Semester - 2 (Theory-5, Lab-4)							
Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BS&H	23A0009T	Communicative English	2	0	0	2
2	BS&H	23A0004T	Engineering Chemistry / Chemistry	3	0	0	3
3	ES	23A0002T	Differential Equations and vector calculus	3	0	0	3
4	ES	23A0101T	Basic Civil and Mechanical Engineering	3	0	0	3
5	PC	23A0205T	Network Analysis / Electrical Circuits Analysis – I / Data Structures)	3	0	0	3
6	ES	23A0302P	Engineering Workshop	0	0	3	1.5
7	BS&H	23A0010P	Communicative English Lab	0	0	2	1
8	BS&H	23A0007P	Engineering Chemistry Lab	0	0	2	1
9	PC	23A0206P	Network Analysis and Simulation Lab	0	0	3	1.5
10	MC	23ANS01P	NSS/NCC/Scouts and Guides / Community Service	0	0	1	0.5
			Total credits				**19.5**

COMMUNICATIVE ENGLISH (Common to all branches)					
Course Code	**L : T : P**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
230009T	**2 : 0 : 0**	**2**	**CIE: 30 SEE:70**	**3 Hours**	**BS&H**

Course Objectives:

- Facilitate effective **listening skills** for better comprehension of academic lectures and English spoken by native speakers
- Help improve **speaking skills** motivating the learners to participate in activities such as role plays, discussions and structured talks/oral presentations
- Focus on appropriate **reading skills** for comprehension of various academic texts and authentic materials
- Impart effective strategies for good **writing skills** in summarizing, writing well organized essays, drafting formal letters and designing well structured reports
- Broaden the knowledge base of **grammatical structures** and **vocabulary** and encourage their appropriate use in speech and writing

SYLLABUS		**Total Hours:32**
Unit- I	**HUMAN VALUES: Gift of Magi (Short Story)**	**8**

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading: Skimming to get the main idea of a text Scanning to look for specific pieces of information.
Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar: Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Unit- II	**The Brook by Alfred Tennyson (Poem)**	**7**

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks**.**
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)
Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary: Homonyms, Homophones, Homographs.

Unit- III	**BIOGRAPHY: Elon Musk**	**6**

Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Note-making, paraphrasing
Grammar: Verbs - tenses; subject-verb agreement; Compound words**,**

Vocabulary: Compound words, Collocations		
Unit- IV	**INSPIRATION: The Toys of Peace -Saki**	**6**
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data **Writing**: Letter Writing: Official Letters, Resumes **Grammar :** Reporting verbs, Direct & Indirect speech, Active & Passive Voice **Vocabulary:** Words often confused, Jargons		
Unit- V	**MOTIVATION: The Power of Intrapersonal Communication (An Essay)**	**5**
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts **Reading:** Reading for Comprehension **Writing:** Writing structured essays on specific topics**.** **Grammar:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement) **Vocabulary:** Technical Jargons		
Textbooks: 1. " Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3) 2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)		
Reference Books: 1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020 2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014. 3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019. 4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.		
Web Resources: GRAMMAR: 1. www.bbc.co.uk/learningenglish 2. https://dictionary.cambridge.org/grammar/british-grammar/ 3. www.eslpod.com/index.html 4. https://www.learngrammar.net/ 5. https://english4today.com/english-grammar-online-with-quizzes/ 6. https://www.talkenglish.com/grammar/grammar.aspx **VOCABULARY** 1. https://www.youtube.com/c/DailyVideoVocabulary/videos		

2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Course Outcomes:

On completion of this course, the students are able to:

CO1: The learner will be able to speak and write grammatically accurate sentences through applications of principles of English grammar

CO2: The learner will enhance vocabulary skills to build strong language skills.

CO3: The learner acquires the ability to understand the academic text from multiple dimensions employing ethical and logical reasoning based on accurate comprehension

CO4: The learner gains evaluation potential by employing standard reading & listening strategies to grasp the core essence and spirit of the text

CO5: The learner will gain mastery on speaking & writing skills through the application of relevant guidelines, through consistent practice of functional English expression

CHEMISTRY **(Common to CSE, AI&ML, CS, ECE, EEE, DS)**					
Course Code	**L : T : P**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
230004T	**3 : 0 : 0**	**3**	**CIE: 30** **SEE:70**	**3 Hours**	**BS&H**

Course Objectives:

- To familiarize chemistry and its applications.
- To train the students on the principles and applications of electrochemistry and polymers.
- To introduce instrumental methods.

SYLLABUS		**Total Hours:48**
Unit- I	**Structure and Bonding Models**	**9**

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo- and hetero-nuclear diatomic molecules – energy level diagrams of O2, CO, and NO. π- molecular orbitals of butadiene and benzene, calculation of bond order.

