R24-B.TECH.FOURYEARDEGREECOURSE
DEPARTMENT OF CSE (IoT)
COURSE STRUCTURE

I Year I Semester–Regulation R24

S.No.	Course Code	Course	L	T	P	Credits
1.	MA101BS	Matrices and Calculus	3	1	0	4
2.	CH102BS	Engineering Chemistry	3	1	0	4
3.	CS103ES	Programming for Problem Solving	3	0	0	3
4.	ME105ES	Computer Aided Engineering Graphics	1	0	4	3
5.	EN105HS	English for Skill Enhancement	2	0	0	2
6.	CS106ES	Elements of Computer Science & Engineering	0	0	2	1
7.	CH107BS	Engineering Chemistry Laboratory	0	0	2	1
8.	CS108ES	Programming for Problem Solving Laboratory	0	0	2	1
9.	EN109HS	English Language and Communication Skills Laboratory	0	0	2	1
10.	*MC110	Environmental Science	3	0	0	0
		Induction Program				
		Total	14	3	12	20

I Year II Semester–Regulation R24

S.No.	Course Code	Course	L	T	P	Credits
1.	MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	PH202BS	Applied Physics	3	1	0	4
3.	ME203ES	Engineering Workshop	0	1	3	2.5
4.	EE204ES	Basic Electrical Engineering	2	0	0	2
5.	EC205ES	Electronic Devices and Circuits	2	0	0	2
6.	CS206ES	Python Programming Laboratory	0	1	2	2
7.	PH207BS	Applied Physics Laboratory	0	0	3	1.5
8.	EE208ES	Basic Electrical Engineering Laboratory	0	0	2	1
9.	CS209ES	IT Workshop	0	0	2	1
		Total	11	3	12	20

Syllabus

I Year I Semester–Regulation R24

S.No.	Course Code	Course	L	T	P	Credits
1.	MA101BS	Matrices and Calculus	3	1	0	4
2.	CH102BS	Engineering Chemistry	3	1	0	4
3.	CS103ES	Programming for Problem Solving	3	0	0	3
4.	ME105ES	Computer Aided Engineering Graphics	1	0	4	3
5.	EN105HS	English for Skill Enhancement	2	0	0	2
6.	CS106ES	Elements of Computer Science & Engineering	0	0	2	1
7.	CH107BS	Engineering Chemistry Laboratory	0	0	2	1
8.	CS108ES	Programming for Problem Solving Laboratory	0	0	2	1
9.	EN109HS	English Language and Communication Skills Laboratory	0	0	2	1
10.	*MC110	Environmental Science	3	0	0	0
		Induction Program				
		Total	14	3	12	20

MATRICES AND CALCULUS

B. Tech. I Year I Sem.   **L T P C**
                                                                                                  3 1 0 4

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn
1. Concept of a rank of the matrix and applying this concept to know the consistency and solving thesystem of linear equations.
2. Concept of eigen values and eigenvectors and to reduce the quadratic form to canonical form
3. Geometrical approach to the mean value theorems and their application to the mathematicalproblems and Evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation, concept of total derivative and finding maxima and minima of function oftwo and three variables.
5. Evaluation of multiple integrals and their applications

Course outcomes: After learning the contents of this paper the student must be able to
1. Write the matrix representation of a set of linear equations and to analyse the solution of thesystem of equations
2. Find the Eigen values and Eigen vectors. Reduce the quadratic form to canonical form usingorthogonal transformations.
3. Solve the applications on the mean value theorems and evaluate the improper integrals using Betaand Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes

UNIT-I: Matrices   10 L
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 by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors   10 L
Linear Transformation and Orthogonal Transformation: Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Calculus   10 L
Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series.
Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications)   10 L
Definitions of Limit and continuity.
Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration)   10L

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (onlyCartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and(Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2016.

