



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

B.TECH. in MECHANICAL ENGINEERING COURSE STRUCTURE (MLRS - R20) Applicable From 2020-21 Admitted Batch

I YEAR II SEMESTER

S. No.	Course Code	Course Title	Course Category	Hours Per Week			Total Contact Hour	Credits	Scheme of Examination Maximum Marks		
				L	T	P			Internal (CIE)	External (SEE)	Total
Theory											
1	2020002	Engineering Mathematics - II	BSC	3	1	-	4	4	30	70	100
2	2020008	Engineering Chemistry	BSC	3	1	-	4	4	30	70	100
3	2020502	Data Structures	ESC	3	-	-	3	3	30	70	100
4	2020009	Communicative English	HSMC	2	-	-	2	2	30	70	100
Practical											
5	2020073	Engineering Chemistry Lab	BSC	-	-	3	3	1.5	30	70	100
6	2020074	Communicative English Lab	HSMC	-	-	2	2	1	30	70	100
7	2020372	Engineering Workshop	ESC	1	-	3	4	2.5	30	70	100
8	2020572	Data Structures Lab	ESC	-	-	2	2	1	30	70	100
9	2020021	Environmental Science	*MC	3	-	-	3	0	-	-	-
Total Credits				14	2	10	27	19	240	560	800

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes: After learning the contents of this paper the student must be able to

- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelopiped
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: First Order ODE

Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials $\sin ax$, $e^{ax}V(ax)$ and $aV(ax)$; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelo piped).

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006

3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint,2002.

References:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India,1984.

2020008 - ENGINEERING CHEMISTRY

B.Tech. I Year II Sem

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COURSE OBJECTIVES:

1. Analysis of water for its various parameters and its significance in industrial and domestic Applications.
2. Analyze microscopic chemistry in terms of atomic, molecular orbitals and Inter molecular forces.
3. Apply the electrochemical principles in batteries, understand the fundamentals of corrosion.
4. Understand the chemistry of various fuels and their combustion.
5. Analysis of major chemical reactions that are used in the synthesis of molecules

COURSE OUTCOMES :

1. To innovative methods to improve the quality of soft water for Potable and industrial purpose at cheaper cost and Evaluate the quality and utility of suitable water for industrial as well as domestic applications.
2. Understand the basic tenets of molecular orbital theories and different approaches to types of chemical bonding.
3. Use of primary and secondary batteries in various fields such as automobiles, railways, medical devices, aircrafts and day to day life. Explain the characteristic factors of a metal and environment influencing the rate of Corrosion.
4. Determine efficiency of the fuel in terms of calorific value and combustion reactions of the fuel
5. Recognize and draw structural isomers, stereoisomers including enantiomers and diastereomers and racemic mixture. And Understand the mechanisms of major classes of organic reactions, including substitutions, eliminations and additions
6. Retrieve and critically review information on drugs, including how to synthesize them, from literature resources

Unit I: MOLECULAR STRUCTURE AND THEORIES OF BONDING

Atomic orbitals, molecular orbitals, introduction to VBT, Linear Combination of Atomic orbitals (LCAO), molecular orbitals of diatomic molecules; Molecular orbital energy level diagrams of N₂, O₂, CO molecules. Pi molecular orbitals of 1,3 butadiene

Crystal Field Theory (CFT): Salient Features of CFT-Crystal Fields; Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries; Band structure of solids and effect of doping on conductance.

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

- Understand the Schrodinger wave equation to hydrogen and particle in a box.
- Explain the molecular orbital energy level diagram of different molecular species.
- Apply the band theory of solids for conductors, semiconductors and insulators.
- Analyze discuss the magnetic behavior and colour of complexes.
- Evaluate the Crystal Field theory and Splitting of d- orbitals

Unit II: Water and its Treatment

Introduction: Hardness of water, Causes of hardness; Types of hardness: temporary and permanent, expression and units of hardness; Estimation of hardness of water by complexometric method, numerical problems on hardness of water, Potable water and its specifications, Steps involved in treatment of water, Disinfection of water by chlorination and ozonisation; boiler troubles-scales & sludges, caustic embrittlement, priming and foaming. Boiler feed water and its treatment-Calgon conditioning, Phosphate conditioning and Colloidal conditioning; External treatment of water; Ion-exchange process; Desalination of water: Reverse osmosis.

Learning outcomes: The student will be able to

- Understand the differences between temporary and permanent hardness of water.
- Explain the principles of reverse osmosis and Ion-Exchange processes.
- Apply the drinking water with BIS and WHO standards.
- Analyze problems associated with hard water - scale and sludge.
- Evaluate the Internal and external treatment of water

Unit III: ELECTROCHEMISTRY AND CORROSION

Electro chemical cells: Electrode potential, standard electrode potential, types of electrodes; Calomel, Quinhydrone and glass electrode; Nernst equation; Electrochemical series and its applications; Numerical problems; Batteries: Primary (Dry cell) and secondary batteries (Lead-acid storage battery and Lithium ionbattery).