Unit- II	**Modern Engineering materials**	**10**

Semiconductors – Introduction, basic concept, application

Superconductors: Introduction, Basic concept and Applications.

Super capacitors: Introduction, Basic concept, Classification and Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphine nano particles

Unit- III	**Electrochemistry and Applications**	**10**

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry-potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Unit- IV	**Polymer Chemistry**	**10**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications.

Biodegradable polymers - **poly dioxanone,** Polyglycolic Acid (PGA), Polylactic Acid (PLA).

Unit- V	**Instrumental Methods and applications**	**9**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification, **Gas chromatography,** HPLC: Principle, Instrumentation and applications.

Textbooks:

1. 1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e,Oxford University Press, 2010.

Reference Books:

1. 1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. J.M.Lehn, Supra Molecular Chemistry, VCH Publications

Course Outcomes:

On completion of this course, the students are able to:

CO1: Describe Planck's quantum theory, dual nature of matter, Schrodinger equation, molecular orbital Theory and molecular orbital energy level diagram of differentmolecules

CO2: Explain Crystal field theory, splitting in octahedral and tetrahedral geometry and the magnetic behavior, Oxidation state, coordination and color of complexes.

CO3: Explain the principle of Band diagrams of conductors, superconductor, semiconductorsand insulator and nonmaterial

CO4: Discuss the principles of electrochemistry in potentiometry, conductometry, battery and electrochemical sensors

CO5: Explain polymerization and the preparation, properties, and applications of thermoplastics &thermosetting, elastomers, & conducting polymers

CO6: Discuss the different applications of analytical instruments

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to all branches)					
Course Code	**L : T : P**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
230002T	**3 : 0 : 0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**ES**

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

SYLLABUS		**Total Hours:45**
Unit- I	**Differential equations of first order and first degree**	**9**
Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decayElectrical circuits.		
Unit- II	**Linear differential equations of higher order (Constant Coefficients)**	**9**
Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.		
Unit- III	**Partial Differential Equations**	**9**
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.		
Unit- IV	**Vector differentiation**	**9**
Scalar and vector point functions, vector operator Del, Del applies to scalar point functions-Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.		
Unit- V	**Vector integration**	**9**
Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems		

Textbooks:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. 2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.

4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017
6. 6. Engineering Mathematics I by T.K.V. Iyengar, B.Krishna Gandhi,, S. Chand Publications, 2015 Edition.

Course Outcomes:

On completion of this course, the students are able to:

CO1: Solve the first order differential equations related to various engineering fields.
CO2: Solve the linear differential equations of higher order with constant coefficients
CO3: Identifysolutionmethodsforpartialdifferentialequationsthatmodelphysical processes.
CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO5: Apply Green's, Stokes and Divergence theorem in work done, circulation, flux and triple integrals.

BASIC CIVIL & MECHANICAL ENGINEERING (Common to all branches)					
Course Code	**L : T : P**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
230101T	**3 : 0 : 0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**ESC**

Course Objectives:

- Get familiarized with the scope and importance of Civil Engineering sub-divisions
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation's economy.
- Get familiarized with the importance of quality, conveyance and storage of water
- Introduction to basic civil engineering materials and construction techniques

SYLLABUS	**Total Hours:45**

PART-A

Unit- I	**9**

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of CivilEngineering-StructuralEngineering-Geo-technicalEngineering-TransportationEngineering Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of eachdiscipline-BuildingConstructionandPlanning-ConstructionMaterials-Cement-Aggregate-Bricks-Cementconcrete-Steel.Introductionto Prefabricated construction Techniques

Unit- II	**10**

Fluid Mechanics: Properties of fluids and types of fluids.

Surveying: Objectives of Surveying- Horizontal Measurements-Angular Measurements-Introduction to Bearings Leveling instruments used for leveling – Simple problems on leveling and bearings-Contour mapping.

Unit- III	**9**

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements-Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.

Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water-Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs)

Textbooks:

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. BasicCivilEngineering,SatheeshGopi,PearsonPublications,2009,FirstEdition

Reference Books:

1. Surveying, Vol -I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers,Delhi.2016

3. Irrigation Engineering and Hydraulic Structures – Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K. Khanna, C.E.G. Justoand Veeraraghavan, Nemchandand Brothers Publications 2019. 10th Edition.

