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 Section2(f) & 12(B)of the UGC act,1956

COURSE STRUCTURE AND SYLLABUS – I-II (R20) (w. e. f A.Y. 2020-21)

I YEAR II SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2020002	Engineering Mathematics - II	BS	3	1	0	4	30	70	100
2	2020008	Engineering Chemistry	BS	3	1	0	4	30	70	100
3	2020502	Data Structures	ES	3	0	0	3	30	70	100
4	2020371	Engineering Drawing practice	ES	1	0	4	3	30	70	100
5	2020073	Engineering Chemistry Lab	BS	0	0	3	1.5	30	70	100
6	2020572	Data Structures Lab	ES	0	0	2	1	30	70	100
7	2020372	Engineering Workshop	ES	1	0	3	2.5	30	70	100
Total Credits				**11**	**2**	**12**	**19**	**210**	**490**	**700**

2020002: ENGINEERING MATHEMATICS-II

B.Tech. I Year II Semester   **L T P C**
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Course Objectives: To learn
- Methods of solving the differential equations of 1st and higher order.
- The applications of the differential equations to Newton's law of cooling, Natural growth and decay, etc.
- Concept of Sequence and nature of the series.
- 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
> **Co 1:** Identify whether the given differential equation of first order is exact or not
> **Co 2:** Solve higher differential equation and apply the concept of differential equation to real world problems.
> **Co3:** Analyse the nature of sequence and series.
> **Co 4:** Apply the del operator to vector and scalar valued functions.
> **Co5:** Evaluate the line, surface and volume integrals and converting them from one to Another.

UNIT-I: First Order and First-Degree ODE and its applications

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.

Learning outcomes:
- Identify whether the given differential equation of first order is exact or not.
- Apply the concept of differential equation to real world problems.
- Understand theconepts of linear and Non linear differential equations.
- Analyze Exact and Non Exact differential equations.
- Explain formation of differential equations, Homogeneous equations.

UNIT-II: Higher Order Linear Differential equations

Linear differential equations of second and higher order with constant coefficients, RHS term of the type e^{ax}, Sin ax, Cos ax, and x^n, $e^{ax} V(x)$, $x^n V(x)$, method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

Learning outcomes:
- Identify essential characteristics of linear differential equations with constant coefficients.
- Apply higher order DE's for solving some real world problems.
- Understand the differential equations with constant coefficients by appropriate method.
- Analyse Legendre's equation and Cauchy-Euler equation.
- Explain Method of variation of parameters.

UNIT-III: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test,logarithmic test; Cauchy's Integral test; Cauchy's root test; Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

Learning outcomes:
- Identify the Sequence, types of sequences.
- Apply the concept of sequence and series to real world problems.
- Understand the logical knowledge of forming the series.
- Analyzethe nature of sequence and series.
- Explain Alternating series.

UNIT-IV: Vector Differential Calculus
Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives. Solenoidal and Irrotational vectors, Scalar potential functions. Vector Identities.

Learning outcomes:
- Identify scalar and vector point functions.
- Apply Del to scalar and vector point functions.
- Understand the concepts of Solenoidal and irrotational vectors.
- Analyzethe physical interpretation of Gradient, Divergence and curl.
- Explain vector identies.

UNIT-V: Vector Integral Calculus
Line integral-Work done, SurfaceIntegrals-Flux of a vector valued functionand Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Learning outcomes:
- Identify the work done in moving a particle along the path over a force field.
- ApplyGreens, Stokes and Divergence theorems in evaluation of double and triple integrals.
- Understand the concepts of Line Integral.
- Analyze the Flux of a vector valued function.
- Explain Vector valued theorems to real world problems.

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   **L   T   P   C**

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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 molecularforces.
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 ofsuitable water for industrial as well as domestic applications.
2. Understand the basic tenets of molecular orbital theories and different approaches to types of chemical boding.
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 racemicmixture. 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 orbital's(LCAO), molecular orbital'sof diatomic molecules; Molecular orbital energylevel diagrams of N_2, O_2, 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- orbital's in Tetrahedral, Octahedral and square planar geometries; Band structure of solids and effect

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- orbital's

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 ofnickel.

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 Paracetamoland 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.

L T P C
3 0 0 3

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.

2020371:Engineering Drawing Practice

B.Tech. I Year II Semester   **L TP C**
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Pre Requisites: Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability

Course Objective:

- The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation.
- To prepare the student to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- To get exposure to a CAD package.

Course Outcomes:

1. Familiarize with BIS standards and conventions used in engineering graphics.
2. Draw various engineering curves e.g., ellipse, parabola, cycloids and involutes etc and construct various reduced scales e.g., plain and diagonal scale.
3. Develop the lateral surfaces of simple solids
4. Ability to draw orthographic projections and isometric projections of given engineering components.
5. Visualize different views like elevation and plan for a given line, plane figures or solid objects.
6. Apply drafting techniques and use 2D software e.g., AutoCAD to sketch 2D plane figures.

UNIT – 1 INTRODUCTION TO ENGINEERING DRAWING

Principles of Engineering Graphics and their Significance-Drawing Instruments and their Uses-Conventions in Drawing-BIS -Lettering and Dimensioning.