REFERENCE BOOKS:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint,2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and CompanyLimited, New Delh

ENGINEERING CHEMISTRY

B.Tech. I Year I Sem   **L T P C**
                                                                                     3 1 0 4

Course Objectives:
1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skillsrequired to become a perfect engineer.
2. To know the importance of water and its treatment in domestic and industrial usage.
3. To acquire fundamental aspects of batterychemistry, significance of corrosion its control to protectthe structures.
4. To gain knowledge in the preparation and engineering applications of materials like polymers,cement, smart materials, Lubricants etc.,
5. To acquire required knowledge the basic concepts of petroleum and its products.

Course Outcomes:
1. They can predict potential applications of chemistry and practical utility in order to become goodengineers and entrepreneurs.
2. The students are able to understand the basic importance of water and its usage in domestic andindustrial purposes.
3. Students will acquire the basic knowledge of battery technology and electrochemical proceduresrelated to corrosion and its control.
4. They can learn the fundamentals and general properties of polymers and other engineeringmaterials.
5. Students will be able to understand the mechanism of combustion for solving problems related tocombustion.

UNIT - I: Water and its treatment: **[10]**
Introduction to hardness of water – Estimation of hardness of water by complexometric 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. Defluoridation - Determination of Fion by ion- selective electrode method.

Boiler troubles: Sludge, 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 – II Battery Chemistry & Corrosion   **[10]**
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 anda 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 anodeand impressed current methods. Electroplating of Cu

UNIT - III: Polymeric materials: [10]

Definition – Classification of polymers with examples – Types of polymerization – addition (free radicaladdition) and condensation polymerization with examples – Nylon 6:6, Terylene

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP).Rubbers: Natural rubber, Processing and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: [10]

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula and Numericals Classification-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 – Transesterification, advantages. Combustion – Calculation of air quantities (Numericals).

UNIT - V: Engineering Materials: [8]

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinylamides

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

TEXT BOOKS:
1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016 A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K.Shashikala, Pearson Publications, 2021.
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

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

PROGRAMMING FOR PROBLEM SOLVING

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of the C programming language.
- To learn the usage of structured programming approaches in solving problems.

Course Outcomes: The student will learn

To write algorithms and to draw flowcharts for solving problems.

- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in the C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - I: Introduction to Programming

Compilers, compiling and executing a program.

Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode with examples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen,strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type

UNIT - III: Preprocessor and File handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT - IV: Function and Dynamic Memory Allocation:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

TEXT BOOKS:

Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
   1. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

COMPUTER AIDED ENGINEERING GRAPHICS

B.Tech. I Year I Sem

	L	T	P	C
	1	0	4	3

Course Objectives:
- Todeveloptheabilityofvisualizationofdifferentobjectsthroughtechnicaldrawings.
- Toacquirecomputerdraftingskillforcommunicationofconcepts,ideasinthedesignofengineering produ cts.
- Apply the knowledge of interpretation of projection in different quadrants.
- Create intricate details of components through sections and develop its surfaces.
- Convert the pictorial views into orthographic view and vice versa.

Course Outcomes: At the end of the course, the student will be able to:
- CO1: Apply computer aided drafting toolstocreate2Dand3Dobjects
- CO2: Sketch conics and different types of solids
- CO2: Appreciate the need of Sectional views of solids and Development of surfaces of solids
- CO4: Read and interpret engineering drawings
- CO5: Conversionoforthographicprojectionintoisometricviewandviceversamanuallyandbyusing computer aided drafting

UNIT–I:
Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General methodonly.Cycloid,EpicycloidandHypocycloid,IntroductiontoComputeraideddrafting– views,commandsand conics

UNIT-II:
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Pointsand 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 – IsometricProjectionofobjectshavingnon-isometriclines.IsometricProjectionofSphericalParts.Conversionof Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographicprojection into isometric view using computer aided drafting.

TEXTBOOKS:

1. Engineering Drawing N.D.Bhatt /Charotar
2. EngineeringDrawingandgraphicsUsingAutoCADThirdEdition,T.Jeyapoovan,Vikas:S.Chanda nd company Ltd.

REFERENCEBOOKS:
1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

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

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ENGLISH FOR SKILL ENHANCEMENT

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B.Tech. I Year I Sem.   **L T P C**
                                                                                                                          2 0 0 2

Course Objectives: This course will enable the students to:
1. Improve the language proficiency of students in English with an emphasis on Vocabulary,
2. Grammar, Reading and Writing skills.
3. Develop study skills and communication skills in various professional situations.
4. Equip students to study engineering subjects more effectively and critically using the theoretical
5. and practical components of the syllabus.

Course Outcomes: Students will be able to:
1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written
3. communication.
4. Demonstrate their understanding of the rules of functional grammar.
5. Develop comprehension skills from the known and unknown passages.
6. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in
7. various contexts.
8. Acquire basic proficiency in reading and writing modules of English.

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, Structuresand 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 andSubject-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: dentifying Common Errors in Writing with Reference to Misplaced Modifiers and **Tenses.**

Reading: **Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises forPractice.**

Writing: **Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter ofRequisition, 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 ReportsFormats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.**

Note: *Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.*

Note: 1. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is Open-ended,* **besides following the prescribed textbook, it is required to prepare teaching/learningmaterials** by the teachers collectively **in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.**

Note**: 2.Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.**

TEXT BOOK:
1. **"English: Language, Context and Culture" by Orient BlackSwan 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.

ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING

B.Tech. I Year I Sem.   **L T P C**
                                                                                         0 0 2 1

Course Objective: **To provide an overview of the subjects of computer science and engineering.**
Course Outcomes:
1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problem solving.
3. Know the need and types of operating system, database systems.
4. Understand the significance of networks, internet, WWW and cyber security.Understand Autonomous systems, the application of artificial intelligence.

UNIT – I
Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units,Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

UNIT – II
Software development – waterfall model, Agile, Types of computer languages – Programming, markup,scripting Program Development – steps in program development, flowcharts, algorithms, data structures
– definition, types of data structures

UNIT – III
Operating systems: Functions of operating systems, types of operating systems, Device & Resource Management Database Management Systems: Data models, RDBMS, SQL, Database Transactions, datacenters, cloud services

UNIT – IV
Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensornetworks, vehicular networks, 5G communication.
World Wide Web – Basics, role of HTML, CSS, XML, Tools for web designing, Social media, Onlinesocial networks.
Security – information security, cyber security, cyber laws

UNIT – V
Autonomous Systems: IoT, Robotics, Drones, Artificial Intelligence – Learning, Game Development,natural language processing, image and video processing.
Cloud Basics

TEXT BOOK:
1. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. GerstingUniversity of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

REFERENCE BOOKS:
1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.

ENGINEERING CHEMISTRY LABORATORY

B.Tech. I Year I Sem   **L T P C**
                                                                                          0 0 2 1

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

- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometryand pH metry methods.
- Students will learn to prepare polymers such as Thiokol rubber and nylon-6 in the laboratory.
- Students will learn skills related to the lubricant properties such as viscosity of oils.
- Students will learn the extent of corrosion in metals like mild steel.

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

- Determination of parameters like hardness of water in various conditions.
- Able to know parameters of rate of corrosion of mild steel in various conditions.
- Able to perform methods such as conductometry, potentiometry and pH metry in order to find outthe concentrations or equivalence points of acids and bases.
- Students are able to prepare polymers like Thiokol rubber and nylon-6.
- Estimations viscosity of lubricant oils.

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
II. Conductometry: Estimation of the concentration of an acid by Conductometry.
III. Potentiometry: Estimation of the amount of Fe+2 by Potentiomentry.
IV. pH Metry: Determination of an acid concentration using pH meter.
V. Preparations:
1. Preparation of Thiokol Rubber.
2. Preparation Nylon – 6,6.
VI. Lubricants:
1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
VII. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence ofinhibitor.
VIII. Virtual lab experiments
1. Construction of Fuel cell and its working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

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

PROGRAMMING FOR PROBLEM SOLVING LABORATORY

B.Tech. I Year I Sem.

L	T	P	C
0	1	2	2

 [Note:The programs may be executed using any available Open Source/ Freely available IDESome of theTools available are:

CodeLite: https://codelite.org/ Code:Blocks: http://www.codeblocks.org/
DevCpp : http://www.bloodshed.net/devcpp.htmlEclipse:
http://www.eclipse.orgThis list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:
- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C likeoperators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:
- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:
a. Write a simple program that prints the results of all the operators available in C (including pre/post increment , bitwise and/or/not , etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion andcasting. Take the values from standard input.

Simple numeric problems:
a. Write a program for finding the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write a program that declares Class awarded for a given percentage of marks, where mark **<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction.Read percentage from standard input.**
d. Write a program that prints a multiplication table for a given number and the number of rows inthe table. For example, for a number 5 and rows = 3, the output should be:
   5 x 1 = 5
   5 x 2 = 10
   5 x 3 = 15
e. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:
a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut+(1/2)at^2$ where u and a are the initial velocity in m/sec (= 0) and acceleration in

m/sec^2 (= 9.8 m/s^2)).

b. Write a C program, which takes two integer operands and one operator from the user, performsthe

operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

c. Write a program that finds if a given number is a prime number

d. Write a C program to find the sum of individual digits of a positive integer and test given numberis palindrome.

e. 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 Cprogram to generate the first n terms of the sequence.

f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

g. Write a C program to find the roots of a Quadratic equation.

h. Write a C program to calculate the following, where x is a fractional value. i. 1-x/2 +x^2/4-x^3/6

i. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+ +x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays, Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.

b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in asingle dimension array.

c. Write a C program that uses functions to perform the following:Addition of Two Matrices

d. Multiplication of Two Matrices

Transpose of a matrix with memory dynamically allocated for the new matrix as row and columncounts may not be the same.

e. Write C programs that use both recursive and non-recursive functions

To find the factorial of a given integer.

To find the GCD (greatest common divisor) of two given integers.

To find x^n

f. Write a program for reading elements using a pointer into an array and display the values usingthearray.

g. Write a program for display values reverse order from an array using a pointer.

h. Write a program through a pointer variable to sum of n elements from an array.

Files:

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 withtheir uppercase equivalents.

c. Write a C program to count the number of times a character occurs in a text file. The file nameand the character are supplied as command line arguments.

d. Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values aregiven in the command line. (hint: convert the strings using atoi function)

Now the program asks for an index and a value from the user and the value at that index shouldbechanged to the new value in the file. (hint: use fseek function)

The program should then read all 10 values and print them back.

e. Write a C program to merge two files into a third file (i.e., the contents of the first file followedby those of the second are put in the third file).

Strings:

    a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

    b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent

    c. Write a C program that uses functions to perform the following operations:To insert a sub-string into a given main string from a given position.
       To delete n Characters from a given position in a given string.

    d. Write a C program to determine if the given string is a palindrome or not (Spelled same in bothdirections with or without a meaning like madam, civic, noon, abcba, etc.)

    e. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn'tcontain ch.

    f. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

    a. 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 to construct a pyramid of numbers as follows:

```
  1         *        1        1         *
 1 2       * *      2 3      2 2       * *
1 2 3     * * *     4 5 6    3 3 3    * * *
                           4 4 4 4     * *
                                        *
```

Sorting and Searching:

    a. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.

    b. Write a C program that uses non recursive function to search for a Key value in a given sortedlist of integers using binary search method.

    c. Write a C program that implements the Bubble sort method to sort a given list ofintegers in ascending order.

    d. Write a C program that sorts the given array of integers using selection sort in descending order

    e. Write a C program that sorts the given array of integers using insertion sort in ascending order

    f. Write a C program that sorts a given array of names

TEXT BOOKS:

    1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition,Pearson

    2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

    1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI

    2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill

    3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB

    4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)

    5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.

    6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

    7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

B.Tech. I Year I Sem.   **L T P C**

                                                                                 0 0 2 1

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 everydaysituations both in formal and informal contexts.

Course Objectives:
- To facilitate computer-assisted multi-media instruction enabling individualized andindependent language learning
- To sensitize the students to the nuances of English speech sounds, word accent, intonation andrhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English byproviding an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize the impact of dialects.
- To train students to use language appropriately for public speaking, group discussionsand interviews

Course Outcomes: Students will be able to:
- Understand the nuances of English language through audio- visual experience and groupactivities
- Neutralise their accent for intelligibility
- Speak with clarity and confidence which in turn enhances their employability skills
- Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:
  - **a. Computer Assisted Language Learning (CALL) Lab**
  - **b. Interactive Communication Skills (ICS) Lab**

Listening Skills:
Objectives
   1. To enable students develop their listening skills so that they may appreciate the role in theLSRW skills approach to language and improve their pronunciation
   2. To equip students with necessary training in listening, so that they can comprehend the speechof 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 professionalcontexts
   • 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 – I
CALL 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 – II
CALL Lab:
Understand: **Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern insentences – Intonation.**
Practice: **Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern insentences – 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 andSeeking Permissions - Telephone Etiquette.**

Exercise – III

CALL 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 – Thankingand 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 audiovisual 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 contentsof the syllabus.**

Suggested Software:
- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).Digital All
- Orell Digital Language Lab (Licensed Version)

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

Syllabus

I Year II Semester–Regulation R24

S.No.	Course Code	Course	L	T	P	Credits
1.	MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	PH202BS	Applied Physics	3	1	0	4
3.	ME203ES	Engineering Workshop	0	1	3	2.5
4.	EE204ES	Basic Electrical Engineering	2	0	0	2
5.	EC205ES	Electronic Devices and Circuits	2	0	0	2
6.	CS206ES	Python Programming Laboratory	0	1	2	2
7.	PH207BS	Applied Physics Laboratory	0	0	3	1.5
8.	EE208ES	Basic Electrical Engineering Laboratory	0	0	2	1
9.	CS209ES	IT Workshop	0	0	2	1
		Total	**11**	**3**	**12**	**20**

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

B. Tech. I Year II Sem.   **L T   P   C**
                                                                                                 3 1   0   4

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn
1. Methods of solving the differential equations of first order.
2. Methods of solving the differential equations of higher order.
3. Concept, properties of Laplace transforms. Solving ordinary differential equations using Laplacetransforms techniques.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to line, surface and volumeintegrals

Course outcomes: **After learning the contents of this paper the student must be able to**
1. Identify whether the given differential equation of first order is exact or not.
2. Solve higher differential equation and apply the concept of differential equation to real worldproblems.
3. Use the Laplace transforms techniques for solving ODE's.
4. Evaluate the line, surface and volume integrals.
5. Converting line, surface and volume integrals from one to another

UNIT-I: First Order ODE   8 L
Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations,Applications: Orthogonal Trajectories (only in Cartesian Coordinates) Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order   10 L
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sin , cos ax, polynomials in x, $e^{ax}V(x)$ and $x\,V(x)$, method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

UNIT-III: Laplace transforms   10 L
Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation   10 L
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   **10 L**

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

TEXT BOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and CompanyLimited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008

APPLIED PHYSICS

B.Tech. I Year II Sem.

	L	T	P	C
	3	1	0	4

Pre-requisites: 10 + 2 Physics

Course Objectives:
The objectives of this course for the student are to:
Understand the basic principles of quantum physics and band theory of solids.
1. Understand the underlying mechanism involved in construction and working principles of
2. various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nano scale, quantum confinement and various fabrications
5. techniques.
6. Study the characteristics of lasers and optical fibers.

Course Outcomes:
At the end of the course the student will be able to:
1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
4. Appreciate the features and applications of Nano materials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

UNIT - I: QUANTUM PHYSICS AND SOLIDS
Quantum Mechanics: Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect - Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time dependent and independent Schrodinger wave equation - particle in one dimensional potential box- Rectangular potential barrier
Solids: Symmetry in solids, free electron theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem -Kronig-Penney model – E-K diagram- effective mass of electron- origin of energy bands- classification of solids.

UNIT - II: SEMICONDUCTORS AND DEVICES
Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

UNIT - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS
Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric,and pyroelectric materials – applications – liquid crystal displays (LCD) and crystal oscillators.
Magnetic Materials: Hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics.

Energy Materials: Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

UNIT - IV: NANOTECHNOLOGY

Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods – top-down fabrication: ball milling - physical vapor deposition (PVD) – chemical vapor deposition (CVD) - characterization techniques - XRD, SEM &TEM - applications of nano materials.

UNIT -V: LASER AND FIBER OPTICS

Lasers: Laser beam characteristics-three quantum processes-Einstein coefficients and their relations- lasing action - pumping methods- ruby laser, He-Ne laser, CO2 laser, Argon ion Laser, Nd: YAG laser- semiconductor laser-applications of laser.

Fiber Optics: Introduction to optical fiber- advantages of optical Fibers - total internal reflection-Construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- Losses in optical fiber - optical fiber for communication system - applications.

Textbooks:
1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy", A Textbook of Engineering Physics"- **S. Chand Publications, 11th Edition 2019.**
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4thEdition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2ndEdition,2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives-NANO DIGEST, 1st Edition, 2021.

Reference Books:
1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition-2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion andStorageAliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1st Edition,
2022Solid state physics by R.L. Singhal-KNRN
Publications

ENGINEERING WORKSHOP

B.Tech. I Year II Sem.   **L   T   P   C**
                                                              0   1   3   2.5

Pre-requisites: Practical skills

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineeringproducts.
- To provide hands on experience about use of different engineering materials, tools, equipmentsand processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipmentand machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribedtolerances.

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

- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including pluming, fitting,
- carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including drilling,
- material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice..

1. TRADESFOREXERCISES:

At least two exercises from each trade:

    I.   Carpentry–(T-LapJoint,DovetailJoint, Mortise&TenonJoint)
    II.   Fitting–(V-Fit,DovetailFit&Semi-circularfit)
    III.   Tin-Smithy–(Square Tin,RectangularTray&ConicalFunnel)
    IV.   Foundry–(PreparationofGreenSandMouldusingSinglePieceandSplitPattern)
    V.   Welding Practice–(ArcWelding&GasWelding)
    VI.   House-wiring–(Parallel&Series, Two-waySwitchandTubeLight)
    VII.   BlackSmithy–(Round toSquare,FanHookandS-Hook)

2. TRADESFORDEMONSTRATION&EXPOSURE:

Plumbing,MachineShop,MetalCutting(WaterPlasma),PowertoolsinconstructionandWoodWorking

TEXTBOOKS:

1. WorkshopPractice/B.L.Juneja/Cengage
2. WorkshopManual/K.Venugopal/Anuradha.

REFERENCEBOOKS:

1. WorkshopManual-P.Kannaiah/K.L.Narayana/Scitech
2. WorkshopManual/VenkatReddy/BSP
3. Dictionary of Mechanical Engineering – G.H.F. Nayler, Jaico Publishing House.

BASIC ELECTRICAL ENGINEERING

B.TECH. I YEAR II SEMESTER   **L   T   P   C**
                                                                   2   0   0   2

Prerequisite: Matrices and Calculus, Intermediate Physics.

