 7: Exercise Programs on Pointers.

Module 8: Exercise Programs on Functions.

Module 9: Exercise Programs on user defined data types.

Module 10: Exercise Programs on Files.

B.Tech. (II Sem.)	20ME52 - ENGINEERING MECHANICS AND FUEL TESTING LAB	L	T	P	Cr.
		0	0	3	1.5

PRE-REQUISITES: Engineering Mechanics, Applied Chemistry

COURSE EDUCATIONAL OBJECTIVE:

The main objective of this course is to demonstrate the concepts of Engineering Mechanics and fuels through experiments.

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

CO1: Verify the basic laws of Mechanics in static environment. **(Apply-L3)**

CO2: Evaluate the forces in the mechanical systems. **(Apply-L3)**

CO3: Estimate various properties of fuel like Viscosity Flash and Fire point. **(Apply-L3)**

CO4: Determine calorific-value of fuels. **(Apply-L3)**

LIST OF EXPERIMENTS:
At least 10 experiments are to be conducted

1 Verification of polygon law of forces using Universal-Table apparatus.
2 Verification of Lami's Theorem.
3 Study of the equilibrium of parallel forces using Beam Reaction apparatus.
4 Determination of coefficient of friction between the two materials using Tilting-plane method.
5 Estimate Time period of oscillations of a simple and compound pendulum.
6 Verification of Newton 's second law.
7 Determination of viscosity of given oil using Saybolt Viscometer.
8 Determination of Calorific value of given fuel using Junkers Gas Calorimeter.
9 Determination of viscosity of given oil using Red-wood-II Viscometer.
10 Determination of viscosity of given oil using Englers Viscometer.
11 Determination of Flash and Fire point of given oil using ABELS Apparatus.
12 Determination of Calorific value of given fuel using BOMB Calorimeter.

REFERENCES:

Lab-Manual