OFFICE OF THE REGISTRAR :: DIBRUGARH UNIVERSITY :: DIBRUGARH

Ref. No. DU/DR-A/B.Tech (Syllabus I&II)/2024/026 Date: 08.01.2024

NOTIFICATION

As recommend by the ***126th Meeting*** of the Under Graduate Board held on 23.11.2023, the 129th Meeting of the Academic Council, Dibrugarh University held on 08.12.2023 vide ***Resolution No. 09*** has approved the Course Structure and Syllabus of First and Second Semester B. Tech. Programmes (Common to all) w.e.f. the academic session 2023-2024.

The Course Structure and Syllabus is enclosed herewith.

Issued with due approval.

Sadiz Ahmed

Deputy Registrar (Academic) *i/c*

Dibrugarh University

Copy for kind information and necessary action to:

1. The Hon'ble Vice-Chancellor i/c, Dibrugarh University.
2. The Deans, Dibrugarh University.
3. The Registrar, Dibrugarh University.
4. All the Heads and Chairpersons of the Teaching Departments and Centres of Studies, Dibrugarh University.
5. The Director, DUIET, Dibrugarh University.
6. The Controller of Examinations i/c, Dibrugarh University.
7. The Inspector of Colleges, Dibrugarh University.
8. The Director, IQAC, Dibrugarh University.
9. The Joint / Deputy Controller of Examinations – 'B', 'C' & 'A', Dibrugarh University.
10. The Programmer, Dibrugarh University with a request to upload the notification in the Dibrugarh University Website.
11. File

Sadiz Ahmed

Deputy Registrar (Academic) *i/c*

Dibrugarh University

Curriculum 2023
DUIET
First Year (Common to all Branches)

Semester I
Mandatory Induction Programme (3 weeks duration)

Sl. No.	Course Code	Course Title	L	T	P	Credit
1.	BS-101	Mathematics-I	3	0	0	3
2	ES-101 (T)	Basic Electrical Engineering	2	0	0	2
3.	ES-101 (P)	Basic Electrical Engineering Lab	0	0	2	1
4.	ES-102	Engineering Graphics & Design	1	0	4	3
5.	HSMC- 101 (T)	English for Technical Writing	2	0	0	2
6.	HSMC- 101 (P)	English for Technical Writing Lab	0	0	2	1
7.	BS-102	Biology for Engineers	3	0	0	3
8.	ES-103	Basic Engineering Workshop	0	0	4	2
9.	SBC-101	Skill Based Course-I	1	0	4	3
Total						**20**

Semester II

Sl. No.	Course Code	Course Title	L	T	P	Credit
1.	BS-201	Mathematics-II	3	1	0	4
2.	BS-202 (T)	Physics-I	3	1	0	4
3.	BS-202 (P)	Physics-I Lab	0	0	2	1
4.	BS-203 (T)	Chemistry	3	0	0	3
5.	BS-203 (P)	Chemistry Lab	0	0	2	1
6.	ES-201 (T)	Programming for Problem Solving	2	0	0	2
7.	ES-201 (P)	Programming for Problem Solving Lab	0	0	4	2
8.	ES-202	Digital Fabrication/ Workshop/ Manufacturing Practices Lab	0	0	4	2
9.	ES-203	Design Thinking	0	0	2	1
10.	HSMC-201	Universal Human Value-I	2	0	0	2
11.	AU-202	Sports and Yoga/NSS/NCC	2	0	2	0
12.	SBC-201	Skill Based Course-II	1	0	4	3
Total						**25**

SEMESTER I

Course Code	BS-101
Course Title	Mathematics-I
Number of Credits	3 (L: 3, T: 0)
Course Category	Basic Science Course
Branch	All Branches (CSE, ECE, ME, PE)
Course Objectives	The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

Pre-requisites (if any): 10+2 Mathematics

Module 1: Basic Calculus: (6 Lectures)

Curvature, evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Module 2: Single-variable Calculus (Differentiation): (6 Lectures)

Rolle's Theorem, Mean value theorems and applications; Extreme values of functions; Linear approximation; Indeterminate forms and L' Hospital's rule.

Module 3: Sequences and series: (10 Lectures)

Limits of sequence of numbers, Calculation of limits, Infinite series; Tests for convergence; Power series, Taylor and Maclaurin series; Taylor theorem, convergence of Taylor series, error estimates.

Module 4: Multivariable Calculus (Differentiation): (8 Lectures)

Limit, continuity and partial derivatives, directional derivatives, gradient, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers.

Module 5: **Multivariable Calculus (Integration):** (10 Lectures)

Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Gradient, curl and divergence, Theorems of Green, Gauss and Stokes.

TEXTBOOKS/REFERENCES:

1. **AICTE's Prescribed Textbook: Mathematics-I (Calculus & Linear Algebra) ISBN: 9789391505172**

2. Reena Garg, Engineering Mathematics, Khanna Book Publishing Company, 2022.

3. Reena Garg, Advanced Engineering Mathematics, Khanna Book Publishing Company, 2021.

4. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

5. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

6. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

7. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Course outcomes: The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate differentiation and integration. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. The students will learn

- To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- The tool of power series and Fourier series for learning advanced Engineering Mathematics.
- To deal with functions of several variables that are essential in most branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

Course Code	ES-101 (T)
Course Title	Basic Electrical Engineering
Number of Credits	2 (L: 2, T: 0, P: 0)
Course Category	Engineering Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electrical Engineering.

Course Contents:

Module I: (10 Lectures)

D. C. Circuits covering, Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel and series-parallel circuits excited by independent voltage sources; Power and energy; Electromagnetism covering, Faradays Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced EMF; Concepts of self-inductance, mutual inductance, and coefficient of coupling; Energy stored in magnetic fields;

Module II: (10 Lectures)

Single Phase A.C. Circuits covering, Generation of sinusoidal voltage- definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current and phasor representation of alternating quantities; Analysis with phasor diagrams of R, L, C, RL, RC and RLC circuits; Real power, reactive power, apparent power and power factor, series, parallel and series- parallel circuits; Three Phase A.C. Circuits covering, Necessity and Advantages of three phase systems, Generation of three phase power, definition of Phase sequence, balanced supply and balanced load; Relationship between line and phase values of balanced star and delta connections; Power in balanced three phase circuits,

Module III: (6 Lectures)

Transformers covering, Principle of operation and construction of single-phase transformers (core and shell types). EMF equation, losses, efficiency, and voltage regulation; Synchronous Generators covering, Principle of operation; Types and constructional features; EMF equation;

Module IV: (6 Lectures)

DC Machines covering, working principle of DC machine as a generator and a motor; Types and constructional features; EMF equation of generator; DC motor working principle; Back EMF and its significance, torque equation; Types of D.C. motors, characteristics, and applications; Necessity of a starter for DC motor;

Module V: (4 Lectures)

Three Phase Induction Motors covering; Concept of rotating magnetic field; Principle of operation, types, and constructional features; Slip and its significance; Applications of squirrel cage and slip ring motors; Necessity of a starter, star-delta starter.