Course Objectives:
1. To know about KVL & KCL laws
2. To understand Single & Three phase AC circuits.
3. To learn about the working of DC Machines and Transformers.
4. To comprehend the working principle of Induction Motor.
5. To import the knowledge of various electrical installations and the concept of power, power factorand its improvement.

Course Outcomes: Upon completing this course, the student will be able to
1. Resolve electrical circuits using network laws and theorems.
2. Operate resonance in series RLC circuits.
3. Identify losses and calculate the efficiency of Transformer.
4. Analyze Torque-Speed Characteristics of Three phase Induction Motor.
5. Analyze importance of Earthing and Energy Consumption.

UNIT: I   D.C. CIRCUITS   10L
Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT: II   A.C. CIRCUITS   10L
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT: III   D.C.MACHINES & TRANSFORMERS   10L
Construction and working principle of dc machine, performance characteristics of dc shunt machine. Idealand practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto- transformer and three-phase transformer connections.

UNIT: IV   A.C. MACHINES   10L
Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.(Elementary Treatment Only)

UNIT: V   ELECTRICAL INSTALLATIONS   10L
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. 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, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand,2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1stEdition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering",2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

WEB REFERENCES:
1. https://nptel.ac.in/courses/108108076
2. https://nptel.ac.in/courses/108105053

ELECTRONIC DEVICES AND CIRCUITS

B.Tech. I Year II Sem.   **L T P C**
                                                                                                  2 0 0 2

Course Objectives:
1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.

Course Outcomes:
Upon completion of the Course, the students will be able to:
1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.

UNIT - I
Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

UNIT - II
Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III
Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

UNIT - IV
Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, VoltAmpere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT – V
Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle ofOperation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

TEXT BOOKS:
1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009,Pearson.

REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications,Cambridge, 2018.

PYTHON PROGRAMMING LABORATORY

B.Tech. I Year II Sem.

L	T	P	C
0	1	2	2

Course Objectives:
- To install and run the Python interpreter
  - To learn control structures.
- To Understand Lists, Dictionaries in python
  - To Handle Strings and Files in Python

Course Outcomes: After completion of the course, the student should be able to
- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O, Python standard library
- Implement Digital Systems using Python

Note: **The lab experiments will be like the following experiment examples**

Week -1:
1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a
Calculator.3.
   i) Write a program to calculate compound interest when principal, rate and number of periods are
      given.
   ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
   **4. Read name, address, email and phone number of a person through keyboard and
      printthe details.**

Week - 2:
1. Print the below triangle using for
   loop.5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or uppercasecharacter or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

Week - 3:
1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returnsTrue if it is a palindromeand False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4:

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sortedin ascending order and False otherwise.
2. Write a function called has_duplicates that takes a list and returns True if there is any element thatappears more than once. It should not modify the original list.

    i). Write a function called remove_duplicates that takes a list and returns a new list with only theunique elements from the original. Hint: they don't have to be in the same order.
    ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add"I", "a", and the empty string.
    iii). Write a python code to read dictionary values from the user. Construct a function to invert itscontent. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'

    ii) Remove the given word in all the places in a string?

    iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by correspondingletters in lower case without using a built-in function?
4. Writes a recursive function that generates all binary strings of n-bit length

Week - 5:

1. i) Write a python program that defines a matrix and prints
    ii) Write a python program to perform addition of two square matrices
    iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometricalshapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments anddraws a representation of the Rectangle on the Canvas.
    b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that ituses the color attribute as the fill color.
    c. Write a function called draw_point that takes a Canvas and a Point as arguments and draws arepresentation of the Point on the Canvas.
    d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects.Write a function called draw_circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiplelevels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week- 7

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present initand display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blankspaces, lower case letters and uppercase letters.

Week - 8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttonsas Submit and Reset.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage

APPLIED PHYSICS LABORATORY

B.Tech. I Year II Sem   **L   T   P   C**

                                                          0   0   3   1.5

Course Objectives:
The objectives of this course for the student to
1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments andtheir measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Able to measure the characteristics of dielectric constant of a given material.
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Understanding the method of least squares fitting.

Course Outcomes:
The students will be able to:
1. Know the determination of the Planck's constant using Photo electric effect and identify thematerial whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Gain the knowledge of applications of dielectric constant.
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Carried out data analysis.

List of Experiments:
1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode
5. Input and output characteristics of BJT (CE, CB & CC configurations)
6. a) V-I and L-I characteristics of light emitting diode (LED)
   b) V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of the resistivity of semiconductor by two probe method. 9. Study B-H curve of amagnetic material.
9. Determination of dielectric constant of a given material
10. a) Determination of the beam divergence of the given LASER beam
11. b) Determination of Acceptance Angle and Numerical Apertureof an optical fiber.
12. Understanding the method of least squares – torsional pendulum as an example.

   Note: Any 8 experiments are to be performed.

Reference book:
1. **S. Balasubramanian, M.N. Srinivasan "A Textbook of Practical Physics"- S. Chand Publishers,2017**

BASIC ELECTRICAL ENGINEERING LABORATORY

B.TECH. I YEAR II SEMESTER **L T P C**

0 0 2 1

Prerequisite: Basic Electrical Engineering
Course Objectives:
1. To measure the electrical parameters for different types of DC circuits.
2. To compute the electrical parameters for different types AC circuits
3. To observe the transient response of various R, L and C circuits using different excitations.
4. To determine the performance of different types of DC, and Transformers
5. To determine the performance of different types of AC machines.

Course Outcomes: Upon completing this course, the student will be able to
1. Verify the basic Electrical circuits through different experiments.
2. Verify the Active and Reactive power of three phase balanced circuit.
3. Evaluate the performance calculations of Electrical Machines through various testing methods.
4. Evaluate the performance calculations of Transformers through various testing methods.
5. Analyze the transient responses of R, L and C circuits for different input conditions

List of experiments/demonstrations:
PART- A (compulsory)
1. Verification of KVL , KCL & Superposition theorem
2. Verification of Thevenin's and Norton's theorem
3. Transient Response of Series RL and RC circuits for DC excitation
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC seriescircuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)
2. Three Phase Transformer: Verification of Relationship between Voltages and Currents(Star-Delta, Delta-Delta, Delta-star, Star-Star)
3. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator.

WEB REFERENCES:
http://vlabs.iitkgp.ernet.in/be/#

IT WORKSHOP

B.Tech. I Year II Sem.

	L	T	P	C
	0	0	2	1

Course Objectives: **The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher.**

Course Outcomes:

- Perform Hardware troubleshooting
- Understand Hardware components and inter dependencies
- Safeguard computer systems from viruses/worms
- Document/ Presentation preparation
- Perform calculations using spreadsheets

PC Hardware

Task 1: **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.**

Task 2: **Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.**

Task 3: **Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.**

Task 4: **Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva**

Internet & World Wide Web

Task1**:** 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, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.**

Task 2: 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.**

Task 3**:** Search Engines & Netiquette: **Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.**

Task 4: Cyber Hygiene: **Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsersto blockpop ups, block active x downloads to avoid viruses and/or worms.**

LaTeX and WORD

Task 1 – Word Orientation**: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.**

Task 2: Using LaTeX and Word **to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.**

Task 3: 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.**

Task 4: 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, Paragraphsand MailMerge in word.**

Excel

Excel Orientation: **The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excelas a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.**

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA **- .Features to be covered:- Cell Referencing, Formulae in excel – average,std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP**

Task 3: **Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting**

Powerpoint

Task 1: **Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.**

Task 2: **Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.**

Task 3: **Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter,**

notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*

2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEYDreamtech*

3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education.*

4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)

5. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.

6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson andKen Quamme. – *CISCO Press, Pearson Education*.

IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan –CISCO Press, *Pearson Education.*