E- Resources :

https://archive.nptel.ac.in/courses/105/106/105106201/

PART-B	
Unit- I	**9**
Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society-Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors. Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.	
Unit- II	**9**
Manufacturing Processes: Principles of Casting, Forming, and joining processes, Machining, Introduction CNC machines, 3D printing, and Smart manufacturing. **Thermal Engineering** – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles	
Unit- III	**9**
Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants. Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications. Introduction to **Robotics** - Joints & links, configurations, and applications of robotics. (Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)	
Textbooks: 1.Internal Combustion Engines by V. Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd. 2.A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd. 3.An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, cengage learning India pvt. Ltd	
Reference Books: 1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I 2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications 3. Thermal Engineering by Mahesh M Rathore Tata Mcgraw Hill publications (India) Pvt. Ltd. 4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata Mcgraw Hill publications (India) Pvt. Ltd.	
Course Outcomes: On completion of this course, the students are able to: **CO1:** Know the concepts of surveying and to understand the measurement of distances, angles and levels	

through surveying

CO2: Realize the importance of Transportation in nation's economy and the engineering measures related to highways in terms of geometrics

CO3: Understand the importance of water resources and storage structures so that the social responsibilities of water conservation will be appreciated.

CO4: Understand the different manufacturing processes

CO5: The basics of thermal engineering and its applications.

CO6: Describe the working of different mechanical power transmission systems and power Plants; learn basics of robotics.

NETWORK ANALYSIS					
Course Code	**L : T : P**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
23A0205T	**3 : 0 : 0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**PCC**

Course Objectives:

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
- To impart knowledge on applying appropriate theorem for electrical circuit analysis
- To explain transient behavior of circuits in time and frequency domains
- To teach concepts of resonance
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship

SYLLABUS	**Total Hours:45**
Unit- I	**9**

Types of circuit components, Types of Sources and Source Transformations, Mesh analysis and Nodal analysis, problem solving with resistances only including dependent sources also. Principal of Duality with examples.

Network Theorems: Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens - problem solving using dependent sources also.

Unit- II	**9**

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots.

Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, Heaviside's expansions, problem solving using Laplace transform.

Unit- III	**9**

Steady State Analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-L- C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving using Laplace transforms also.

Unit- IV	**9**

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case-resistance present in both branches, anti-resonance at all frequencies.

Coupled Circuits: Coupled Circuits: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits-problem solving.

Unit- V	**9**

Two-port Networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h- parameters, Relationships Between parameter Sets, Parallel & series connection of two port networks, cascading of two port networks, problem solving using dependent sources also.

Image and iterative impedances. Image and iterative transfer constants. Insertion loss. Attenuators and pads. Lattice network and its parameters. Impedance matching networks.

Textbooks:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.

3. Network lines and Fields by John. D. Ryder 2nd Edition, PHI

Reference Books:

1. D. Roy Choudhury, Networks and Systems, New Age International Publications, 2013.
2. Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017
3. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku, McGraw-Hill Education.

Course Outcomes:

On completion of this course, the students are able to:

CO1: Understand basic electrical circuits with nodal and mesh analysis.
CO2: Analyse the circuit using network simplification theorems.
CO3: Find Transient response and Steady state response of a network.
CO4: Analyse electrical networks in the Laplace domain.
CO5: Compute the parameters of a two-port network.

ENGINEERING WORKSHOP (Common to all branches)					
Course Code	**L: T:P**	**Credits**	**Exam.Marks**	**Exam Duration**	**Course Type**
23A0302P	**0 : 0 : 3**	**1.5**	**CIE:30 SEE:70**	**3 Hours**	**ES**

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Syllabus

List of Experiments

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a. Half –Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b)Conical funnel c)Elbow pipe d)Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c)Semi-circular fit
   d) Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series b)Two-way switch c) Go down lighting
   d)Tube light e) Three phase motor f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

Text Books:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn.2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 &2017.

References:

1. Elements of Workshop Technology, Vol. I by S.K. Hajra Choudhury &Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

Course Outcomes:

CO1: Identify workshop tools and their operational capabilities.

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, and foundry and welding.

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

COMMUNICATIVE ENGLISH LAB
(Common to all branches)

Course Code	L: T:P	Credits	Exam.Marks	Exam Duration	Course Type
23A0010P	**0 : 0 : 2**	**1**	**CIE:30** **SEE:70**	**3 Hours**	**BS&H**

Course Objectives:

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning students will get trained in the basic communication skills and also make them ready to face job interviews

Syllabus

List of Experiments

1. VOWELS & CONSONANTS
2. NEUTRILIZATION/ ACCENT RULES
3. COMMUNICATION SKILLS & JAM
4. ROLE PLAY OR CONVERSATIONAL PRACTICE
5. EMAIL WRIRING
6. RESUME WRITING, COVER LETTER, SOP
7. GRPOUP DISCUSSION-METHODS & PRACTICE
8. DEBATE - METHOD & PRACTICE
9. PPT PRESENTATION / PSTER PRESENTATION
10. INTERVIEW SKILLS

Suggested Software: Walden InfoTech / Young India Films

References:

1. Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students,(3rd Ed) Trinity Press.