Geometrical Constructions: Bisecting a Line, Arc. Dividing A Line into 'N' Equal Parts, Construction of Polygons, Division of Circle into Equal Parts (8 And 12)

Construction of Scales: Plain, Diagonal and Vernier Scale.

Conic Sections: Ellipse, Parabola, Hyperbola and Rectangular Hyperbola- General Methods only.

Engineering Curves: Cycloid, Epicycloid, Hypocycloid

Involutes: For Circle, Triangle, Square, Pentagon and Hexagon.

Learning Outcome:

1. To understand the basic standards, conventions of engineering drawing and how to use the instruments in drawing.

2. Learn and draw the various types of curves used in engineering application.

UNIT – 2 ORTHOGRAPHIC PROJECTIONS

Principles- Assumptions- Different Angles of Projection.

Projections of Points- orientation in all the quadrants

Projections of Lines- Parallel, Perpendicular, Inclined to one plane and Inclined to both planes.

Projections of Planes: Surface Parallel, Perpendicular, Inclined to one plane and Inclined to both planes.

Learning Outcome:
1. Knowledge in various planes of projections
2. To draw the front view, top view and side views of the given geometrical elements

UNIT – 3   PROJECTIONS OF SOLIDS

Classification of solids- Axis- Parallel, Perpendicular, Inclined to one plane and Inclined to both planes- Prisms, Pyramids, Cylinder and Cone

Learning Outcome:
1. To understand the various solid types
2. To draw all the views of the given solid in all possible orientations.

UNIT – 4   SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

Types of Section Planes, Sectioning Prisms, Pyramids, Cylinders and Cones using various planes.
Development of surfaces of right Regular Solids- Parallel Line Method, Radial Line Method.

Learning Outcome:
1. To identify the cut surfaces and represent the sectional views graphically when the solid is sectioned.
2. To develop the surfaces of solid using various methods.

UNIT – 5 ISOMETRIC PROJECTIONS AND PERSPECTIVE PROJECTIONS

Principles, Isometric Views of Planes, Solids- Box Method, Offset Method, Compound solids, Sectioned Solids. Conversion of Isometric to Multi view projection and vice versa.

Learning Outcome:
1. Knowledge in principles of isometric projection
2. Conversion of isometric to orthographic and vice-versa.

Text Books:
1. N.D.Bhatt, Elementary Engineering Drawing, Charotar Publishers,2012.
2. Basanth Agrawal and C M Agrawal –Engineering Drawing 2e –,McGraw-Hill Education(India) Pvt.Ltd.

References:
1. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishers
2. Engineering Drawing- Johle/Tata Macgraw Hill.
3. K.Veenugopal, –Engineering Drawing and Graphics + Autocad New Age International Pvt.Ltd, 2011.

2020073: ENGINEERING CHEMISTRY LAB

B.Tech - I Year II Semester   **L T P C**
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Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student.
The student will learn:
• 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 an 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 to:
- Understand various procedures for performing the experiments.
- Explain the different measuring devices and meters to record the data
- Apply the mathematical concepts and equations to obtain quality results.
- Analyze the analytical techniques and graphical analysis to the experimental data.
- Evaluate the various parameters for different experiments accurately.

List of Experiments:
1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry

Conductometric titrations
3. Strong acid $_{vs}$ strong base
4. Weak acid $_{vs}$ strong base

Potentiometric titrations
5. Strong acid $_{vs}$ strong base
6. Redox titration:-Fe^{2+} using KMnO4
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography- calculation of Rf values. eg: ortho and para nitro phenols
10.. Determination of acid value of coconut oil
11. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
12. Determination of surface tension of a give liquid using stalagnometer

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
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

2020572: DATA STRUCTURES LAB

B.Tech. I YearIISem.   **LT/PC**
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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.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

B.Tech I Year II Semester   **L   T   P C**
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COURSE OBJECT :
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

UNIT – 1 CARPENTRY & FITTING
Carpentry – Introduction, Carpentry tools, sequence of operations, Trade importance, advantages, disadvantages and applications
Fitting – Introduction, fitting tools, sequence of operations, Trade importance, advantages, disadvantages   and applications
UNIT – 2   TIN SMITHY AND BLACKSMITHY
Tin-Smithy – Introduction, Tin smithy tools, sequence of operations, Trade importance, advantages, disadvantages   and applications
Black smithy- Introduction, Black smithy tools, sequence of operations, Trade importance, advantages, disadvantages and applications
UNIT – 3   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)

LIST OF EXPERIMENTS:
1. Carpentry
2. Fitting
3. House Wiring
4. Tin smithy
5. Black smithy
6. welding
7.Foundry
TRADES FOR DEMONSTRATION & EXPOSURE:
1.Plumbing
2. Metal Cutting (Water Plasma), Power
   Tools In Construction And
3.   Wood Working
TEXT BOOK :
1.   Workshop Practice /B. L. Juneja / Cengage
2.   Workshop Manual / K. Venugopal / Anuradha
REFERENCE BOOK :
1.   Work shop Manual – P. Kannaiah/ K. L. Narayana/ SciTech

2.   Workshop Manual / Venkat Reddy/ BSP

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)