Causes and effects of corrosion: Theories of chemical and electrochemical corrosion, mechanism of electrochemical corrosion; Types of corrosion: Galvanic, water-line and pitting corrosion; Factors affecting rate of corrosion; Corrosion control methods: proper designing, Cathodic protection, sacrificial anode and impressed current cathodic methods; Surface coatings: Metallic coatings- Methods of coating- electroplating and Electroless plating of nickel.

Learning outcomes: The student will be able to

- Understand the Nernst equation for calculating electrode and cell potentials.
- Explain the corrosion prevention methods and factors affecting corrosion.
- Apply the Pilling Bedworth rule for corrosion and corrosion prevention.
- Analyze the Dry and Wet corrosion and its Mechanism.
- Evaluate the Corrosion control methods.

Unit IV: STEREOCHEMISTRY, REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES

Introduction to representation of 3-dimensional structures: Structural and stereoisomers, configurations, symmetry and chirality; Enantiomers, diastereomers, optical activity and configurational nomenclatures (D,L and R,S configurations) Confirmation analysis of n-butane. Substitution reactions: Nucleophilic substitution reactions, Mechanism of SN^1 , SN^2 reactions; Electrophilic and nucleophilic addition reactions; Addition of HBr to propene; Markownikoff and anti Markownikoff's additions; Grignard additions on carbonyl compounds; Elimination reactions: Dehydro halogenation of alkylhalides; Saytzeff rule; Oxidation reactions: Oxidation of alcohols using $KMnO_4$ Reduction reactions: Reduction of carbonyl compounds using $LiAlH_4$; Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

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

- Understand the 3 dimension structures of organic chemistry

- Explain the symmetry ,chirality of the organic molecule
- Apply the Markownikoff and anti Markownikoff's additions; Grignard additions .conformations of n-butane
- Analyze the reaction mechanism of different compounds.
- Evaluate thesynthesis of aspirin, paracetamol

Unit V: Spectroscopic techniques and applications:

Principles of spectroscopy, selection rules and applications of electronic spectroscopy. and IR spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Spin-spin splitting, Introduction to Magnetic Resonance Imaging.

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

- Understand the. principles of . spectroscopy and its selection rules
- Explainthe concepts of nuclear magnetic resonance spectroscopy
- Apply the chemical shift values for the different compounds
- Analyze the different structures of organic compound
- Evaluate the vibrational and rotational spectroscopy

Text Books:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.

Reference books:

1. Engineering chemistry by Ramadevi
2. Engineering chemistry by Bharathikumari
3. Engineering Chemistry by P.C.Jain & M.Jain Dhanpat Rai Publishing Company Ltd
4. Delhi.Engineering Chemistry (NPTEL Web-book) by B.L. Tembe, Kamaluddin and M.S. krishnan

2020502: DATA STRUCTURES

B.TECH I Year IISem.

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Prerequisites

A course on “Programming for Problem Solving “

Objectives

- Exploring basic data structures such as linked list, stacks and queues.
- Describes searching and sorting techniques.
- Introduces trees and graphs.

Outcomes

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Implement and know the application of algorithms for searching and sorting.
- Design programs using a variety of data structures- lists, stacks, queues, trees and graphs.

UNIT - I Introduction to Data Structures, Linear list – singly linked list, Doubly linked list, Circular linked list - operations and its applications

UNIT-II

Stacks-Introduction, Operations, array and linked representations of stacks, stack applications(Infix to postfix conversion and postfix evaluation), Queues-Introduction, operations, array and linked representations of queues and its applications.

UNIT - III

Searching: Linear Search and Binary Search and its applications.

Sorting: Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort and its applications.

UNIT-IV

Trees -Introduction, Types of trees, Binary tree, recursive and non- recursive Traversals of Binary Tree, Binary search tree- Operations and its applications.

UNIT - V

Graphs: Introduction, Types of graphs, Representation of graphs, Graph Traversal Methods, comparison between trees and graphs and its applications.

Text Books

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

References

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.*

Learning Objectives: The course will help to

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

SYLLABUS UNIT –I

‘The Raman Effect’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II

‘Ancient Architecture in India’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III

‘Blue Jeans’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives- Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying-** Providing Examples or Evidence

UNIT –IV

‘What Should You Be Eating’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V

‘How a Chinese Billionaire Built Her Fortune’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: **Technical Reports-** Introduction – Characteristics of a Report – Categories of Reports

Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing aReport.

Text Books:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar.Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University

B.Tech I Year Syllabus**MLRITM****2020073 - ENGINEERING CHEMISTRY LAB****B.Tech. I Year II Semester****L T P C
0 0 3 1.5**

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will earn:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as a function of time.
- The measurement of physical properties like adsorption and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness and chloride content in water.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like adsorption and viscosity.
- Calculation of R_f values of some organic molecules by TLC technique.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$
7. Determination of rate constant of acid catalysed hydrolysis of methylacetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of R_f values. eg ortho and para nitrophenols
10. Determination of acid value of coconut oil
11. Verification of Freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a given liquid using stalagmometer.