Online Learning Resources/Virtual Labs:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured

9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc

Course Outcomes:

CO1: Analyze the English speech sounds, stress, intonation for better Listening practice
CO2: Apply communication skills through various language learning activities
CO3: Application of writing skills through design and preparation of professional Resume & email writing
CO4: Create effective resonate and prepare themselves to face interviews in future

CHEMISTRY LAB (Common to CSE, AI&ML, ECE, EEE, DS)					
Course Code	**L: T:P**	**Credits**	**Exam.Marks**	**Exam Duration**	**Course Type**
23A0007P	**0 : 0 : 2**	**1**	**CIE:30 SEE:70**	**3 Hours**	**BS&H**

Course Objectives:

- Verify the fundamental concepts with experiments

Syllabus

List of Experiments

1. Measurement of 10Dq by spectrophotometric method
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law
9. Simultaneous estimation of Mn and Cr ions by spectrophotometry in water samples.
10. Wavelength measurement of sample through UV-Visible Spectroscopy
11. Identification of functional groups in organic compounds by IR Spectroscopy.
12. Preparation of nano materials by precipitation method
13. Estimation of Ferrous Iron by Dichrometry
14. Determination of Hardness of a groundwater sample
15. pH metric titration of strong acid vs strong base

(**Any 10 experiments from the above list)References:**

Text Book(s):

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Jain & Jain. Engineering Chemistry: Dhanapath rai Publications., 2015.
3. S.S.Dara, Experiments and Calculations in Engineering Chemistry: S-Chand Publications,Revised edition, 2008.

Reference Book(s):

1. "Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publicationsby J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

Course Outcomes:

CO1: Determine the cell constant and conductance of solutions and the strength of an acid by conductometry

CO2: Synthesize of advanced polymer materials

CO3: Measure the strength of an acid present in secondary battery and Ferrous ion usingvolumetric analysis

CO4: Determine the potentials and EMFs of solutions by Potentiometry

CO5: Identify some organic and inorganic compounds by instrumental methods

CO6: Synthesize of nano materials by simple methods

NETWORK ANALYSIS AND SIMULATION LABORATORY					
Course Code	**L: T:P**	**Credits**	**Exam.Marks**	**Exam Duration**	**Course Type**
23A0206P	**0 : 0 : 3**	**1.5**	**CIE:30 SEE:70**	**3 Hours**	**PCC**

Course Objectives:

- To gain hands on experience in verifying Kirchoff's laws and network theorems
- To analyze transient behavior of circuits
- To study resonance characteristics
- To determine 2-port network parameters

Syllabus

List of Experiments (**Conduct all experiments)**

The following experiments need to be performed using both Hardware and simulation Software.
The experiments need to be simulated using software and the same need to be verified using the hardware.

1. Study of components of a circuit and Verification of KCL and KVL.
2. Verification of mesh and nodal analysis for AC circuits
3. Verification of Superposition, Thevenin's & Norton theorems for AC circuits
4. Verification of maximum power transfer theorem for AC circuits
5. Verification of Tellegen's theorem for two networks of the same topology.
6. Study of DC transients in RL, RC and RLC circuits
7. To study frequency response of various 1st order RL & RC networks
8. To study the transient and steady state response of a 2nd order circuit by varying its various parameters and studying their effects on responses
9. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
10. Determination of open circuit (Z) and short circuit (Y) parameters
11. Determination of hybrid (H) and transmission (ABCD) parameters
12. To measure two port parameters of a twin-T network and study its frequency response.

Hardware Requirements:

Regulated Power supplies, Analog/Digital Function Generators, Digital Multimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components.

Software requirements:

Multisim/ Pspice/Equivalent simulation software tool, Computer Systems with required specifications.

References:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.

Course Outcomes:

CO1: Implement various DSP Algorithms using MATLAB.
CO2: Implement DSP algorithms with Digital Signal Processor.

CO3: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth filters.
CO4: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital IIR- Chebyshev filters.
CO5: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using window techniques.
CO6: Analyze and implement various digital filters.

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

(Common to all branches)

Course Code	L : T : P	Credits	Exam Marks	Exam Duration	Course Type
23ANS01P	**0 : 0 : 1**	**0.5**	**CIE: 30** **SEE:70**	**3 Hours**	**BS&H**

Course Objectives:

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

SYLLABUS

Unit- I Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution

Unit- II Nature & Care

Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

Unit- III Community Service

Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders Survey in the village, identification of problems- helping them to solve via media authorities-experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.

v) Any other programmes in collaboration with local charities, NGOs etc

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service SchemeVol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject

Course Outcomes:

On completion of this course, the students are able to:

CO-1: Understand the importance of discipline, character and service motto

CO-2: Solve some societal issues by applying acquired knowledge, facts, and techniques.

CO-3: Explore human relationships by analyzing social problems.

CO-4: Determine to extend their help for the fellow beings and downtrodden people.

CO-5: Develop leadership skills and civic responsibilities.