



TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with 'A+' Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790, email: info@tkrcet.ac.in, web site: www.tkrct.ac.in



B.TECH – COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) COURSE STRUCTURE R22

SEMESTER I

S.No.	Course Class.	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	HS	D1HSE1	English for Skill Enhancement	2	0	0	2	40	60	100
2	BS	D1BSEC1	Engineering Chemistry	3	1	0	4	40	60	100
3	BS	D1BSM1	Linear Algebra and Ordinary Differential Equations	3	1	0	4	40	60	100
4	ES	D1ESCP1	C Programming for Problem Solving	3	0	0	3	40	60	100
5	ES	D1ESITW1	IT Workshop and Elements of Computer Engineering	0	0	2	1	40	60	100
6	ES	D1ESCEG	Computer Aided Engineering Graphics	1	0	4	3	40	60	100
7	HS	D1HSE2	English Language and Communication Skills Lab	0	0	2	1	40	60	100
8	BS	D1BSEC2	Engineering Chemistry Lab	0	0	2	1	40	60	100
9	ES	D1ESCP3	C Programming for Problem Solving Lab	0	0	2	1	40	60	100
TOTAL				12	2	12	20	360	540	900

SEMESTER II

S.No.	Course Class.	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	HS	D2HSBF	Business Economics and Financial Analysis	3	0	0	3	40	60	100
2	BS	D2BSAP1	Applied Physics	3	1	0	4	40	60	100
3	BS	D2BSM5	Statistical Methods and Vector Calculus	3	1	0	4	40	60	100
4	ES	D2ESBEE	Basic Electrical Engineering	3	0	0	3	40	60	100
5	ES	D2ESDS	Data Structures	3	0	0	3	40	60	100
6	BS	D2BSAP2	Applied Physics Lab	0	0	2	1	40	60	100
7	ES	D2ESBES	Basic Electrical and Simulation Lab	0	0	2	1	40	60	100
8	ES	D2ESDSL	Data Structures Lab	0	0	2	1	40	60	100
TOTAL				15	2	6	20	320	480	800



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C

2/0/0 2

ENGLISH FOR SKILL ENHANCEMENT (D1HSE1)

Course Objectives:

The objective of the course is to improve the language proficiency of students in English by bettering their Listening, Speaking, Reading, Writing, Vocabulary and Grammar skills. It is intended to develop their communication skills in different professional and social situations. The course is designed in such a manner that its theoretical and practical components equip students to comprehend engineering subjects more effectively and critically.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Develop the skills to build vocabulary and use the words contextually. L3
2. Experiment with the nature and style of sensible writing and learning how to describe people, objects places, events etc. L3
3. Distinguish the different types of reading and appropriately identify and rectify grammatical errors. L4
4. Interpret the meanings of texts and comprehend the style and tone of the writing of authors. L5
5. Assess the importance of a passage text essay etc. based on its moral and ethical values. L5

UNIT I

Chapter entitled '*Toasted English*' by R.K.Narayan from "*English: Language, Context and Culture*" published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

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

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

Writing: 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

Chapter entitled '*Appro JRD*' by Sudha Murthy from "*English: Language, Context and Culture*" published by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

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

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT III

Chapter entitled ‘**Lessons from Online Learning**’ by **F.Haider Alvi, Deborah Hurst et al** from “*English: Language, Context and Culture*” published by Orient BlackSwan, Hyderabad. **Vocabulary:** Words Often Confused - 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 – Intensive Reading and Extensive Reading – Exercises for Practice

Writing: Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT IV

Chapter entitled ‘**Art and Literature**’ by **Abdul Kalam** from “*English: Language, Context and Culture*” published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

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

UNIT V

Chapter entitled ‘**Go, Kiss the World**’ by **Subroto Bagchi** from “*English: Language, Context and Culture*” published by Orient BlackSwan, Hyderabad.

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

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 a Report.

Text Book:

1. “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad. 2022. Print.

Reference Books:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of

Functional Language, Grammar and Vocabulary. (2nd ed.). Sage Publications India Pvt. Ltd.

5. (2019). Technical Communication. Wiley India Pvt. Ltd.

6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.

7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C

3/1/0 4

ENGINEERING CHEMISTRY (D1BSEC1)

Course Objectives:

Understanding the fundamental principles of Chemistry and their Applications to an Engineering problems. Analyze properties and applications of an Engineering materials.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Applying the concepts of Molecular Orbital Theory for predicting Molecular Orbital Energy level diagrams and Bond strengths. L3
2. Apply analytical techniques to assess water quality for Industrial and Domestic applications. L3
3. Student will learn the battery chemistry principles and construction, also learn the concepts of Corrosion and preventive methods. L3
4. Students will analyze the properties and Calorific value of various fuels. L4
5. Explore Knowledge of Polymer materials and their properties for Engineering applications. L3

UNIT I

Molecular Structure and Theories of Bonding

Chemical bonding:

Introduction to atomic and molecular orbitals. Linear combination of atomic orbital's (LCAO). Energy level diagram of homonuclear (N₂, O₂ and F₂) and hetero nuclear(CO and HF). π -molecular orbitals of butadiene and benzene.

Bonding in solids:

Band structure of solids. The effect of doping on band structure in solids and electronic properties of materials.

UNIT II

Water and its treatment

Introduction to hardness of water – Estimation of hardness of water by complex metric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water-Disinfection of potable water by chlorination and break-point chlorination.

Boiler troubles:

Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water –Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water– Reverse osmosis.

UNIT III**Battery Chemistry & Corrosion**

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion:

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- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT IV**Energy Sources**

Introduction, Calorific value of fuel – HCV, LCV- Dulong's formula. Solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Trans esterification, advantages

UNIT V**Polymeric Materials**

Definition–Classification of polymers with examples–Types of polymerizations–addition (free radical addition) and condensation polymerization with –Nylon 6:6.

Plastics:

Definition and characteristics-thermoplastic and thermo-setting plastics, Preparation, Properties and engineering applications of PVC, Bakelite and Teflon.

Rubbers:

Natural rubber and its vulcanization.

Elastomers:

Characteristics–preparation–properties and applications of Buna-S, Butyl rubber.

Conducting Polymers:

Characteristics and Classification with examples-mechanism of conducting polymer trans-poly acetylene and applications of conducting polymers.

Text Books:

1. Engineering Chemistry, Dr. Bharathi Kumari Yalamanchili VGS Techno series Publishing Company, 2018
2. Engineering Chemistry P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
3. Engineering Chemistry Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
4. A textbook of Engineering Chemistry M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
5. Textbook of Engineering Chemistry Jaya Shree Ani Reddy, Wiley Publications.

Reference Books:

1. Engineering Chemistry Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C

3/1/0 4

LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS (D1BSM1)

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives:

Students should learn the concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations, Concept of Eigen values and Eigen vectors and to reduce the quadratic form to canonical form, Methods of solving the differential equations of first order, Find general solution to linear, homogeneous and non-homogeneous ODEs with constant coefficients, Evaluation of double integrals.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Discuss the matrix representation of a set of linear equations and to analyse the solution of the system of equations. L4
2. Apply the concept of matrices to reduce the quadratic form to canonical form using orthogonal transformation. L3
3. Identify whether the given DE of first order is exact or not and utilizes the knowledge of ODE to solve problems on application of ODE. L3
4. Solve higher order differential equation and apply the concept of differential equation to real world problems. L3
5. Evaluating double integrals and applying them to compute the areas of regions. L5

UNIT I

Matrices & System of Equations:

Types of matrices - rank of a matrix by Echelon form and normal form- inverse of non singular matrices by Gauss-Jordan method - System of linear equations- solving system of homogeneous and non homogeneous equations- Gauss elimination method.

UNIT II

Eigen Values and Eigen Vectors:

Eigen values and Eigen vectors and their properties - Cayley-Hamilton theorem (without proof) finding inverse and powers of a matrix by Cayley-Hamilton theorem- diagonalization of a Matrix - linear transformation and orthogonal transformation - quadratic forms and nature of the quadratic forms- reduction of quadratic form to Canonical forms by orthogonal transformation.

UNIT III**Ordinary Differential Equations of First Order, First Degree and its applications Applications:**

Exact- linear and Bernoulli's equations- orthogonal trajectories - applications - Newton's law of cooling-law of natural growth and decay.

UNIT IV**Second Order Ordinary Linear Differential Equations:**

Second order linear differential equations with constant coefficients- Non-Homogeneous terms of the type e^{ax} - $\sin ax$ - $\cos ax$ - polynomials x - $e^{ax} V(x)$ and $xV(x)$ in method of variation of parameters.

UNIT V**Double Integrals and Applications:**

Evaluation of double Integrals (cartesian and polar coordinates) - change of order of integration(only cartesian form)- change of variables (cartesian to polar) for double integrals- applications of double integrals to evaluate surface areas of curves (only in Cartesian Coordinates).

Text Books:

1. B.S.Grewal- Higher Engineering Mathematics- Khanna Publishers- 40th Edition-2015.
2. Ramana B.v.- Higher Engineering Mathematics- Tata McGraw Hill New Delhi- 11th Reprint- 2010.
3. Engineering Mathematics by TKV Iyengar, B. Krishna Gandhi, S. Chand and publications

Reference Books:

1. N.P. Bali and Manish Goyal- A text book of engineering Mathematics-Laxmi Publications-Reprint-2008.
2. Erwin Kreyszig –Advanced Engineering Mathematics- 10th Edition- Wiley - 2021
3. Advanced Engineering Mathematics by S.R.K. Iyengar R.K. Jain – Narosa Publications.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C
3/0/0 3

C PROGRAMMING FOR PROBLEM SOLVING (D1ESCP1)

Course Objective:

To provide students with an in-depth understanding and hands-on experience in using the C programming language to develop efficient and effective programs.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Develop programs using the taxonomy of C Programming Language: Data types, Operators, Expressions, selection and repetition statements. L3
2. Utilize arrays, functions, recursion, scope, storage classes in developing C programs, implement stacks and queues and apply search and sorting algorithms on arrays. L3
3. Construct C programs using pointers and strings L3
4. Develop C programs using structures, unions and analyze preprocessor commands and command line arguments. L4
5. Develop C programs for various applications using file I/O functions. L3

UNIT I

Introduction to Computers Data Representation

Number Systems, Computer Languages, Algorithms. Introduction to C Language: Data types, Operators, Expressions, Statements-Selection Statements – if and Switch Statements, Repetition (Loop) statements.

UNIT II

Arrays

One and two dimensional arrays, multidimensional arrays, inter function communication Arrays applications- linear search, binary search, bubble sort, Implementation of stacks and queues.

Functions:

Scope and Extent, storage classes, recursive functions.

UNIT III

Pointers

Introduction, Pointers for inter function communication, arrays of pointers, pointer arithmetic and arrays, passing an array to a function, memory allocation functions, pointers to functions, pointers to pointers.

Strings:

Concepts, String Input/ Output functions, arrays of strings, string manipulation functions.

UNIT IV**User Defined Data types Structure and Unions**

Initialization, accessing structures, operations on structures. Complex structures-Nested structures, structures containing arrays, structures containing pointers, arrays of structures, structures and functions, Passing structures through pointers, self-referential structures, unions, bit fields, C programming examples, command-line arguments, pre-processor commands.

UNIT V**Input and Output**

Concept of a file, streams, text files and binary files, file input/output functions (standard library input/output functions for files), error handling, positioning functions (fseek, rewind and ftell).

Text Books:

1. Computer Science: A Structured Programming Approach Using C, B. A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh, Second Edition, Oxford University Press.

Reference Books:

1. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, Second Edition, Pearson education.
2. Programming with C, B. Gottfried, 3rd edition, Schaum's outlines, McGraw Hill Education (India) Pvt Ltd.
3. C From Theory to Practice, G S. Tselikis and N D. Tselikas, CRC Press.
4. Basic computation and Programming with C, Subrata Saha and S. Mukherjee, Cambridge University Press.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C

0/0/2 1

IT WORKSHOP AND ELEMENTS OF COMPUTER ENGINEERING (D1ESITW1)

Course Objectives:

To provide training on PC Hardware, assembling, software installation, Internet, World Wide Web, and usage of productivity tools for documentation, Spreadsheet computations and Presentations.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Apply knowledge for computer assembling and software installation. L3
2. Solve the trouble shooting problems. L4
3. Apply the tools for preparation of PPT, Documentation and budget sheet and develop Standard documents, research documents and project plans using Latex. L3

PC Hardware

The students should work on working PC to disassemble and assemble to working condition and install operating system like Linux or any other on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.

Problem 1

Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

Problem 2

Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

Problem 3

Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Problem 4

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

Internet & World Wide Web

Problem 5

Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate how to access the websites and email.

Problem 6

Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Problem 7

Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. Usage of search engines like Google, Yahoo, ask.com and others should be demonstrated by student.

Problem 8

Cyber Hygiene: Students should learn about viruses on the internet and install antivirus software. Student should learn to customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Problem 9

Develop home page: Student should learn to develop his/her home page using HTML consisting of his/her photo, name, address and education details as a table and his/her skill set as a list.

Productivity Tools LaTeX and Word Word Orientation

An overview of LaTeX and Microsoft (MS) office / equivalent (FOSS) tool word should be learned: Importance of LaTeX and MS office / equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that should be covered in each, using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Problem 10

Using LaTeX and Word

To create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colours, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Problem 11

Creating project abstract Features to be covered

Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Problem 12

Creating a Newsletter Features to be covered

Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs in word.

Problem 13

Spreadsheet Orientation

Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler

Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Problem 14

Calculating GPA Features to be covered

Cell Referencing, Formulae in spreadsheet – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, Sorting, Conditional formatting.

Problem 15

Creating Power Point

Student should work on basic power point utilities and tools in Latex and Ms Office/equivalent (FOSS) which help them create basic power point presentation. PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting Images, Tables and Charts.

SCI LAB

1. a) Introduction to Sci lab and its benefits
b) Sci Lab migration, Toolboxes and Forums
2. a) Installing
b) Getting Started
3. a) Vector Operation
b) Matrix Operation
4. a) Conditional branching
b) Iteration
5. Scripts and Functions
6. Plotting 2D graphs
7. File Handling
8. User Defined Input and Output
9. Integration
10. Solving Non linear Equations
11. a) Linear equations Gaussian Methods
b) Linear equations Iterative Methods
12. Interpolation
13. a) ODE Euler methods
b) ODE Applications
c) Optimization Using Karmakar Function
14. Digital Signal Processing
15. a) Control systems
b) Discrete systems
16. a) Xcos Introduction
b) Calling User Defined Functions in XCOS
c) Simulating a PID controller using XCOS

Text Books:

2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
3. LaTeX Companion – Leslie Lamport, PHI/Pearson.
4. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech.
5. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
6. PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft).



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C

1/0/4 3

COMPUTER AIDED ENGINEERING GRAPHICS (DIESCEG)

Course Objectives:

To develop the ability to visualization of different objects through Engineering drawing principles and to acquire computer drafting skills for the communication of concepts, and ideas in the design of engineering products.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Apply computer-aided drafting tools and conventional methods to create engineering curves. [L3]
2. Acquire skills to sketch projections of points, lines and planes. [L3]
3. Make use of computer-aided graphics and conventional drafting methods for drawing projections of solids and auxiliary views. [L3]
4. Acquire skills in the development of surfaces for the right regular solids like prisms and pyramids. [L3]
5. Students will learn using computer-aided graphics and conventional methods for drafting Orthographic and Isometric views of lines, planes, and simple and compound solids. [L3]

UNIT I

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

UNIT II

Orthographic Projections:

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes.

UNIT III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views.

UNIT IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting.

UNIT V**Isometric Projections:**

Principles of Isometric Projection – Isometric Scale – Isometric Views Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

Text Books:

1. Engineering Drawing N.D. Bhatt, Charotar publishing house Pvt Ltd
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T.Jeyapoovan, Vikas and company Ltd.

Reference Books:

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill Pvt. Ltd
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rana, Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford University press.
5. Computer Aided Engineering Drawing, Edited by K Balaveera Reddy at al- CBSPublishers

Note: External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C

0/0/2 1

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB (D1HSE2)

The English Language and Communication Skills (ELCS) 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:

Students will be able to:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize the 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 the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews

Course Outcomes:

Upon completion of this course the student will be able to:

- | | |
|--|----|
| 1. Build the capability to listen and interpret a text and participate in situational dialogues. | L3 |
| 2. Develop the skills to pronounce words appropriately and understand the significance of learning phonetics. | L3 |
| 3. Distinguish between wrong and right accent and use intonation in sentences aptly. | L4 |
| 4. Compare the differences between spoken and written communication. | L5 |
| 5. Assess various skills used to make a presentation effective and also develop confidence in facing interviews. | L5 |

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 the 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 in sentences.

- Listening for general content
- Listening to fill up information
- 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
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Sessions

The following course content is prescribed for the English Language and Communication Skills Lab.

Exercise – ICALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

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

Exercise – IICALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - *Testing Exercises*

ICS Lab:

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

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

Exercise - IIICALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation - *Testing Exercises*

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing
Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication-Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab:

Understand: Group Discussion *Practice:* Group Discussion

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 T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

Source of Material (Master Copy):

- *Exercises in Spoken English. Part 1,2,3.* CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:

1. Cambridge Advanced Learners' English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley.
3. Punctuation Made Easy by Darling Kindersley.
4. Oxford Advanced Learner's Compass, 10th Edition.
5. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
7. English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.

8. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
9. Digital All
10. Orell Digital Language Lab (Licensed Version)

Reference Books:

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*.
5. Orient Black Swan Pvt. Ltd.
6. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C

0/0/2 1

ENGINEERING CHEMISTRY LAB (D1BSEC2)

Course Objectives:

Develop laboratory skills in chemical analysis and synthesis. Learn to handle and use various laboratory equipment and instruments.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Analyze the parameters like hardness in water by complexometric method. L4
2. Calculate the concentration of given solutions by using Instrumentation techniques such as Potentiometry and Conductometry. L3
3. Determine physical properties such as surface tension and viscosity of various liquids. L3
4. Synthesis of Bakelite using basic preparatory technique. L4
5. Determination of R_f value by using Thin layer chromatography technique (TLC). L3

List of Experiments:

1. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
2. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
3. **Potentiometry:**
 - a) Estimation of the concentration of an acid by Potentiometry
 - b) Estimation of the amount of Fe^{+2} by Potentiometry.
4. **pH Metry:** Determination of an acid concentration using pH meter.
5. **Preparations:** Preparation of Bakelite.
6. **Lubricants:**
 - a) Estimation of acid value of given lubricant oil.
 - b) Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
7. **Virtual lab experiments**
 - a) Construction of Fuel cell and it's working.
 - b) Smart materials for Biomedical applications
8. **Additional Experiments:**
 - a) Thin layer Chromatography calculation of R_f values
 - b) Determination of Surface tension of given liquid by using Stalagmometer.
 - c) Verification of Lambert's and Beer's law using $KMnO_4$.

Reference Books:

1. Lab manual for Engineering chemistry by B.Ramadevi and P.Aparna, S Chand Publications, New Delhi(2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I.Vogel, ELBS Publications.
4. College Practical Chemistry by V.K.Ahluwalia, Narosa Publications Ltd. New Delhi(2007).



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester I

L/T/P C

0/0/2 1

C PROGRAMMING FOR PROBLEM SOLVING LAB (D1ESCP3)

Course Objective

To provide hands-on experience in file handling, memory management, and developing efficient algorithms using C.

Course Outcomes

Upon completion of this course the student will be able to:

- | | |
|--|-----|
| 1. Develop C programs to solve mathematical and scientific problems. | L3 |
| 2. Develop C programs to work on files. | L3. |
| 3. Construct C programs to understand the memory allocation functions. | L3 |

List of Experiments:

- Write a C program to find the factorial of a positive integer.
 - Write a C program to find the roots of a quadratic equation.
- Write a C program to determine if the given number is a prime number or not.
 - A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
 - Write a C program to generate the first n terms of the sequence.
- Write a C program to construct a pyramid of numbers.
 - Write a C program to calculate the following Sum: $\text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$
- The Least Common Multiple (LCM) of two positive integers a & b is the smallest integer that is evenly divisible by both a and b. Write a C program that reads two integers and calls GCD (a, b) function that takes two integer arguments and returns their LCM. The lcm (a, b) function should calculate the least common multiple by calling the GCD (a,b) function and using the following relation: $\text{LCM}(a,b) = ab / \text{GCD}(a,b)$
 - Write a C program that reads two integers n and r to compute the nc_r value using the following relation: $nc_r(n,r) = n! / r! (n-r)!$. Use a function for computing the factorial value of an integer.
- Write C program that reads two integers x and n and calls a recursive function to compute x_n .
 - Write a C program that uses a recursive function to solve the Towers of Hanoi problem.
 - Write a C program that reads two integers and calls a recursive function to compute nc_r value.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user using Sieve of Eratosthenes algorithm.
 - Write a C program that uses non recursive function to search for a Key value in a given list of integers. Use linear search method.
- Write a menu-driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message

- if an invalid choice is entered.
- b) Write a C program that uses non recursive function to search for a Key value in given sorted list of integers. Use binary search method.
8. a) Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- b) Write a C program that reads two matrices and uses functions to perform the following:
- i) Addition of two matrices
 - ii) Multiplication of two matrices
9. a) Write a C program that uses functions to perform the following operations:
- I) to insert a sub-string into a given main string from a given position.
 - II) to delete n characters from a given position in a given string
- b) Write a C program that uses a non-recursive function to determine if the given string is a palindrome or not.
10. a) Write a C program to replace a substring with another in a given line of text.
- b) Write a C program that reads 15 names each of up to 30 characters, stores them in an array, and uses an array of pointers to display them in ascending (ie. alphabetical) order.
11. a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b) Write a C program to convert a positive integer to a roman numeral. Ex. 11 is converted to XI.
12. a) Write a C program to display the contents of a file to standard output device.
- b) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
13. a) Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command-line arguments.
- b) Write a C program to compare two files, printing the first line where they differ.
14. a) Write a C program to change the nth character (byte) in a text file. Use fseek function.
- b) Write a C program to reverse the first n characters in a file. The file name and n are specified on the command line. Use fseek function.
15. a) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).
- b) Define a macro that finds the maximum of two numbers. Write a C program that uses the macro and prints the maximum of two numbers.
16. a) Write a C Program to calculate the sum of n numbers entered by the user using malloc() and free() functions.
- b) Write a C Program to calculate the sum of n numbers entered by the user using calloc() and free() functions.

Text Books:

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
2. Computer Programming using C in C, V. Rajaraman, PHI.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. C++: The complete reference, H. Schildt, TMH Publishers.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester II

L/T/P C

3/0/0 3

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS (D2HSBF)

Course Objectives:

To learn the basic Business types, Impact of economy on business and firms specifically.

To analyze the business from the financial perspective.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Analyze the total structure of the business and able to identify and classify the Different types of business entities.-L3
2. Assess the demand and supply analyses with the help of various measures and types of Elasticity of demand.-L3
3. Evaluate the knowledge about production and cost analysis for product and services.-L2
4. Interpret the fundamental concepts related to financial accounting.-L2
5. Predict the financial position by analyzing the financial statement of the company Through various ratios-L3

UNIT I

Introduction to Business and Economics:

Business:

Define Business, characteristics of business, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company.

Economics:

Significance of Economics, Micro and Macro Economic Concepts, and Importance of National Income, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist,

UNIT II

Demand Analysis:

Elasticity of Demand:

Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making,

Demand Forecasting:

Steps in Demand Forecasting, Methods of Demand Forecasting.

UNIT III

Production, Cost, Market Structures & Pricing:

Production Analysis:

production function, Law of returns to scale, Internal and External Economies of Scale.

Cost analysis:

Cost concepts, Types of Costs. Break-even Analysis (BEA)

Pricing:

Types of Pricing, product life cycle, **GST (Goods & service Tax)**

Market Structures-

Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, oligopoly.

UNIT IV**Financial Accounting:**

Accounting concepts and Conventions, Accounting Equation, Double- Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

UNIT V**Financial Analysis through Ratios:**

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Text Books:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.
4. Rakesh garg, sandeep garg, Hand book of GST in India
5. A.R. Aryasri (2011), Managerial Economics and Financial Analysis, TMH, India.

References:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester II

L/T/P C

3/1/0 4

APPLIED PHYSICS (D2HSBF)

COURSE OBJECTIVES

This course is designed to provide a comprehensive understanding of quantum mechanics principles and their applications. It covers the basics of band theory of solids, allowing students to classify materials based on energy gaps. The course also delves into semiconductor physics and their numerous engineering applications. Students will acquire knowledge about optoelectronic and display devices, exploring their relevance in engineering. Additionally, the course includes the study of optical fiber characteristics and their applications, along with an introduction to quantum information science.

COURSE OUTCOMES

Upon completion of this course the student will be able to:

1. Apply the basic principle of quantum mechanics to understand quantum physics in the field of physics. L3
2. Classify the materials on the basis of energy gap, by understanding the fundamentals of band theory of solids. L4
3. Apply the physics behind the semiconductors enables the students to use them in engineering applications. L3
4. Analyzing the various categories of opto-electronic, dielectric, and display materials to determine how they can be used in different technical and engineering applications. L4
5. Explore fiber optics and quantum information enables the students to apply them in systems like optical communications and advanced quantum communication. L4

UNIT I

QUANTUM PHYSICS

Wave particle duality, de-Broglie's matter waves, characteristics of matter waves, Davisson and Germer's experiment, Heisenberg's uncertainty principle, Schrödinger time-independent wave equation, Physical significance and characteristics of wave function, Particle in a one- dimensional box and extension to 3D.

UNIT II

BAND THEORY OF SOLIDS

Free electron theory (Classical & Quantum): Fermi level, Density of states.

Periodic potential, Bloch theorem, Kronig-Penny model, E-k diagram, Concept of effective mass, Origin of energy bands in solids, Classification of materials into conductors semiconductors and Insulators.

UNIT III**SEMICONDUCTOR PHYSICS**

Intrinsic and Extrinsic semiconductors, Carrier concentration in Intrinsic semiconductor, carrier concentration in Extrinsic semiconductor: donor concentration in n-type and acceptor concentration in p-type semiconductors, Variation of Fermi level with temperature and doping concentration, Carrier transport diffusion and drift, Formation of PN junction, V-I characteristics of PN diode, Hall effect and its applications.

UNIT IV**OPTOELECTRONIC, DIELECTRIC AND DISPLAY DEVICES****Optoelectronics devices:**

Direct and Indirect band gap semiconductors, Construction and working of LED, Laser diode, Photodiode, PIN diode, Avalanche photo diode (APD) and solar cells.

Dielectric and Display Materials:

Basic definitions, Types of polarizations (qualitative) - Ferroelectric, Piezoelectric and Pyroelectric materials, Applications, Luminescence, Photoluminescence, Cathodoluminescence, Electroluminescence, Injectionelectroluminescence.

Displays:

working principles of plasma, LCD and numerical displays

UNIT V**FIBER OPTICS AND QUANTUM INFORMATION SCIENCE**

Fiber Optics: Introduction to optical fiber, Construction and working principle of an Optical Fiber, Acceptance angle and numerical aperture, Types of Optical fibers, step and graded index fibers, Attenuation in optical fiber, Applications of optical fiber : Optical fiber communication system.

Quantum information science: Introduction, Quantum mechanical bit, Superposition and entanglement, Representation of quantum mechanical state using Dirac notation, Hilbert space, Quantum state vector, Bloch sphere representation of Qubit, Quantum logic gates: Single Qubit gates, Multiple Qubit gates, Applications.

Text Books:

1. P.K PalaniSami, Engineering Physics-II, S. Chand publications Pvt.Ltd.
2. Avadhanulu M N., Kshirsagar P G, A text book of Engineering Physics, S Chand publications Pvt. Ltd, 2014.
3. D.K. Bhattacharya and Poonam Tandon, Engineering Physics, Oxford Higher Education press, 2015
4. Bhavana P. Butey, Applied Physics for Engineering, Oxford University Press

Reference Books:

1. Gaur R K., Gupta S L, Engineering Physics, Dhanpat Rai Publications, 2012.
2. Ajoy Ghatak, Basic Quantum Mechanics, 5th Edition, Trinity/Laxmi Publications Ltd., 2014.
3. Mehta V K., Mehta Rohit, Principles of Electronics, S. Chand Publications Pvt. Ltd, 2014.
4. David Halliday, Robert Resnick, Jearl Walker, Fundamentals of Physics, 10th Edition, Wiley Publishers, 2013.
5. Jack D Hidary, Quantum Computing: An Applied Approach, Springer, 2019.
6. Seiki Akama, Elements of Quantum Computing: History, Theories and Engineering Applications, Springer; 2015.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester II

L/T/P C

3/1/0 4

STATISTICAL METHODS AND VECTOR CALCULUS (D2BSM5)

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives:

Students should learn the introduction of Statistics to understand the basic statistical tools for analysis & interpretation of qualitative and quantitative data, Understand the basic concepts of Time 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:

Upon completion of this course the student will be able to:

1. Apply Statistical logic for solving the problems. L3
2. Analyse the qualitative & quantitative data .L4
3. Analyse the time series f or the given data. L4
4. Explain and compute derivatives of vector valued functions, gradient functions. L5
5. Evaluate the line-surface and volume integrals and converting them from one to another. L5

UNIT I

Introduction of Statistics

Functions of statistics, Collection of data, Classification of data, Tabulation of data, diagrammatic and Graphical representation of data. Measures of Central Tendency- Mean, Median, Mode, Geometric Mean and Harmonic Mean.

UNIT II

Measures of Dispersion

Range, Quartile deviation, Mean Deviation, Standard deviation and Coefficient of variation, Skewness: Karl Pearson's co-efficient of skewness, Bowley's co-efficient of skewness, Kelleysco-efficient of skewness, Kurtosis.

UNIT III

Time Series Analysis

Introduction, Components of time series, uses of time series, Measurement of Trend by Graphic method, Method of semi averages, Moving average methods, Measurements of

seasonal fluctuations by Method of simple averages, Ratio to Trend Method, Ratio to moving average Methods

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 Integral- surface Integral and volume Integrals- Green's theorem- Gauss Divergence theorem and Stoke's theorem (without proofs) and their applications.

Text Books:

1. Fundamentals of applied Statistics, S.C. Gupta & V.K. Kapoor, Sultan Chand & Sons
2. S.C. Gupta & V.K. Kapoor., Fundamentals of Mathematical Statistics, S Chand Publishers.
3. B.S. Grewal- Higher Engineering Mathematics- Khanna Publishers- 40th Edition-2015.
4. Engineering Mathematics by TKV Iyengar, B. Krishna Gandhi, S. Chand and publications

Reference Books:

1. Introduction to Statistics by Härdle, Wolfgang Karl, Klinke, Sigbert, Rönz, Bernd, Springer (E- BOOK)
2. Erwin Kreyszig –Advanced Engineering Mathematics- 10th Edition- Wiley - 2021



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester II

L/T/P C

3/0/0 3

BASIC ELECTRICAL ENGINEERING (D2ESBEE)

Prerequisites: Linear Algebra and Calculus

Course Objectives:

Objectives of this course are

1. To introduce the concept of DC and AC electrical circuits and its applications.
2. To determine the performance of single phase transformer.
3. To study the concepts of different types of Electrical Machines.
4. To acquire knowledge about various configurations for electrical installations and its applications.

Course Outcomes:

Upon completion of this course the student will be able to:

- | | |
|---|----|
| 1. Analyze DC circuits and various theorems. | L4 |
| 2. Analyze AC circuits using basic principles. | L4 |
| 3. Apply knowledge of transformer principles to understand its characteristics and predict performance in various scenarios. | L3 |
| 4. Draw the characteristics and performance metrics of electrical machines to optimize their usage in practical applications. | L4 |
| 5. Describe the applications of different electrical installations and analyze their practical implications. | L4 |

UNIT I

DC Circuits

Electrical circuit elements (R, L and C), Dependent and Independent of voltage and current sources, Kirchhoff current and voltage laws, Analysis of Resistive circuits-Mesh, Nodal Analysis and Star-Delta Transformations, Superposition, Reciprocity, Thevenin, Norton, Maximum Power Transfer Theorems, Numerical problems.

UNIT II

AC Circuits

AC Fundamentals:

Sinusoidal voltage and currents, mathematical and graphical representation, concept of cycle period, frequency, instantaneous, peak, average, RMS values, peak factor, form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC and RLC combinations (series and parallel). Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III**Transformers**

Magnetic circuits, Construction and working principle of Ideal and Practical Transformer, Equivalent Circuit, Losses in Transformers, Regulation and Efficiency, OC & SC test on 1-phase Transformer. Auto- Transformer. Three-phase transformer connections.

UNIT IV**Electrical Machines**

Construction of DC machines, Armature windings – DC Generator – Principle of operation - EMF Equation – DC Motor – Principle of operation – Back EMF - Torque Equation, Generation of rotating magnetic fields, Construction and working principle of a three-phase and Single-phase induction motor, torque- speed characteristics, Construction and working principle of synchronous generators.

UNIT V**Electrical Installations**

Basic concept of wiring systems, Service Mains, Meter board and Distribution board, Concept of Earthing. Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. S.K. Bhattacharya, “Electrical installations and House Wiring”, Pearson Publications.

Reference Books:

1. S.K. Bhattacharya, “Basic Electrical & Electronics Engineering”, Pearson Publications.
2. V. N. Mittal and Arvind Mittal, “Basic Electrical Engineering” McGraw Hill.
3. Edward Hughes, “Electrical Technology”, Pearson Education.
4. Edminister, J., “Electrical Circuits” Schaum’s Outline Series, Tata McGraw Hill.
5. Sudhakar and Shyam Mohan, “Circuits and Networks Analysis and Synthesis, Tata McGraw Hill



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Phone: 9100377790, email: info@tkrcet.ac.in, web site: www.tkrct.ac.in



CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester II

L/T/P C
3/0/0 3

DATA STRUCTURES (D2ESDS)

Course Objective:

To provide students with a thorough understanding of data structures and algorithms, focusing on their efficiency and application in solving complex computational problems.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Analyze time and space complexity of various problems and distinguish various data structures. L4
2. Identify various Abstract Data Types and their applications. L3
3. Utilize concepts and techniques related to Binary Trees, Priority queues, sets and unions ADTs to Solve complex data structure problems. L3
4. Analyze and implement various kinds of searching and sorting techniques L4
5. Apply advanced data structures and graph theory concepts to design and implement Efficient Solutions for complex problems. L3

UNIT I

Basic Concepts

Data objects and Structures, Algorithm Specification-Introduction, Recursive algorithms, Data abstraction, Performance analysis- Time complexity and Space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples, Introduction to Linear and Non Linear data structures.

UNIT II

Representation of Single, Two Dimensional Arrays and their Applications

Sparse matrices-array and linked representations. Linear list ADT-array representation and linked list representation, Singly Linked Lists-Operations Insertion, Deletion, Circular linked lists-Operations for Circular linked lists, Doubly Linked Lists Operations- Insertion, Deletion. Stack ADT, definition, array and linked list implementations, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition, array and linked list, Implementations, Circular queues-Insertion and deletion operations, Polynomial.

UNIT III

Trees

Definition, terminology, Binary trees-definition, Properties of Binary Trees, Binary Tree ADT, representation of Binary Trees-array and linked representations, Binary Tree traversals, threaded binary trees, Priority Queues –Definition and applications, Max Priority Queue ADT implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap. Disjoint set ADT - Equivalence relations, the dynamic equivalence problem, Basic data structure, Smart union algorithms, Path compression, worst case for union by rank and path compression, and an application - generation of mazes.

UNIT IV**Searching**

Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, Overflow Handling, Comparison of Searching methods.

Sorting: Insertion Sort, Selection Sort, Radix Sort, Quick sort, Heap Sort, Merge sort, Comparison of Sorting methods.

External sorting-Model for external sorting, basic external sorting algorithm, multi-way merge, poly- phase merge, replacement selection.

UNIT V**Graphs**

Definitions, Terminology, Applications and more definitions, Properties, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph Search methods - DFS and BFS, Complexity analysis. Search Trees Binary Search Tree ADT, Definition, Operations- Searching, Insertion and Deletion, Balanced search trees-AVL Trees-Definition and Examples only, B-Trees-Definition and Examples only, Red Black Trees-Definitions and Examples only, k-d trees, Comparison of Search Trees.

Text Books:

1. Data structures, Algorithms and Applications in C++, 2nd Edition, Sartaj Sahni, Universities Press.
2. Data structures and Algorithms in C++, Adam Drozdek, 4th edition, Cengage learning.

Reference Books:

1. Data structures with C++, J. Hubbard, Schaum's outlines, TMH.
2. Data structures and Algorithms in C++, M.T. Goodrich, R. Tamassia and D. Mount, Wiley India.
3. Data structures and Algorithm Analysis in C++, 3rd edition, M. A. Weiss, Pearson.
4. Classic Data Structures, D. Samanta, 2nd edition, PHI.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester II

L/T/P C

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APPLIED PHYSICS LAB (D2BSAP2)

Course Objectives:

This course includes the examination of the wavelength and V-I characteristics of laser diodes. It covers the comprehension of the numerical aperture and bending loss in optical fibers. Students will explore the variation of current with voltage in optoelectronic devices. The curriculum also covers the Hall Effect in semiconductors. Furthermore, students will learn how to experimentally determine Planck's constant.

Course Outcomes:

Upon completion of the course the student will be able to:

- | | |
|--|----|
| 1. Illustrate the V-I characteristics of Laser diode. | L3 |
| 2. Evaluate the numerical and bending loss of given optical fiber. | L5 |
| 3. Analyze the V-I characteristics of LED and photodiode devices. | L4 |
| 4. Illustrate the type of semiconductor by using Hall Effect experiment. | L3 |
| 5. Calculate the Plank's constant using Photocell. | L3 |

List Of Experiments:

1. Energy Band gap: To determine the energy band gap of a given semiconductor diode.
2. Plank's Constant: To determine the Plank's constant using photoelectric effect.
3. Hall Effect: To evaluate the Hall coefficient of a given semiconductor.
4. LED: To study the V-I characteristics of Light Emitting Diode.
5. Laser diode: To study the V-I characteristics of semiconductor laser diode.
6. Laser Diffraction: To determine the wavelength of given Laser beam.
7. Numerical aperture: To determine the numerical aperture of an optical fiber
8. Losses in optical fibers: To estimate the bending loss in an optical fiber.
9. Photodiode: To study the V-I characteristics and measure the dark current in the photodiode.
10. Solar Cell: To find the fill factor of solar cell using V-I characteristics.

Note: Any eight experiments are to be performed compulsory

Reference Books:

1. Ruby Das, Rajesh Kumar, C. S. Robinson, Prashant Kumar Sahu, A Textbook of Engineering Physics Practical, Second Edition, University Science Press, New Delhi, 2016.
2. C. V. Madhusudana Rao, V. Vasanth Kumar, Engineering physics lab Manual, Scitech publications (india) Pvt.Ltd-2014.
3. Dr. Y. Aparna & Dr. K. Venkateswara Rao, Laboratory Manual of Engineering Physics, V.G.S Publishers.



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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Semester II

L/T/P C

0/0/2 1

BASIC ELECTRICAL AND SIMULATION LAB (D2ESBES)

Prerequisites: Basic Electrical Engineering

Course Objectives:

1. Students will gain the basic knowledge of electrical circuits using various laws.
2. Identify and apply different theorems for electrical circuits.
3. Assess the performance of different types of Electrical machines and single phase transformer.
4. Apply basic electrical engineering knowledge for house wiring practice.

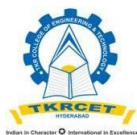
Course Outcomes:

Upon completion of the course the student will be able to:

- | | |
|---|----|
| 1. Assess various laws to solve electrical networks. | L3 |
| 2. Design of theorems using MATLAB software | L3 |
| 3. Verify network theorems to solve complex electrical networks. | L3 |
| 4. Evaluate the performance of different types of Electrical machines and single phase transformer by conducting various tests. | L4 |
| 5. Design electrical installations using different lamp controlled methods, staircase wiring and different wiring connection. | L4 |

List of Experiments: (Any 10 Experiments)

1. Verification of Ohm's, Kirchhoff's current law and Voltage law using hardware and digital simulation.
2. Mesh analysis using hardware and digital simulation.
3. Nodal analysis using hardware and digital simulation
4. Verification of Thevenin and Norton theorems using hardware and digital simulation.
5. Verification of Super position and Reciprocity theorems hardware and digital simulation.
6. Magnetization characteristics of DC shunt generator.
7. Conduct brake test on dc shunt motor.
8. To perform open circuit and short circuit test on single phase transformer.
9. Make circuit for series and parallel connection of lamps.
10. Make a circuit for stair case wiring.
11. Make a circuit for Godown wiring.
12. Make a electrical bell connection practice board.



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Semester II

L/T/P C

0/0/2 1

DATA STRUCTURES LAB (D2ESDSL)

Course Objective:

To provide students with practical experience in implementing, analyzing, and applying various data structures and algorithms using C++.

Course Outcomes:

Upon completion of the course the student will be able to:

1. Apply various searching and sorting techniques for solving the given problems L3
2. Apply various data structures such as stacks, queues, search trees, and hash tables to solve the computing problems. L3
3. Implement different disjoint set operations and k-d trees. L3

C++ Programming Concepts

Review of C, input and output in C++, functions in C++-value parameters, reference parameters, Parameter passing, function overloading, function templates, Exceptions-throwing an exception and handling an exception, arrays, pointers, new and delete operators, class and object, access specifiers, friend functions, constructors and destructor, Operator overloading, class templates, Inheritance and Polymorphism.

List of Programs to be performed during the Course

1. Write a C++ program that uses functions to perform the following:
 - a) Create a singly linked list of integers.
 - b) Delete a given integer from the above linked list.
 - c) Display the contents of the above list after deletion.
2. Write a template based C++ program that uses functions to perform the following:
 - a) Create a doubly linked list of elements.
 - b) Delete a given element from the above doubly linked list.
 - c) Display the contents of the above list after deletion.
3. Write a C++ program that uses stack operations to convert a given infix expression into its post fix equivalent, Implement the stack using an array.
4. Write a C++ program to implement a double ended queue ADT using an array, using a doubly linked list.
5. Write a C++ program that uses functions to perform the following:
 - a) Create a binary search tree of characters.
 - b) Traverse the above Binary search tree recursively in pre-order, in order and post-order.
6. Write a C++ program that uses function templates to perform the following:
 - a) Search for a key element in a list of elements using linear search.
 - b) Search for a key element in a list of sorted elements using binary search.

7. Write a C++ program that implements Insertion sort algorithm to arrange a list of integers in ascending order.
8. Write a template based C++ program that implements selection sort algorithm to arrange a list of elements in descending order.
9. Write a template based C++ program that implements Quick sort algorithm to arrange a list of elements in ascending order.
10. Write a C++ program that implements Heap sort algorithm for sorting a list of integers in ascending order.
11. Write a C++ program that implements Merge sort algorithm for sorting a list of integers in ascending order.
12. Write a C++ program to implement all the functions of a dictionary (ADT) using hashing.
13. Write a C++ program that implements Radix sort algorithm for sorting a list of integers in ascending order.
14. Write a C++ program that uses functions to perform the following:
 - A) Create a binary search tree of integers.
 - B) Traverse the above Binary search tree non-recursively in ignored.
15. Write a C++ program that uses functions to perform the following:
 - A) Create a binary search tree of integers.
 - B) Search for an integer key in the above binary search tree non-recursively.
 - C) Search for an integer key in the above binary search tree recursively.
16. Write a C++ program to implement hashing using any hash function.
17. Write a C++ program to implement extendible hashing.