Module VI: (4 Lectures)

Sources of Electrical Power covering, Introduction to Wind, Solar, Fuel cell, Tidal, Geothermal, Hydroelectric, Thermal-steam, diesel, gas, nuclear power plants; Concept of cogeneration, and distributed generation;

TEXT/REFERENCS BOOKS:

1. AICTE's Prescribed Textbook: Basic Electrical Engineering, Khanna Book Publishing.

2. Ritu Sahdev (2022), Basic Electrical Engineering, Khanna Book Publishing.

3. Nagrath I.J. and D. P. Kothari (2001), Basic Electrical Engineering, Tata McGraw Hill.

4. Hayt and Kimberly, Engineering Circuit Analysis, Tata McGraw Hill.

5. Kulshreshtha D.C. (2009), Basic Electrical Engineering, Tata McGraw Hill.

6. Rajendra Prasad (2009), Fundamentals of Electrical Engineering, Prentice Hall, India Hughes, E. 2005)

COURSE OUTCOMES:

The students will learn:

1. To explain strong basics of Electrical Engineering and practical implementation of Electrical fundamentals.
2. To understand and analyze basic Electric and Magnetic circuits.
3. To identify different applications of commonly used electrical machinery.

Course Code	ES-101 (P)
Course Title	Basic Electrical Engineering Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Course Category	Engineering Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electrical Engineering.

List of Experiments of Basic Electrical Engineering Lab

1. Verification of Ohm's law.
2. Verification of Kirchoff's Current Law.
3. Verification of Kirchoff's Voltage Law.
4. Verification of Thevenin's theorem.
5. Verification of Super Position Theorem.
6. Verification of Maximum powder transfer theorem
7. Study the Norton theorem.
8. Verification of Reciprocity Theorem

Course Code	ES-102
Course Title	Engineering Graphics & Design
Number of Credits	3 (L: 1, T: 0, P: 4)
Course Category	Engineering Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The objective of this Course is to provide the students with the basic knowledge about Engineering Drawing. Detailed concepts are given in projections, technical drawing, dimensioning and specifications, so useful for a student in preparing for an engineering career.

Course Contents

Traditional Engineering Graphics:

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

Computer Graphics:

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling

Module I: Introduction to Engineering Drawing: (7 Lectures)

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

Module II: Orthographic Projections: (7 Lectures)

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

Module III: Projections of Regular Solids: (7 Lectures)

Covering those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale.

Module IV: Sections and Sectional Views of Right Angular Solids: (7 Lectures)

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids- Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry. .

Module V: Isometric Projections: (7 Lectures)

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

Module VI: Overview of Computer Graphics: (5 Lectures)

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard,

Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids

Text/Reference Books:

1. **AICTE's Prescribed Textbook: Engineering Graphics & Design (ISBN: 978-93-91505-066)**
2. Jain, Maheshwari, Gautam (2021), Engineering Graphics & Design, Khanna Book Publishing.
3. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing.
4. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson.
5. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.
6. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
7. (Corresponding set of) CAD Software Theory and User Manuals.

Course Code	HSMC-101-T
Course Title	English for Technical Writing
Number of Credits	2 (L: 2, T: 0)
Course Category	Humanities & Social Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objectives	To provide learning environment to practice listening, speaking, reading and writing skills and also to acquaint hands-on experience through case-studies, mini-projects, group and individual presentations.

Course Content:

Module I: Vocabulary Building (6 Lectures)

1.1. The concept of Word Formation

1.2. Root words from foreign languages and their use in English

1.3. Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.

1.4. Synonyms, antonyms, and standard abbreviations.

Module II: Basic Writing Skills (10 Lectures)

1.1. Sentence Structures

1.2. Use of phrases and clauses in sentences

1.3. Importance of proper punctuation

1.4. Creating coherence

1.5. Organizing principles of paragraphs in documents

1.6. Techniques for writing precisely

Module III: Identifying Common Errors in Writing (8 Lectures)

1.1. Subject-verb agreement

1.2. Noun-pronoun agreement

1.3. Misplaced modifiers

1.4. Articles

1.5. Prepositions

1.6. Redundancies

1.7. Clichés

Module IV: Nature and Style of sensible Writing (10 Lectures)

1.1. Describing

1.2. Defining

1.3. Classifying

1.4. Providing examples or evidence

1.5. Writing introduction and conclusion

Module V: Writing Practices (6 Lectures)

1.1. Comprehension

1.2. Précis Writing

1.3. Essay Writing

TEXTBOOKS/REFERENCES:

1. AICTE's Prescribed Textbook: English (with Lab Manual), Khanna Book Publishing Co.
2. Effective Communication Skills. Kul Bhushan Kumar, Khanna Book Publishing, 2022.
3. Practical English Usage. Michael Swan. OUP. 1995.
4. Remedial English Grammar. F.T. Wood. Macmillan.2007
5. On Writing Well. William Zinsser. Harper Resource Book. 2001
6. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
7. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
8. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

Alternative NPTEL/SWAYAM Course:

S. No.	NPTEL Course Name	Instructor	Host Institute
1.	ENGLISH LANGUAGE FOR COMPETITIVE EXAMS	PROF. AYSHA IQBAL	IIT MADRAS
2.	TECHNICAL ENGLISH FOR ENGINEERS	PROF. AYSHA IQBAL	IITM

Course Code	HSM-101-P
Course Title	English for Technical Writing
Number of Credits	1 (P: 2)
Course Category	Humanities & Social Science Courses
Branch	Mechanical Engineering
Course Objectives	a. To assist the students to carry on the tasks and activities through guided instructions and materials. b. To effectively integrate English language learning with employ-ability skills and training. c. To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

Module I: Oral Communication

(This Module involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

Course Outcomes: The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Course Code	BS102
Course Title	Biology for Engineers
Number of Credits	3 (L: 3, T: 0, P: 0)
Course Category	Basic Science Course
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The objective of this Course is to provide the students with an introductory and broad treatment of biology which they can use in Engineering.

Module 1. Introduction (2 Lectures)

Purpose: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry. Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry.

Module 2. Classification Purpose (5 Lectures)

To convey that classification per se is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted. Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure-prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitataacquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus.

Module 3 -Genetics Purpose (6 Lectures)

To convey that “Genetics is to biology what Newton’s laws are to Physical Sciences” Mendel’s laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics.

Module 4.-Biomolecules Purpose (4 Lectures)

To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids

Module 5. Enzymes Purpose (5 Lectures)

To convey that without catalysis life would not have existed on earth Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyze reactions. Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. AICTE Revised Model Curriculum for UG Degree Course in Electronics and Communication Engineering (ECE) 54 Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis.

Module 6. Information Transfer Purpose (4 Lectures)

The molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination. DICOM Image formats, The DNA Technology (Use and Application) Regulation Bill, 2019

Module 7. Macromolecular analysis Purpose (4 Lectures)

How to analyses biological processes at the reductionistic level Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

Module 8.- Metabolism Purpose (6 Lectures)

The fundamental principles of energy transactions are the same in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to CO2 + H2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge.

Module 9. Microbiology (4 Lectures)

Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.

References:

1) General Biology, Uma Devi Koduru, Khanna Book Publishing Company.

2) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd

3) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons

4) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company 5) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

6) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

Course Outcomes:

After studying the course, the student will be able to:

• Describe how biological observations of 18th Century that lead to major discoveries.

• Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological

• Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring • Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine

• Classify enzymes and distinguish between different mechanisms of enzyme action.

• Identify DNA as a genetic material in the molecular basis of information transfer.

•Analyse biological processes at the reductionistic level

•Apply thermodynamic principles to biological systems. • Identify and classify microorganisms

Course Code	ES-103
Course Title	Basic Engineering Workshop
Number of Credits	2 (L: 0, T: 0, P: 4)
Course Category	Engineering Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	To Study the different hand operated power tools, uses and their demonstration. To gain a good basic working knowledge required for the production of various engineering products. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field. To develop a right attitude, team working, precision and safety at work place. It explains the construction, function, use and application of different working tools, equipment and machines. To study commonly used carpentry joints.To have practical exposure to various welding and joining processes. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances

Course Content

1. **Machine shop**

   Safety guidelines. Lathe machine, its parts, functions, operations, advantages, disadvantages and applications. Job practice on Pedestal drilling machines, Radial Drilling Machines, Grinding operations and finishing operations.Practice on Shaper Machine, Radial Drilling Machine, grinding operations.

2. **Fitting shop**

   Classification of Fitting Tools, Limits, Fits and Tolerance, Practice of different fitting operations, Filing methods. Plumbing tools and operations. Assembly of different joints, thread cutting,Reamering,plumbing operations, measurements and error detection.

3. **Carpentry shop**

   Timber, Seasoning, preservation, plywood and ply boards, classification and commercial

sizes of Timber, defects and diseases of timber use, care and sharpening of common carpentry hand tools.Engineering applications: basic carpentry operations, marking sawing, planning, chiseling etc. Different carpentry joints and their uses. Engineering applications: Basic carpentry operations, marking, sawing, planning, chiseling etc. Different carpentry joints and their uses.

4. **Electrical shop**

   Electrical safety and precautions. Basic electrical connections and types. Electrical instruments-testers, Multimeters, Meggers etc.

5. **Welding shop (Arc welding + Gas welding)**

   Safety Precautions. Arc Welding-Manual Metal Arc Welding technique and equipments, welding electrodes and types, functions. Types of Welding joints. Common defects in welding. Practice with Oxy acetylene gas welding**,** types of electrodes, flux. Applications, advantages and disadvantages of Arc Welding and Gas Welding**.**

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

CO1-Operate the different Machine tools.

CO2-Work on manufacturing of components using workshop trades including plumbing, fitting, carpentry, electrical wiring, machining and welding.

CO3-Identify suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.

CO4-Analyse dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

CO5-By assembling different components, they will be able to design small projects of their interest.

Suggested Text/Reference Books:

(i) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

(ii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.

(iii)Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.

(iv) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

(v) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017.

Course Code	SBC-ME-101
Course Title	Introduction to Automobiles
Number of Credits	3 (L: 1, T: 0, P:4)
Course Category	Skill Based Course-I
Branch	ME
Course Objectives	The goal of this course is to develop the skill of students in automobile repairing by giving them hands on training on the subject.

Course Content:

Introduction to Automobiles: Introduction to Automobile Industry and History, Vehicle Architecture and Classification, Automotive Safety Regulations and Standards

Introduction to conventional automobiles with IC Engines: Basics of Thermodynamics and Combustion, Automotive Transmission Systems, Braking Systems, Suspension and Steering Systems, Vehicle Electrical and Electronics Systems, Automotive HVAC Systems, Automotive Safety Systems and Advanced Driver Assistance Systems (ADAS)

Alternative Propulsion Systems: Introduction to Electric Vehicles (EVs), Hybrid Electric Vehicles (HEVs), Fuel Cell Vehicles (FCVs)

Practical Exposure and Skill Development: Vehicle Inspection and Maintenance, Design of an Electric or Fuel Cell Vehicle Component/System.

Text/Reference Books:

1. Heywood, J. B. (1988). Internal Combustion Engine Fundamentals (1st ed.). McGraw-Hill.
2. Husain, I. (2014). Electric and Hybrid Vehicles: Design Fundamentals (1st ed.). CRC Press.
3. Jurgen, R. K. (1994). Automotive Electronics Handbook (1st ed.). McGraw-Hill.
4. Gilles, T. (2019). Automotive Service: Inspection, Maintenance, Repair (6th ed.). Cengage Learning.

Course Code	SBC-ECE-101
Course Title	Semiconductor devices and Application
Number of Credits	3 (L: 1, T: 0, P:4)
Course Category	Skill Based Course-I
Branch	ECE
Course Objectives	The goal of this course is to develop the skill of students in Semiconductor devices and its applications by giving them hands-on-training on the subject.

Course Content

Semiconductor Devices and Application

Module – I Introduction to semiconductor devices and Semiconductor components – Basic of Active Components BJT, FET, etc. Basic of passive components – Register, Inductor, Capacitor, LED etc.

Module – II (Practical and Design) i) Design of simple DC power supply. ii) Design of audio amplifier circuit. iii) Design of LED running display. iv) Design of Automated Light nighting system. v) Design of Borglar Alarm Circuit. vi) Design of a Rain alarm system. vii) Design of a Fire alarm system. viii) Design of a FM transmitter.

Module – III One Semiconductor based project need to submit.

Course Code	SBC-PE-101
Course Title	Basic of Petroleum Engineering-I
Number of Credits	3 (L: 1, T: 0, P:4)
Course Category	Skill Based Course-I
Branch	PE
Course Objectives	The goal of this course is to develop the skill of students in the basics of Petroleum Engineering and its applications by giving them hands on training on the subject.

Basic of Petroleum Engineering-I

Module I: Introduction to geology, Rock and its types, Minerals, different types of rock structures, Mapping.

Module II: Fundamentals of Petroleum, Petroleum Reservoir, Reservoir Engineering, Classification of Petroleum Reservoir' Reservoir Rock and Fluid Properties, Reservoir Drive Mechanics and Recovery Factors, Resource and Reserve Concept, Flow of Fluids Through Porous Media, Darcy's Law, Productivity Index, Injectivity Index, Formation Damage, Skin Effect.

Module III: Introduction to Oil and Gas well Production, Productivity Index (PI), and Inflow Performance Relationship (IPR); Importance of Well Completion, Well Completion Equipment, and Well Completion Methods.

BOOKS:

1. Principles of Oil Well Production- T. E. W. Nind.
2. Applied Petroleum Reservoir Engineering- Craft and Hawkins.
3. The Technology of Artificial Lift Methods, Volume 1- Kermit E. Brown.
4. Petroleum Engineering Handbook-Howard B. Bradley.
5. Oil and Gas Filed Development Techniques: Well Completion and Servicing- Denis Perrin, Michel Caron and Georges Gaillot.
6. Production Operations: Well Completions, Workover and Stimulation, Volume 1- Thomas O. Allen and Alan P. Roberts. Production Operations: Well Completions, Workover and Stimulation, Volume
7. Reservoir Engineering Handbook- Tarek Ahmed
8. Advanced Reservoir Engineering- Tarek Ahmed, Paul D. Mcinney
9. Phase Behavior of Petroleum Reservoir Fluid- Pederson, Chrisgtensen
10. Estimation and Classification of Reserves of Crude oil, Natural Gas & Condensate- Chapman Corrnquist
11. Fundamental of Reservoir Engineering- L. P. Dake Applied Petroleum Reservoir Engineering- Craft and Hawkins
12. H. H., Rutley's , Elements of Mineralogy
13. Krishnan, M. S. Geology of India and Burma
14. Mahapatra G. B. A Textbook of GeologY
15. Raup & Stanley, Principles of PalaeontologY
16. Billings, M. P., Structural Geology
17. Tyrrel, G. W., An Introduction to Petrology

Course Code	SBC-CSE-101
Course Title	Data Analysis in Sci-Lab and Excel
Number of Credits	3 (L: 1, T: 0, P:4)
Course Category	Skill Based Course-I
Branch	CSE
Course Objectives	The goal of this course is to obtain the necessary knowledge to solve numerical problems through Sci-lab capacities.

Course Content

Unit1: Installation of the software Scilab. Basic syntax, Mathematical Operators, Predefined constants, Built in functions.

Unit 2: Handling these data structures of the following using built in functions.

a) Scalars & Vectors- elementary mathematical functions, mathematical functions on scalars, initializing vectors in scilab, mathematical operations on vectors, relational operations on vectors, logical operations on vectors, built-in logical functions.

b) Complex numbers, trigonometric functions, inverse trigonometric functions, hyperbolic functions.

c) Matrices - introduction, arithmetic operators for matrices, basic matrix processing.

d) Polynomials - introduction, creating polynomials, basic polynomial commands, finding roots of polynomial, polynomial arithmetic, miscellaneous polynomial handling.

e) Solving linear system of Equations- Diagonal System, Upper triangular system, Lower triangular system

Unit 3: Graphics handling - 2D, 3D - Generating .jpg files, Function plotting - Data plotting

Unit 4: MS Excel

Text Books:

1. Sandeep Nagar, Introduction to Scilab: For Engineers and Scientists. Apress publisher, New York, USA, 2017.

2. A.S.Nair, SCILAB (A free software to MATLAB), S. Chand Publishing, New Delhi, India, 2012.

Learning Outcome:

- To aware the students about SCILAB software environment
- Students will understand the basics of SCILAB software and its data class.
- Students to learn basic SCILAB programming for engineering applications.

Semester II

Course Code	BS-201
Course Title	Mathematics-II
Number of Credits	4 (L: 3, T: 1)
Course Category	Basic Science Course
Branch	All Branches (CSE, ECE, ME, PE)
Course Objectives	The goal of this course is to learn fundamental mathematics necessary to formulate, solve and analyse engineering problems.

Course Content

Module 1: Matrices (10 Lectures)

Linear Systems of Equations; Linear Independence; Rank of a Matrix; Determinant, Inverse of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Orthogonal transformation; Diagonalization of matrices; Cayley-Hamilton Theorem.

Module 2: First order ordinary differential equations: (6 Lectures)

Exact, linear and Bernoulli's equations. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Module 3: Ordinary differential equations of higher orders: (8 Lectures)

Second order linear differential equations with variable coefficients: Euler-Cauchy equations, solution by variation of parameters; Power series solutions: Legendre's equations and Legendre polynomials, Frobenius method, Bessel's equation and Bessel's functions of the first kind and their properties.

Module 4: Complex Variable – Differentiation: (8 Lectures)

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

Module 5: Complex Variable – Integration: (8 Lectures)

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

TEXTBOOKS/REFERENCES:

1. AICTE's Prescribed Textbook: Mathematics-II (Calculus, Ordinary Differential Equations and Complex Variable) ISBN: 978-93-91505-28-8

2. Reena Garg, Engineering Mathematics, Khanna Book Publishing Company, 2022.

3. Reena Garg, Advanced Engineering Mathematics, Khanna Book Publishing Company, 2021.

4. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2006.

5. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

6. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.

7. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

8. S. L. Ross, Differential Equations, 3rd Edition, Wiley India, 1984.

9. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

10. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.

11. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

12. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

13. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

COURSE OUTCOMES: The objective of this course is to familiarize the prospective engineers with techniques in matrices, ordinary differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:

- The essential tool of matrices and linear algebra in a comprehensive manner.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

Course Code	BS-202 (T)
Course Title	Physics-I
Number of Credits	4 (L: 3, T: 1)
Course Category	Basic Science Course (Quantum Mechanics for Engineers)
Branch	CSE, ECE
Course Objectives	To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

Course Content: Quantum Mechanics for Engineers

Pre-requisites (if any): Mathematics Course on Differential equations & linear algebra

Module I: Wave nature of particles and the Schrodinger equation (10 Lectures)

Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

Module II: Mathematical Preliminaries for quantum mechanics (10 Lectures)

Complex numbers, Linear vector spaces, inner product, operators, eigen value problems, Hermitian operators, Hermite polynomials, Legendre's equation, spherical harmonics.

Module III: Applying the Schrodinger equation (10 Lectures)

Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, square-well potential, linear harmonic oscillator. Numerical solution of stationary-state Schrodinger equation for one dimensional problems for different potentials Scattering from a potential barrier and tunneling; related examples like alpha-decay, field ionization and scanning tunneling microscope .Three-dimensional problems: particle in three dimensional box and related examples, Angular momentum operator, Hydrogen atom ground-state, orbitals, interaction with magnetic field, spin

Module IV: Introduction to solids (10 Lectures)

Free electron theory of metals, Fermi level, density of states, Application to white dwarfs and neutron stars, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands.

TEXTBOOKS/REFERENCES:

1. Eisberg and Resnick, Introduction to Quantum Physics
2. D. J. Griffiths, Quantum mechanics
3. Richard Robinett, Quantum Mechanics
4. Daniel McQuarrie, Quantum Chemistry

Alternative NPTEL/SWAYAM Course:

S. No.	NPTEL Course Name	Instructor	Host Institute
1	Quantum Mechanics I	Prof. P. Ramadevi	IIT Bombay

Course Code	BS-202 (T)
Course Title	Physics-I
Number of Credits	4 (L: 3, T: 1)
Course Category	Basic Science Course (Introduction to Electromagnetic Theory)
Branch	ME, PE
Course Objectives	To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology

Course Content: Introduction to Electromagnetic Theory

Pre-requisites (if any): Mathematics course with vector calculus

Module I: Electrostatics in vacuum (8 Lectures)

Coulomb's law and its application, Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Gauss' law and its applications; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution; Boundary conditions of electric field and electrostatic potential, method of images; energy of a charge distribution and its expression in terms of electric field.

Module II: Electrostatics in a linear dielectric medium (6 Lectures)

Electrostatic field and potential of a dipole; Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; Solving simple electrostatics problems in presence of dielectrics – Point charge at the center of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field.

Module III: Magnetostatics (4 Lectures)

Lorentz force law and its application, Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

Module IV: Magnetostatics in a linear magnetic medium (4 Lectures)

Magnetization and associated bound currents; auxiliary magnetic field H; Boundary conditions on B and H; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials

Module V: Faraday's law (6 Lectures)

Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law; Differential form of Faraday's law expressing curl of electric field in terms of time-derivative of magnetic field and calculating electric field due to changing magnetic fields; energy stored in a magnetic field

Module VI: **Displacement current, Magnetic field due to time-dependent electric field and Maxwell's equations** (6 Lectures)

Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displacement current and magnetic field arising from time dependent electric field; Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Pointing vector with examples.

Module VII: Electromagnetic waves (6 Lectures)

The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure.

TEXTBOOKS/REFERENCES:

1. AICTE's Prescribed Textbook: Physics (Introduction to Electromagnetic Theory) with Lab Manual, ISBN: 978-93-91505-165
2. Bhattacharya & Nag, Engineering Physics
3. David Griffiths, Introduction to Electrodynamics
4. Halliday and Resnick, Physics
5. W. Saslow, Electricity, magnetism and light
6. Malik, Singh, Engineering Physics, Tata McGraw Hill

Alternative NPTEL/SWAYAM Course:

S. No.	NPTEL Course Name	Instructor	Host Institute
1	**Introduction To Electromagnetic Theory**	**Prof. Manoj Harbola**	**IIT Kanpur**

Course Code	BS -101-P
Course Title	Physics- I- Lab
Number of Credits	1(P: 2)
Course Category	Basic Science Course
Branch	All Branches (CSE, ECE, ME, PE)
Course Objectives	a. Impart practical knowledge about some of the phenomena they have studied in their Physics-I course and 10+2 level. b. Develop the experimental skill of the students. c. Develop communication skill both in oral and written among the students

Sl. No	**Aim of the Experiment**
1	To determine the inertia of a body about an axis passing through its centre of gravity and perpendicular to its length
2	To determine the Young's modulus of the material of a given wire by Searle's apparatus
3	To determine the average resistance of the meter-bridge wire by using Carey Foster's bridge
4	To determine 'J' (Joule's mechanical equivalent of heat) by electrical method
5	To determine the specific heat of a liquid by Newton's law of cooling method
6	To determine the refractive index of a given liquid by using travelling microscope
7	To determine the magnifying power of a telescope by linear method and find its resolving power
8	To draw common base characteristics of a P.N.P junction transistor
9	To study Hall effect phenomenon and determine type of semiconductor
10	To study the I-V characteristics of solar cell
11	To calculate the numerical aperture and study the losses that occur in optical fibre cable
12	To Demonstrate Faradays law using Faradays law apparatus
13	To study impedance parameters of a dielectric sample

Experiments That May Be Performed Through Virtual Labs

Sl. No.	**Experiment Name**	**Experiment Link(s)**
1	Photoelectric effect experiment	http://mpv-au.vlabs.ac.in/modernphysics/Photo_Electric_Effect
2	**LC circuit and LCR circuit**	1. http://vlab.amrita.edu/?sub=1&brch=75&s **im=326&cnt=1** **2.** http://vlab.amrita.edu/?sub=1&brch=75&s **im=330&cnt=1** **3.** http://vlab.amrita.edu/?sub=1&brch=75&s **im=318&cnt=1** **4.** http://vlab.amrita.edu/?sub=1&brch=75&s **im=325&cnt=1** **5.** http://vlabs.iitkgp.ernet.in/asnm/exp12/ind **ex.htm**

Course Code	BS -203-T
Course Title	Chemistry
Number of Credits	3 (L: 3, T: 0)
Course Category	Basic Science Course
Branch	All Branches (CSE, ECE, ME, PE)
Course Objectives	To acquaint the students with the basic phenomenon/concepts of Chemistry and study its applications relevant to various streams of Engineering and Technology

Course Content

Module I: Atomic and Molecular Structure Schrodinger Equation (10 lectures)
Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties.

Module II: Spectroscopic Techniques and Applications (8 lectures)
Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques.

Module III: Water Technology (4 lectures)
Types of Hardness, Units of Hardness, Estimation of Hardness- EDTA method, Numericals based on the above. Water Softening methods: Ion-exchange process: Polymer ion Exchange. Dissolved oxygen: BOD and COD. Sewage water treatment: Trickling filter and UASB process. Reverse Osmosis: Disinfection method by Chlorination and UV.

Module IV: Use of Free Energy in Chemical Equilibria (4 lectures)
Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Use of free energy considerations in metallurgy through Ellingham diagrams.

Module V: Periodic Properties (4 lectures)
Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

Module VI: Stereochemistry (6 lectures)
Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

Module VII: Organic reactions and synthesis of a drug molecule (4 lectures)
Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

TEXTBOOKS/REFERENCES:

1. AICTE's Prescribed Textbook: Chemistry – I with Lab Manual, Khanna Book Publishing.
2. Engineering Chemistry, by Manisha Agrawal.
3. University chemistry, by B. H. Mahan
4. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
5. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
6. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
7. Physical Chemistry, by P. W. Atkins 8.
8. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Alternative NPTEL/SWAYAM Course:

S. No.	NPTEL Course Name	Instructor	Host Institute
1	Chemistry - I	Prof. Mangala Sunder Krishnan	IITM

Course Code	BS -203-P
Course Title	Chemistry lab
Number of Credits	1(P: 2)
Course Category	Basic Science Course
Branch	All Branches (CSE, ECE, ME, PE)
Course Objectives	Impart practical knowledge about some of the concepts they have studied in their Chemistry-I course and 10+2 level. Develop the experimental skill of the students. Develop communication skill both in oral and written among the students

Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. The course will enable the students:

● To analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.

● To rationalise bulk properties and processes using thermodynamic considerations.

● To distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques

● To rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.

● To list major chemical reactions that are used in the synthesis of molecules.

Sl. No	Aim of the Experiment
1	To determine the viscosity of a given liquid by Ostwald viscometer.
2	To determine the number of components in a mixture by thin layer chromatography and calculate the Rf value for each component.
3	To estimate the total hardness of water by the EDTA titration method
4	To determine the chlorine content of water.
5	To Determine the Acid Value of an oil.
6	Synthesis of a polymer (Urea Formaldehyde resin) molecule.
7	Determination of the partition coefficient of a substance between two immiscible liquids.
8	To estimate the Adsorption of acetic acid by charcoal.
9	To determine the strength of a given HCl solution by titrating against a standard NaOH solution by conductometric method
10	Analysis of IR spectra of any three organic compounds.

Laboratory Outcomes:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn:

● To estimate rate constants of reactions from concentration of reactants/products as a function of time.

● To measure molecular/system properties such as viscosity, conductance of solutions, hardness of water, chloride content of water, etc.

Course Code	ES-101 (T)
Course Title	Programming for Problem Solving
Number of Credits	2 (L: 2, T: 0, P: 0)
Course Category	Engineering Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The objective of this Course is to formulate simple algorithms for arithmetic and logical problems, to translate the algorithms to programs (in C language), to test and execute the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion, to apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Course Content

Unit 1: (8 lectures) Introduction to Programming, Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

Unit 2: (14 lectures) Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops.

Unit 3: (6 lectures) Arrays, Arrays (1-D, 2-D), Character arrays and Strings

Unit 4: (6 lectures) Basic Algorithms, Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Unit 5 (5 lectures) Function, Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Unit 6 (4 lectures) Recursion, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Unit 7 (4 lectures) Structure, Structures, Defining structures and Array of Structures

Unit 8 (2 lectures) Pointers, Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list, (no implementation)

Unit 9 File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Text Books

(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

(ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

(iii) S K Srivastava, C in depth (bpb).(iv) Jayashree,Introduction to C Programming

Suggested Reference Books

(i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Course Code	ES-201 (P)
Course Title	Programming for Problem Solving Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Course Category	Engineering Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The objective of this Course is to formulate the algorithms for simple problems, to translate given algorithms to a working and correct program, to correct syntax errors as reported by the compilers, to write iterative as well as recursive programs, to represent data in arrays, strings and structures and manipulate them through a program.

Course Content:

Tutorial 1: Problem solving using computers:

Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:

Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:

Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:

Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:

Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings

Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:

Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):

Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls

Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation

Lab 11: Pointers and structures

Tutorial 12: File handling:

Lab 12: File operations

Course Code	ES-202
Course Title	Digital Fabrication/ Workshop/ Manufacturing Practices Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Course Category	Engineering Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The course is designed to impart knowledge and skills related to 3D printing technologies, selection of material and equipment and develop a product using this technique in Industry 4.0 environment.

Course Content:

Study of the working principle: Practical cutting operations with different thickness of metal plates and experiments. Experiment on shaping machine: flat surfaces, dovetail cutting – grooving, keyway cutting etc.. Experiment on slotting machine: flat surfaces, dovetail cutting – grooving, keyway cutting etc. - making hexagonal hole using slotting machine; Introduction to EDM, Milling machine and CNC lathe machine.

Text/Reference Books:

1. Hazra Choudhury, S. K., Hazra Choudhury, A. K., & Roy, N. Elements of Workshop Technology (Vol. I & II).

2. Rajput, R. K. A Textbook of Manufacturing Technology.

Course Code	ES-203
Course Title	Design Thinking
Number of Credits	1 (L: 0, T: 0, P: 2)
Course Category	Engineering Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

Course Content:

Unit 1: An Insight to Learning Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting.

Unit 2: Remembering Memory Understanding the Memory process, Problems in retention, Memory enhancement techniques.

Unit 3: Emotions: Experience & Expression Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers.

Unit 4: Basics of Design Thinking Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype,

Unit 5: Being Ingenious & Fixing Problem Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem Solving.

Unit 6: Process of Product Design Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design.

Unit 7: Prototyping & Testing What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, Sample Example, Test Group Marketing.

Unit 8: Celebrating the Difference Understanding Individual differences & Uniqueness, Group Discussion and Activities to encourage the understanding, acceptance and appreciation of Individual differences.

Unit 9: Design Thinking & Customer Centricity Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design.

Unit 10: Feedback, Re-Design & Re-Create Feedback loop, Focus on User Experience, Address "ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – "Solving Practical Engineering Problem through Innovative Product Design & Creative Solution".

Text/Reference Books: 1. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company.

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Course Code	HSMC-201
Course Title	Universal Human Value-I
Number of Credits	2 (L: 2, T: 0)
Course Category	Humanities & Social Science Courses
Branch	All Branches (CSE, ECE, PE, ME)
Course Objectives	To provide learning environment to practice listening, speaking, reading and writing skills and also to acquaint hands-on experience through case-studies, mini-projects, group and individual presentations.

1-Courses on Human Values

During the Induction Program, students would get an initial exposure to human values through the Introduction to Universal Human Values. This exposure is to be augmented by this compulsory full semester foundation course.

This introductory course input is intended:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.

3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

Salient Features of the Course:

The salient features of this course are:

1. It presents a universal approach to value education by developing the right understanding of reality (i.e. a worldview of the reality “as it is”) through the process of self-exploration.

2. The whole course is presented in the form of a dialogue whereby a set of proposals about various aspects of the reality are presented and the students are encouraged to self-explore the proposals by verifying them on the basis of their natural acceptance within oneself and validate experientially in living.

3. The prime focus throughout the course is toward affecting a qualitative transformation in the life of the student rather than just a transfer of information.

4. While introducing the holistic worldview and its implications, a critical appraisal of the prevailing notions is also made to enable the students discern the difference on their own right.

Course Methodology

1. The methodology of this course is exploration and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. The course is in the form of 28 lectures (discussions) and 14 practice sessions.
3. It is free from any dogma or value prescriptions.

4. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation – the whole existence is the lab and every activity is a source of reflection.
5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
6. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

COURSE TOPICS :

The syllabus for the lectures and practice sessions (28 lectures) is given below:

Module 1 – Introduction to Value Education (6 lectures and 3 tutorials for practice session)
Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: Self-exploration as the Process for Value Education
Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

Module 2 – Harmony in the Human Being (6 lectures and 3 tutorials for practice session)
Lecture 7: Understanding Human being as the Co-existence of the Self and the Body
Lecture 8: Distinguishing between the Needs of the Self and the Body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of Self and Body
Lecture 9: The Body as an Instrument of the Self
Lecture 10: Understanding Harmony in the Self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the Self
Lecture 11: Harmony of the Self with the Body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of Self with the Body

Module 3 – **Harmony in the Family and Society (6 lectures and 3 tutorials for practice session) Lecture 13:** Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

Module 3 – Harmony in the Family and Society (6 lectures and 3 tutorials for practice session) Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS9 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS10 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS11 Exploring Systems to fulfil Human Goal

Module 4 – Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature.
Tutorial 10: Practice Session PS12 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS13 Exploring Co-existence in Existence

Module 5 – Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)
Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS14 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order **Lecture 26:** Competence in Professional Ethics
Tutorial 13: Practice Session PS15 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models Typical Case Studies **Lecture 28:** Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS16 Exploring Steps of Transition towards Universal Human Order.

Text Book and Teachers Manual
a. The Textbook - A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2 nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
b. The Teacher's Manual- Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, RR Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53.
c. Professional Ethics and Human Values, Premvir Kapoor, ISBN: 978-93-86173-652, Khanna Book Publishing Company, New Delhi, 2022.

Reference Books 1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999. 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Course Code	AU202
Course Title	Sports and Yoga/NSS/NCC
Number of Credits	0 (L: 2, T: 0, P: 2)
Course Category	Audit Course
Branch	All Branches (CSE, ECE, PE, ME)
Course Objective	The objective of this Course is to make the students understand the importance of sound health and fitness principles as they relate to better health.

Course Contents:

Module I: Introduction to Physical Education, Meaning & definition of Physical Education, Aims & Objectives of Physical Education, Changing trends in Physical Education

Module II: Olympic Movement , Ancient & Modern Olympics (Summer & Winter), Olympic Symbols, Ideals, Objectives & Values, Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

Module III: Physical Fitness, Wellness & Lifestyle, Meaning & Importance of Physical Fitness & Wellness, Components of Physical fitness, Components of Health related fitness, Components of wellness, Preventing Health Threats through Lifestyle Change, Concept of Positive Lifestyle

Module IV: Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga, Define Anatomy, Physiology & Its Importance, Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)

Module V: Kinesiology, Biomechanics & Sports, Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. &Sports, Newton's Law of Motion & its application in sports. Friction and its effects in Sports.

Module VI: Postures, Meaning and Concept of Postures, Causes of Bad Posture, Advantages & disadvantages of weight training, Concept & advantages of Correct Posture, Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis, Corrective Measures for Postural Deformities.

Module VII: Yoga, Meaning & Importance of Yoga, Elements of Yoga, Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas, Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana), Relaxation Techniques for improving concentration - Yog-nidra.

Module VIII: Yoga & Lifestyle, Asanas as preventive measures, Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana, Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana, Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana., Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana, Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

Module IX: Training and Planning in Sports, Meaning of Training, Warming up and limbering down, Skill, Technique & Style, Meaning and Objectives of Planning, Tournament – Knock-Out, League/Round Robin & Combination.

Module X: Psychology & Sports, Definition & Importance of Psychology in Physical Edu. & Sports, Define & Differentiate Between Growth & Developmen, Adolescent Problems & Their Management, Emotion: Concept, Type & Controlling of emotions, Meaning, Concept & Types of Aggressions in Sports, Psychological benefits of exercise, Anxiety & Fear and its effects on Sports Performance, Motivation, its type & techniques, Understanding Stress & Coping Strategies.

Module XI: Doping, Meaning and Concept of Doping, Prohibited Substances & Methods, Side Effects of Prohibited Substances.

Module XII: Sports Medicine, First Aid – Definition, Aims & Objectives, Sports injuries: Classification, Causes & Prevention, Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries.

Module XIII: Sports / Games Following subtopics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc. History of the Game/Sport, Latest General Rules of the Game/Sport, Specifications of Play Fields and Related Sports Equipment, Important Tournaments and Venues, Sports Personalities, Proper Sports Gear and its Importance.

Text Books/References:

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light On Yoga By B.K.S. Iyengar. 3. Health and Physical Education – NCERT (11th and 12th Classes)

Course Code	SBC-ME-201
Course Title	Computer Aided Designs
Number of Credits	3 (L: 1, T: 0, P:4)
Course Category	Skill Based Course-II
Branch	ME
Course Objectives	The goal of this course is to develop the skill of students in Computer Aided Designs by giving them hands on training on the subject.

Course Content:

Overview of Computer Graphics: Listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects; Isometric Views of lines, Planes, Simple and compound Solids];

Customization & CAD Drawing: Consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

Annotations, layering & other functions: Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modelling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerance techniques; dimensioning and scale multi views of dwelling;

Demonstration of a simple team design project: Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modelling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Text/Reference Books:

1. Shah, M. B., & Rana, B. C. (2008). Engineering Drawing and Computer Graphics (1st ed.). Pearson Education.
2. Jolhe, D. A. (2017). Engineering Drawing: With an Introduction to AutoCAD (1st ed.). Tata McGraw Hill.

Course Code	SBC-ECE-201
Course Title	Repairing and Maintenance of Domestic Electronics Appliances
Number of Credits	3 (L: 1, T: 0, P:4)
Course Category	Skill Based Course-I
Branch	ECE
Course Objectives	The goal of this course is to develop the skill of students in Repairing and Maintenance of Domestic Electronics Appliances by giving them hands-on-training on the subject.

Course Content

Module-1

Introduction to Electricity: Electric Charge, Voltage, Electric Current, Ohm's Law, Electric Potential, Cell, Serial and Parallel Circuit, their effect on Voltage and Current, Transformer, Use and Operation

Module-2

Electronic and Electrical components: Active and Passive Components, Resistors, Capacitors and Inductors, their identification, types and application, Semiconducting Devices: Diodes, its type, characteristics and applications, Transistors, Integrated Circuits, Study of a transistor, use of a transistor as an amplifier and as a switch., Analog ICs, 555 timer, IC741, characteristics of 741, Digital ICs, ICs for logic gates, Truth table verification of logic gates, Connectors, Fuse, types, Use of Fuses and its rating, Relays and Switches, Panel Components, Digital electronics — gates and its application, multiplexers, de-multiplexers, counter

Module-3

Soldering/ de- soldering techniques: Soldering Iron, Soldering wire, Soldering Flux, Soldering method, Zero defect soldering, Desoldering pump, Temperature controlled soldering station, Hands-on-practices of Soldering

Module-4

Tools and equipment use for Repairing and maintenance of Electrical Equipment: Screw Driver Set, Tweezers, Different Types of Tweezers, Nose Pliers, Wire Cutter • Hot air gun, Liquid solder pest, Magnifying Lamp and Measuring Tools, Brush, CRO, Nipper, Test and Measurement Equipment, Multimeter Operation etc

Module-5

Basic functionality and Installation of washing machine: Different type of washing machines & working principle, Basic hand wash process, Different types of technologies being used in Washing machines — Pulsator, Agitator, Agipellar, Tumble wash, • Main parts of washing machines and their functionalities etc. Opening the packed Washing machine, Selection of the suitable place for washing machine, Installation of washing machine, Demonstration of various functionality of washing machine

Module-6

Fault identification, Repair and Maintenance of Washing machine: Testing & identification of the faulty block on the basis of symptom, rectifying common faults by replacing the damage components, Testing of the damage block after repair, Step by step re-assembly of the washing machine panel.

Module-7

Basic functionality and Installation of Microwave oven: Basic working principle of circuit and block description of Microwave Oven/ Induction Stove, identification of parts and their working, MWO / Induction Stove heating/cooking, MWO/ Induction Stove safe utensils, Tips & Safety precautions for MW/ Induction Stove, Opening the packaged Microwave Oven/ Induction Stove, Selection of the electric power socket, switch rating and place for microwave oven/ Induction Stove installation, Install the microwave oven/ Induction Stove with the help of step by step instruction. Demonstration of various functionality of Microwave Oven/ Induction Stove.

Module-8

Fault identification, Repair and Maintenance of Microwave oven and Induction Stove: Identify the problem based on customer's information, possible solutions and repair costs involved, Common occurring faults with the Microwave Oven/ Induction Stove their identification and repair, Maintenance of Microwave Oven/ Induction Stove.

Module-9

Basic functionality and Installation of Mixer/Juicer/Grinder: Working principle of mixer/juicer/grinder, Identification of various parts and their functionalities. functioning of motor and circuit breaker, Opening the packaged Mixer/Juicer/Grinder, assembly of component, Selection of the power socket, switch rating and place for installation, Steps to Install the Mixer/Juicer/Grinder. Demonstration of various functionalities of Mixer/Juicer/Grinder

Module-10

Fault identification, Repair and Maintenance of Mixer/Juicer/Grinder: Common occurring faults, identification and repair, maintenance of Mixer/Juicer/Grinder

Module-11

Basic functionality and Installation of Water purifier: Working principle /functionality of different types of water purifiers, part identification and their working, unpacking of Water purifier, Selection of the place for installation, Steps to Install the water purifier.

Module-12

Fault identification, Repair and Maintenance of Water purifier: Identification of problem, possible causes and solution, Replacement of parts, Water Filter Maintenance

Module-13

Safety and Security Procedures: Reporting incidents, system failures, power failures etc., protection equipment, First aid requirement in case of electrical shocks and other injuries

Course Code	SBC-PE-201
Course Title	Basic of Petroleum Engineering-II
Number of Credits	3 (L: 1, T: 0, P:4)
Course Category	Skill Based Course-I
Branch	PE
Course Objectives	The goal of this course is to develop the skill of students in the basics of Petroleum Engineering and its applications by giving them hands on training on the subject.

Course Content

Module-I

History of Drilling: Development of Rotary Drilling, Modern rotary drilling process, Percussion drilling, Well Classification, Drilling Rigs, Rotary rig classification, Land rigs and Marine rigs, Drilling Team.

Well construction: Well head arrangements and its configuration, conductor pipe, surface casing, intermediate casing, production casing, well head housing, casing spool etc.

System of Units: Imperial units- Fundamental units and Derived units, SI system-Fundamental units and derived units, Translations of Imperial units into SI units and vice versa.

Module-II

Basics of different petroleum products; its properties, application and production; Distillation: Brief idea of refining processes, Basics of distillation, different types of distillation, distillation characteristics, multicomponent crude oil distillation; **Composition of Petroleum products:** Physical properties of Petroleum. Crude classification, Evaluation of crude oil. Refinery products - specifications, properties, test methods, additives and their uses; **Important basic properties:** study and significance of the basic properties associated with petroleum products and its handling like; flash point, fire point, crystallisation point, specific gravity, API gravity, pour point pH, turbidity, carbon content, cloud point, TDS, SS, salinity, wax content etc.**; Storage and handling of petroleum products**

Module-III

Basics of Pipeline Engineering, basic equations for the flow of fluids through pipes; Onshore and offshore pipeline, offshore operations- Meteorology, oceanography, buoyancy, platforms.

BOOKS:

1. Handbook of offshore engineering, S. K. Chakrabarti, Volume 1 & 2, Elsevier, 2005.
2. Handbook of Offshore Oil and Gas Operations, James G. Speight, Gulf Professional Publishing, 2014.
3. Offshore Petroleum Drilling and Production, Sukumar Laik, CRC Press, Taylor & Francis Group.
4. Petroleum Transportation Handbook, By: Harold Sill Bell
5. The economics of petroleum, Author: Joseph Ezekiel Pogue
6. Fundamentals of Pipeline Engineering By Jacques Vincent-Genod
7. Pipeline engineering by Henry Liu
8. Petroleum Refining processes by Nelson
9. Handbook of Petroleum Technology-II
10. Modern Petroleum Refining Processes by B. K Bhaskara Rao
11. The chemistry and Technology of Petroleum by James G. Speight

Course Code	SBC-CSE-101
Course Title	MS Office and MS Project Management
Number of Credits	3 (L: 1, T: 0, P:4)
Course Category	Skill Based Course-II
Branch	CSE
Course Objectives	The goal of this course is to To enable the students to use MS Office efficiently.

Course Content

MODULE-I

Concept and Basics of MS Office:

- Text Basics, Formatting, and Saving File, Working with objects in MS-Word
- Introduction to Excel, Formatting Excel Workbook

Setting Up PowerPoint Environment, Creating Slides and Applying Themes

MODULE-II

Intermediate Concepts of MS Office:

- Header & Footers, working with bullets and numbers lists and Tables in MS-Word
- Perform Calculations with Functions, Sort and Filter Data with Excel in MS-Excel

Working with bullets and numbering, Working with Objects, Hyperlinks and Action Buttons in MS-PowerPoint

MODULE-III

Advanced Concepts of MS-Office

- Styles and Content, Merging Documents in MS-Office
- Create Effective Charts to Present Data Visually, Analyze Data Using PivotTables and Pivot Charts, Protecting and Sharing the Workbook in MS-Excel

Working With Movies and Sounds, Animation and Slide Transition, Using slide Master in MS-PowerPoint.

MODULE-IV

Relevant Concepts of MS Office

- Proofing and printing in MS Office
- Proofing and Printing in MS Excel

Slide show option, Proofing and printing in MS PowerPoint

MODULE-V

MS Project Management
Basics and relevant concepts of MS Project Management