References

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition.

B. Tech I Year Syllabus

MLRITM

2020074 – COMMUNICATIVE ENGLISH LAB

B. Tech. I Year II Semester

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The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize their mother tongue influence
5. To train students to use language appropriately for public speaking and interviews

Learning Outcomes: Students will be able to attain

1. Better understanding of nuances of English language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking skills with clarity and confidence which in turn enhances their employability skills

Syllabus

English Language and Communication Skills Lab (ELCS) shall have two parts:

- a. Computer Assisted Language Learning (CALL)Lab**
- b. Interactive Communication Skills (ICS)Lab**

Listening Skills

Objectives

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation insentences.

- Listening for general content
- Listening to fill u pin formation
- Intensive listening
- Listening for specific information

Speaking Skills

Objectives

1. To involve students in speaking activities in various contexts
 2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice: Just A Minute (JAM)Sessions

- Describing objects/situations/people
- Role play – Individual/Group activities

➤ **The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the lab)**

Exercise – I CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV CALL Lab:

Understand: Listening for General Details. *Practice:* Listening Comprehension Tests. **ICS Lab:**

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V CALL Lab:

Understand: Listening for Specific Details. *Practice:* Listening Comprehension Tests. **ICS Lab:**

Understand: Interview Skills. *Practice:* Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL)Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS)Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

B. Tech I Year Syllabus**MLRITM****2020372 - ENGINEERING WORKSHOP****B. Tech. I Year II Sem****L T P C****Prerequisites:****1 0 3 2.5****Course Objectives:**

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, Equipment and machines

Course Outcomes:

1. Explain the design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint. (L4)
2. Demonstrate the design and model various basic prototypes in the trade of fitting such as Straight fit, V- fit. (L4)
3. Understand to make various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder. (L4)
4. Demonstrate the design and model various basic prototypes in the trade of Welding. (L4)
5. Explain to make various basic prototypes in the trade of Black smithy such as J shape, and S shape. (L4)
6. Understand to perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring, Go down wiring. (L4)

UNIT I - CARPENTRY & FITTING

Carpentry – Introduction, Carpentry tools, sequence of operations and applications (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)

Fitting – Introduction, fitting tools, sequence of operations and applications (V-Fit, Dovetail Fit & Semi-circular fit)

Learning Outcomes:

Students should be able to,

1. Understand the trade of carpentry and fitting. (L2)
2. Explain the tools involved in manufacturing operations. (L3)
3. Evaluate the applications of carpentry and fitting. (L4)

UNIT II - TIN SMITHY AND BLACKSMITHY

Tin-Smithy – Introduction, Tin smithy tools, sequence of operations and applications (Square Tin, Rectangular Tray & Conical Funnel).

Blacksmithy- Introduction, Blacksmithy tools, sequence of operations and applications (Round to Square, Fan Hook and S-Hook)

Learning Outcomes:

Students should be able to,

1. Understand the oldest manufacturing methods. (L2)
2. Describe the sequence of operations involved. (L3)
3. Explain the safety precautions and tools usage. (L4)

UNIT III - HOUSE WIRING AND WELDING

House-wiring – Introduction, Electrical wiring tools, sequence of operations and applications (Parallel & Series, Two-way Switch and Tube Light)

Welding Practice – Introduction, electrode, welding tools, and sequence of operations. Advantages and applications (Arc Welding & Gas Welding)

Learning Outcomes:

Students should be able to,

1. Discuss the topic of Heat engines.(L3)
2. Identify types of Heat engines cycles.(L5)
3. Evaluate the Factors affecting routing procedure, Route Sheet.(L4)

Text Books:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

References:

1. Work shop Manual – P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

Prerequisites:

A Course on “Programming for problem solving”

Objectives

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Outcomes

- Ability to develop C programs for computing and real life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.: i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.: i) Creation ii) Insertion iii) Deletion
3. Write a program that uses functions to perform the following operations on circular linked list: i) Creation ii) Insertion iii) Deletion
4. Write a program that implement stack operations using i) Arrays ii) Pointers
5. Write a c program to implement infix to postfix conversion using stack.
6. Write a c program to implement postfix evaluation.
- 7 Write a program that implement Queue operations using i) Arrays ii) Pointers
8. Write a program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort
9. Write a program that implements the following sorting methods to sort a given list of integers in ascending order i) Merge sort ii) Quick sort
10. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers: i) Linear search ii) Binary search
11. Write a program to implement the tree traversal methods using both recursive and non-recursive.
12. Write a program to implement the graph traversal methods.

Text Books

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.

2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

References

1. Data structures: A Pseudocode Approach with C, R.F.GilbergAndB.A.Forouzan, 2nd Edition, Cengage Learning.

2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl,

Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon lifestyle.

TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt.Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications