

Dept. of Computer Science & Engineering (Data Science)

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE**

**MADANAPALLE  
(UGC-AUTONOMOUS)**

**[www.mits.ac.in](http://www.mits.ac.in)**



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
(DATA SCIENCE)**

**Course Structure**

**&**

**Detailed Syllabi**

For the students admitted to

**B. Tech. Regular Four Year Degree Programme from the Academic Year 2023-24**

and

**B. Tech. Lateral Entry Scheme from the Academic Year 2024-25**



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
(DATA SCIENCE)**

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE,  
MADANAPALLE**

**B. Tech Four Year Curriculum Structure**

**Branch: COMPUTER SCIENCE & ENGINEERING**

**(DATA SCIENCE)**

<b>Total Credits</b>	160 Credits for 2023(Regular) & 120 Credits 2024(Lateral Entry) Admitted Batch onwards
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**I. Induction Program and Holistic Development Activities**

<b>Sl.No</b>	<b>Title</b>	<b>Duration</b>
1	Induction Program (Mandatory)	Three weeks' duration at the start of First Year

**R23 - Curriculum Structure  
I Year I Semester**

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	BS&H	23ENG101	Communicative English	2	0	0	2	2
2	BS&H	23MAT101	Linear Algebra and Calculus	3	0	0	3	3
3	BS&H	23CHE102	Chemistry	3	0	0	3	3
4	ESC	23CME101	Basic Civil and Mechanical Engineering	3	0	0	3	3
5	ESC	23CSE101	Introduction to Programming	3	0	0	3	3
6	BS&H	23ENG201	Communicative English Laboratory	0	0	2	2	1
7	BS&H	23CHE202	Chemistry Laboratory	0	0	2	2	1
8	ESC	23CSE201	Computer Programming Laboratory	0	0	3	3	1.5
9	ESC	23ME201	Engineering Workshop	0	0	3	3	1.5
10	BS&H	23HUM201	Health and Wellness, Yoga and Sports	-	-	1	1	0.5
<b>Total</b>				<b>14</b>	<b>0</b>	<b>11</b>	<b>25</b>	<b>19.5</b>

**I Year II Semester**

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	BS&H	23MAT102	Differential Equations and Vector Calculus	3	0	0	3	3
2	BS&H	23PHY101	Engineering Physics	3	0	0	3	3
3	ESC	23EEE101	Basic Electrical and Electronics Engineering	3	0	0	3	3
4	ESC	23ME101	Engineering Graphics	1	0	4	5	3
5	PCC	23CSE102	Data Structures	3	0	0	3	3
6	BS&H	23PHY201	Engineering Physics Laboratory	0	0	2	2	1
7	ESC	23EEE201	Electrical and Electronics Engineering Workshop	0	0	3	3	1.5
8	ESC	23CSE202	IT Workshop	0	0	2	2	1
9	PCC	23CSE203	Data Structures Laboratory	0	0	3	3	1.5
10	BS&H	23HUM202	NSS / NCC / Scouts and Guides / Community Service	-	-	1	1	0.5
<b>Total</b>				<b>13</b>	<b>0</b>	<b>15</b>	<b>28</b>	<b>20.5</b>

(L = Lecture, T = Tutorial, P = Practical, C = Credit)

### THREE WEEK MANDATORY INDUCTION PROGRAMME

- Yoga and Meditation
- Sports and Games
- NSS
- NCC
- MITS Social Responsibility Club
- Management module
- Design Thinking
- Spoken and Written Communication

➤ *Proficiency modules*

- Basic Computer Proficiency
- Interpersonal skills
- Computer Graphics
- Web programming
- Mobile Apps
- Vocabulary enhancement

### HOLISTIC DEVELOPMENT ACTIVITIES

#### Description of Activities

1. Physical and Health
2. Culture
3. Literature and Media
4. Social Service
5. Self-Development
6. Nature and Environment
7. Innovation

# I Year I Semester

**B. Tech I Year I Semester**

**23ENG101 COMMUNICATIVE ENGLISH**

**L T P C**  
**2 0 0 2**

**Pre-requisite:** None

**Course Objectives:**

The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

**UNIT I Lesson: HUMAN VALUES: Gift of Magi (Short Story) 9 hours**

- Listening:** Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
- Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
- Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.
- Writing:** Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
- Grammar:** Parts of Speech, Basic Sentence Structures-forming questions
- Vocabulary:** Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

**UNIT II Lesson: NATURE: The Brook by Alfred Tennyson (Poem) 9 hours**

- Listening:** Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
- Speaking:** Discussion in pairs/small groups on specific topics followed by short structure talks.
- Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
- Writing:** Structure of a paragraph - Paragraph writing (specific topics)
- Grammar:** Cohesive devices - linkers, use of articles and zero article; prepositions.
- Vocabulary:** Homonyms, Homophones, Homographs.

**UNIT III Lesson: BIOGRAPHY: Elon Musk 9 hours**

- Listening:** Listening for global comprehension and summarizing what is listened to.
- Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed
- Reading:** Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
- Writing:** Summarizing, Note-making, paraphrasing
- Grammar:** Verbs - tenses; subject-verb agreement; Compound words, Collocations

**Vocabulary:** Compound words, Collocations

**UNIT IV Lesson: INSPIRATION: The Toys of Peace by Saki 9 hours**

**Listening:** Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

**Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

**Writing:** Letter Writing: Official Letters, Resumes

**Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice

**Vocabulary:** Words often confused, Jargons

**UNIT V Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay) 9 hours**

**Listening:** Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

**Speaking:** Formal oral presentations on topics from academic contexts

**Reading:** Reading comprehension.

**Writing:** Writing structured essays on specific topics.

**Grammar:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

**Vocabulary:** Technical Jargons

**Course Outcomes:**

**CO1:** Understand the topic, context, and pieces of specific information from personal , professional and social situations

**CO2:** Apply discourse markers to speak clearly in formal discussions

**CO3:** Analyze and apply grammatical structures to formulate contextualized phrases and sentences

**CO4:** Analyze texts and images to write summaries based on global comprehension

**CO5:** Draft coherent paragraphs and structured essays

**Text Books:**

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

**Reference Books:**

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

**Web Resources**

**Grammar**

- 1 [www.bbc.co.uk/learningenglish](http://www.bbc.co.uk/learningenglish)
- 2 <https://dictionary.cambridge.org/grammar/british-grammar/>
- 3 [www.eslpod.com/index.html](http://www.eslpod.com/index.html)
- 4 <https://www.learngrammar.net/>
- 5 <https://english4today.com/english-grammar-online-with-quizzes/>

**VOCABULARY**

- 1 <https://www.youtube.com/c/DailyVideoVocabulary/videos>
- 2 [https://www.youtube.com/channel/UC4cmBAit8i\\_NJZE8qK8sfpA](https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA)

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.



**B. Tech I Year I Semester**

**23MAT101 LINEAR ALGEBRA AND CALCULUS**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

**UNIT I MATRICES 9 hours**

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). 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, Jacobi and Gauss Seidel Iteration Methods.

**UNIT II EIGENVALUES, EIGENVECTORS AND ORTHOGONAL TRANSFORMATION 9 hours**

Eigenvalues, 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 9 hours**

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

**UNIT IV PARTIAL DIFFERENTIATION AND APPLICATIONS (MULTI VARIABLE CALCULUS) 9 hours**

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

**UNIT V MULTIPLE INTEGRALS (MULTI VARIABLE CALCULUS) 9 hours**

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

**Course Outcomes:**

At the end of the course, the student will be able to

CO1: Solve the system of linear equations and apply the matrix algebra techniques in practical applications.

CO2: Utilize the Eigenvalues, Eigenvectors and applications of diagonalization in the field of Science and Technology.

CO3: Relate the results of mean value theorems in real life problems.

CO4: Apply the functions of several variables to evaluate the rates of change with respect to time and space variables in engineering.

CO5: Compute the area and volume by interlinking them to appropriate double and triple integrals.

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### **Text Books:**

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

### **Reference Books:**

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14<sup>th</sup> Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, AlphaScience International Ltd., 2021 5<sup>th</sup> Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5<sup>th</sup> Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, Pearson publishers, 9<sup>th</sup> edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year I Semester**

**23CHE102 CHEMISTRY**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches.

**UNIT I STRUCTURE AND BONDING MODELS**

**9 hours**

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of  $\Psi$  and  $\Psi^2$ , particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of N<sub>2</sub>, O<sub>2</sub> and NO, CO  $\pi$ -molecular orbitals of butadiene and benzene, calculation of bond order.

**UNIT II MODERN ENGINEERING MATERIALS**

**9 hours**

Semiconductors – Introduction, basic concept, role of doping agents, applications  
Super conductors -Introduction, basic concept, applications.  
Supercapacitors: Introduction, Basic Concept-Classification – Applications.  
Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphene nanoparticles.

**UNIT III ELECTROCHEMISTRY AND APPLICATIONS**

**9 hours**

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).  
Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.  
Primary cells – Zinc-air battery, Sodium-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

**UNIT IV POLYMER CHEMISTRY**

**9 hours**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation, Poly Dispersity Index (PDI) & it's significance  
Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.  
Elastomers–Buna-S, Buna-N–preparation, properties and applications.  
Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications.  
Bio-Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

**UNIT V INSTRUMENTAL METHODS AND APPLICATIONS**

**9 hours**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopy, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

**Course Outcomes:**

At the end of the course, the students will be able to:

- CO1: Explain the foundations of Quantum mechanics and concept of bonding in homo and hetero diatomic molecules like O<sub>2</sub>, CO etc.
- CO2: Apply the principle of Band diagrams in the application of conductors and semiconductors. Properties and applications of nanomaterials.
- CO3: Compare the materials of construction for battery, its working principles, fuel cells & electrochemical sensors.
- CO4: Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers conducting polymers.
- CO5: Explain the principles of spectrometry, technique of HPLC in separation of solid and liquid mixtures. Summarize the concepts of Instrumental methods.

**Text Books:**

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.
3. G V Subba Reddy, K N Jayaveera, C Ramachandraiah, Engineering Chemistry, McGraw-Hill; First Edition, 2019.

**Reference Books:**

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5<sup>th</sup> Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year I Semester**

**23CME101 BASIC CIVIL AND MECHANICAL ENGINEERING**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

- Get familiarized with the scope and importance of Civil Engineering sub-divisions.
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation's economy.
- Get familiarized with the importance of quality, conveyance and storage of water.
- Introduction to basic civil engineering materials and construction techniques.

**PART A: BASIC CIVIL ENGINEERING**

**UNIT I BASICS OF CIVIL ENGINEERING**

**8 hours**

Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

**UNIT II SURVEYING**

**8 hours**

Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.

**UNIT III TRANSPORTATION ENGINEERING**

**8 hours**

Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.

Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology-Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

**Course Outcomes:**

- CO1: Identify various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.
- CO2: Measure of distances, angles and levels through surveying.
- CO3: Identify various transportation infrastructures, sources of water and various water conveyance, storage structures like dams and reservoirs.

**Text Books:**

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt.Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers.2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

**Reference Books:**

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38<sup>th</sup> Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10<sup>th</sup> Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

**PART B: BASIC MECHANICAL ENGINEERING**

**Course Objectives:**

The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.
- Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

**UNIT I**

**8 hours**

**Introduction to Mechanical Engineering:** Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

**Engineering Materials** - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

**UNIT II**

**8 hours**

**Manufacturing Processes:** Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

**Thermal Engineering** – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

**UNIT III**

**8 hours**

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants. Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

**Course Outcomes:**

On completion of the course, the student should be able to

CO1: Understand the role and importance of mechanical engineering and engineering materials

CO2: Identify the different manufacturing processes for engineering applications and explain the basics of thermal engineering and its applications.

CO3: Explain the working of different mechanical power transmission systems, power plants and robotics.

**Text Books:**

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A Text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications,(India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage Learning India Pvt. Ltd.

**Reference Books:**

1. Appu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak MPandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt.Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year I Semester**

**23CSE101 INTRODUCTION TO PROGRAMMING**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

- Comprehensive knowledge to computer systems, programming languages, and problem-solving techniques.
- Know the concept of control structures and their usage in programming.
- Introduce to the arrays, memory models, and basic string concepts
- Gain a knowledge from the concept of functions, including declaration, definition, and various aspects of function usage.
- Acquire the advanced programming concepts, including user-defined data types, pointers, and file handling.

**UNIT I INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING 9 hours**

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

**UNIT II CONTROL STRUCTURES 9 hours**

Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

**UNIT III ARRAYS AND STRINGS 9 hours**

Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings, String Operations and String functions.

**UNIT IV POINTERS & USER DEFINED DATA TYPES 9 hours**

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions, Dynamic memory allocation.

**UNIT V FUNCTIONS & FILE HANDLING 9 hours**

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling

**Note:** The syllabus is designed with C Language as the fundamental language of implementation.



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### **Course Outcomes:**

A student after completion of the course will be able to

CO1: Illustrate the basic computer concepts and programming principles of C language.

CO2: Develop programs using various control structures in 'C'.

CO3: Design applications using arrays and basic string manipulation.

CO4: Demonstrate the applications of pointers, user-defined types and dynamic memory allocation.

CO5: Design various applications using functions and file concepts.

### **Text Books:**

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition.

### **Reference Books:**

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2<sup>nd</sup> edition
3. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
4. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year I Semester**

**23ENG201 COMMUNICATIVE ENGLISH LABORATORY**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

**List of Topics:**

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

**Course Outcomes:**

- CO1: Understand the English speech sounds, stress, rhythm, intonation and syllabic division for better listening and speaking
- CO2: Apply communication strategies and implement them in language learning activities.
- CO3: Analyze and enhance job-relevant writing skills
- CO4: Evaluate and exhibit professionalism in debates and group discussions.
- CO5: Make effective presentations by developing public speaking abilities

**Suggested Software:**

1. Walden Infotech
2. Young India Films

**Reference Books:**

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press.2018.
2. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India,2016
3. Hewing's, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
4. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English*, (2<sup>nd</sup> Ed),Kindle, 2013

**Web Resources:**

Spoken English:

1. [www.esl-lab.com](http://www.esl-lab.com)
2. [www.englishmedialab.com](http://www.englishmedialab.com)

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3. [www.englishinteractive.net](http://www.englishinteractive.net)
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. [https://www.youtube.com/c/mmmEnglish\\_Emma/featured](https://www.youtube.com/c/mmmEnglish_Emma/featured)
7. <https://www.youtube.com/c/ArnelsEverydayEnglish/featured>
8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. [https://www.youtube.com/channel/UCV1h\\_cBE0Drdx19qkTM0WNw](https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw)

### **Voice & Accent:**

1. <https://www.youtube.com/user/letstalkaccent/videos>
2. <https://www.youtube.com/c/EngLanguageClub/featured>
3. [https://www.youtube.com/channel/UC\\_OskgZBoS4dAnVUgJVexc](https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc)
4. [https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp\\_IA](https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA)

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination

**B. Tech I Year I Semester**

**23CHE202 CHEMISTRY LABORATORY**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

- Verify the fundamental concepts with experiments.

**List of Experiments:**

1. Measurement of  $10Dq$  by spectrophotometric method
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Identification of functional groups in simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

**Course Outcomes:**

At the end of the course, the students will be able to

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer Bakelite materials.

CO3: Measure the strength of an acid present in secondary batteries.

CO4: Measure the wavelength of absorption of some organic compounds using UV-Vis spectroscopy.

CO5: Determine the EMF & redox potentials using potentiometric titrations.

**Reference Books:**

1. Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination

**B. Tech I Year I Semester**

**23CSE201 COMPUTER PROGRAMMING LABORATORY**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

- Provide hands-on experience in programming fundamentals, algorithm design, and basic problem-solving techniques.
- Enable students to implement control structures for program flow control in practical scenarios.
- Reinforce understanding of arrays, memory models, and string manipulation through practical exercises
- Provide hands-on practice with functions, function calls, and parameter manipulation using pointers.
- Offer practical exposure to advanced programming concepts, including user-defined data types, file handling, and pointer operations.

**UNIT I**

**WEEK 1**

**Objective:** Getting familiar with the programming environment on the computer and writing the first program.

**Suggested Experiments/Activities:**

**Tutorial 1:** Problem-solving using Computers.

**Lab1:** Familiarization with programming environment

- i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- ii) Exposure to Turbo C, gcc
- iii) Writing simple programs using printf(), scanf()

**WEEK 2**

**Objective:** Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

**Suggested Experiments /Activities:**

**Tutorial 2:** Problem-solving using Algorithms and Flow charts.

**Lab 1:** Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

- i) Sum and average of 3 numbers
- ii) Conversion of Fahrenheit to Celsius and vice versa

Simple interest calculation

**WEEK 3**

**Objective:** Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

**Suggested Experiments/Activities:**

**Tutorial 3:** Variable types and type conversions:

**Lab 3:** Simple computational problems using arithmetic expressions.

**Problems to Practice:**

- i) Finding the square root of a given number
- ii) Finding compound interest
- iii) Area of a triangle using heron's formulae
- iv) Distance travelled by an object

**UNIT II**

**WEEK 4**

**Objective:** Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

**Suggested Experiments/Activities:**

**Tutorial 4:** Operators and the precedence and as associativity:

**Lab 4:** Write C program to solve Simple computational problems using the operator's precedence and associativity

**Problems to Practice:**

- i) Evaluate the following expressions.
  - a.  $A+B*C+(D*E) + F*G$
  - b.  $A/B*C-B+A*D/3$
  - c.  $A+++B---A$
  - d.  $J= (i++) + (++i)$
- ii) Find the maximum of three numbers using conditional operator
- iii) Take marks of 5 subjects in integers, and find the total, average in float

**WEEK 5**

**Objective:** Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if\*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

**Suggested Experiments/Activities:**

**Tutorial 5:** Branching and logical expressions:

**Lab 5:** Write C program for Problems involving if-then-else structures.

**Problems to Practice:**

- i) Write a C program to find the max and min of four numbers using if-else.
- ii) Write a C program to generate electricity bill.
- iii) Find the roots of the quadratic equation.
- iv) Write a C program to simulate a calculator using switch case.
- v) Write a C program to find the given year is a leap year or not.

**WEEK 6**

**Objective:** Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

**Suggested Experiments/Activities:**

**Tutorial 6:** Loops, while and for loops

**Lab 6:** Write a C program for Iterative problems e.g., the sum of series

**Problems to Practice:**

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) Compute sine and cos series
- iv) Checking a number palindrome
- v) Construct a pyramid of numbers.

**UNIT III**

**WEEK 7:**

**Objective:** Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

**Suggested Experiments/Activities:**

**Tutorial 7:** 1 D Arrays: searching.

**Lab 7:** Write a C program to solve 1D Array manipulation, linear search

**Problems to Practice:**

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 1D array.
- iii) The reverse of a 1D integer array
- iv) Find 2's complement of the given binary number.
- v) Eliminate duplicate elements in an array.

**WEEK 8:**

**Objective:** Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

**Suggested Experiments/Activities:**

**Tutorial 8:** 2 D arrays, sorting and Strings.

**Lab 8:** Write a C program to solve Matrix problems, String operations, Bubble sort

**Problems to Practice:**

- i) Addition of two matrices
- ii) Multiplication two matrices
- iii) Sort array elements using bubble sort
- iv) Concatenate two strings without built-in functions
- v) Reverse a string using built-in and without built-in string functions

## UNIT IV

### WEEK 9:

**Objective:** Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

#### Suggested Experiments/Activities:

**Tutorial 9:** Pointers, structures and dynamic memory allocation

**Lab 9: Write a C program for** Pointers and structures, memory dereference.

#### Problems to Practice:

- i) Write a C program to find the sum of a 1D array using malloc()
- ii) Write a C program to find the total, average of n students using structures
- iii) Enter n students data using calloc() and display failed students list
- iv) Read student name and marks from the command line and display the student details alongwith the total.
- v) Write a C program to implement realloc()

### WEEK 10:

**Objective:** Experiment with C Structures, Unions, bit fields and self-referential structures(Singly linked lists) and nested structures

#### Suggested Experiments/Activities:

**Tutorial 10:** Bitfields, Self-Referential Structures, Linked lists

**Lab10 :** Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

- i) Create and display a singly linked list using self-referential structure.
- ii) Demonstrate the differences between structures and unions using a C program.
- iii) Write a C program to shift/rotate using bitfields.
- iv) Write a C program to copy one structure variable to another structure of the same type.

## UNIT V

### WEEK 11:

**Objective:** Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

#### Suggested Experiments/Activities:

**Tutorial 11:** Functions, call by value, scope and extent,

**Lab 11:** Write a C program to solve Simple functions using call by value, solving differential equations using Eulers theorem.

#### Problems to Practice:

- i) Write a C function to calculate NCR value.
- ii) Write a C function to find the length of a string.



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- iii) Write a C function to transpose of a matrix.
- iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

### WEEK 12:

**Objective:** Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

#### Suggested Experiments/Activities:

**Tutorial 12:** Recursion, the structure of recursive calls

**Lab 12:** Write C program for Recursive functions.

#### Problems to Practice:

- i) Write a recursive function to generate Fibonacci series.
- ii) Write a recursive function to find the lcm of two numbers.
- iii) Write a recursive function to find the factorial of a number.
- iv) Write a C Program to implement Ackermann function using recursion.
- v) Write a recursive function to find the sum of series.

### WEEK 13:

**Objective:** Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

#### Suggested Experiments/Activities:

**Tutorial 13:** Call by reference, dangling pointers

**Lab 13:** Write a C program to solve Simple functions using Call by reference, Dangling pointers.

#### Problems to Practice:

- i) Write a C program to swap two numbers using call by reference.
- ii) Demonstrate Dangling pointer problem using a C program.
- iii) Write a C program to copy one string into another using pointer.
- iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

### WEEK 14:

**Objective:** To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

#### Suggested Experiments/Activities:

**Tutorial 14:** File handling

**Lab 14:** Write a C program to handle File operations.

#### Problems to Practice:

- i) Write a C program to write and read text into a file.
- ii) Write a C program to write and read text into a binary file using fread() and fwrite()
- iii) Copy the contents of one file to another file.
- iv) Write a C program to merge two files into the third file using command-line arguments.
- v) Find no. of lines, words and characters in a file.

Write a C program to print last n characters of a given file.

**Course Outcomes:**

- CO1: Implement coding and debugging the simple programs, create algorithms, and practice problem solving strategies using programming languages.
- CO2: Demonstrate programs that incorporate conditional statements, loops, and break/continue statements to control program execution.
- CO3: Apply coding for real time examples with arrays, array indexing, and manipulate strings in programming tasks.
- CO4: Create, call, and debug functions, modify function parameters using pointers, and gain practical knowledge of variable scope within functions.
- CO5: Apply user-defined data types, manipulate files, pointer operations to solve real-world programming challenges.

**Textbooks:**

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

**Reference Books:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw Hill

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination

**B. Tech I Year I Semester**

**23ME201 ENGINEERING WORKSHOP**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

1. **Demonstration:** Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
  - a) Half – Lap joint
  - b) Mortise and Tenon joint
  - c) Corner Dovetail joint or Bridlejoint
3. **Sheet Metal Working:** Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
  - a) Tapered tray
  - b) Conical funnel
  - c) Elbow pipe
  - d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
  - a) V-fit
  - b) Dovetail fit
  - c) Semi-circular fit
  - d) Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring:** Familiarity with different types of basic electrical circuits and make the following connections.
  - a) Parallel and series
  - b) Two-way switch
  - c) Godown lighting
  - d) Tube light
  - e) Three phase motor
  - f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

**Course Outcomes:**

CO1: Identify workshop tools and their operational capabilities.

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

**Textbooks:**

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

**Reference Books:**

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, MediaPromoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; AtulPrakashan, 2021-22.

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination

**B. Tech I Year I Semester**

**23HUM201 HEALTH AND WELLNESS, YOGA AND SPORTS**

**L T P C**  
**0 0 1 0.5**

**Course Objectives:**

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

**UNIT I**

**5 hours**

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index(BMI) of all age groups.

**Activities:**

- i) Organizing health awareness programmes in community
- ii) Preparation of health profile
- iii) Preparation of chart for balance diet for all age groups

**UNIT II**

**5 hours**

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

**Activities:**

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

**UNIT III**

**5 hours**

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

**Activities:**

- i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
- ii) Practicing general and specific warm up, aerobics
- iii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

**Course Outcomes:**

After completion of the course the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.

CO2: Demonstrate an understanding of health-related fitness components.

CO3: Compare and contrast various activities that help enhance their health.

CO4: Assess current personal fitness levels.

CO5: Develop Positive Personality

**Reference Books:**

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty,
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. HumanKinetics, Inc. 2014

**General Guidelines:**

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

**Evaluation Guidelines:**

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

# I Year II Semester

**B. Tech I Year II Semester**

**23MAT102 DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

**UNIT I DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE 9 hours**

Linear differential equations – Bernoulli’s equations- Exact equations and equations reducible to exact form. Applications: Newton’s Law of cooling – Law of natural growth and decay- Electrical circuits.

**UNIT II LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER (CONSTANT COEFFICIENTS) 9 hours**

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

**UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9 hours**

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange’s method. Homogeneous Linear Partial differential equations with constant coefficients.

**UNIT IV VECTOR DIFFERENTIATION 9 hours**

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

**UNIT V VECTOR INTEGRATION 9 hours**

Line Integral-circulation-work done, surface integral-flux, Green’s theorem in the plane (without proof), Stoke’s theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

**Course Outcomes:**

At the end of the course, the student will be able to

CO1: Find the solution of engineering problems formulated in the form of linear first order differential equations.

CO2: Solve the linear higher order differential equations related to various engineering fields.

CO3: Determine the solutions for linear partial differential equations that model the physical processes.

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO5: Estimate the work done against field, circulation and flux using vector calculus.



**Text Books:**

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

**Reference Books:**

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year II Semester**

**23PHY101 ENGINEERING PHYSICS**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

**UNIT I WAVE OPTICS**

**9 hours**

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

**UNIT II CRYSTALLOGRAPHY AND X-RAY DIFFRACTION**

**9 hours**

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

**UNIT III QUANTUM MECHANICS AND FREE ELECTRON THEORY**

**9 hours**

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

**UNIT IV SEMICONDUCTORS**

**9 hours**

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

**UNIT V DIELECTRIC AND MAGNETIC MATERIALS**

**9 hours**

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility

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and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

### Course Outcomes:

- CO1:** Apply the knowledge of Interference, Diffraction and Polarization techniques for materials testing and explore their applications in both science and technology.
- CO2:** Explain the crystal structure in terms of atomic positions, unit cells, and crystal symmetry and also relate the crystal symmetry to the symmetry observed in a diffraction pattern.
- CO3:** Evaluate the Schrodinger wave equations for simple potentials and explain the concept of conductivity of different types of materials.
- CO4:** Distinguish the semiconductors using Fermi level and identify the type of semiconductors using Hall effect.
- CO5:** Explain the origin of fundamental magnetic phenomena and types of magnetic materials. Understand the induced fields in dielectrics, and electrical behaviour of dielectrics.

### Text Books:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

### Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics” - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.2010
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

**Web Resources:** <https://www.loc.gov/rr/scitech/selected-internet/physics.html>

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year II Semester**

**23ME101 ENGINEERING GRAPHICS**

**L T P C**  
**1 0 4 3**

**Course Objectives:**

- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
- To impart knowledge on the projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
- To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

**UNIT I**

**9 hours**

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involute, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

**UNIT II**

**9 hours**

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

**UNIT III**

**9 hours**

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

**UNIT IV**

**9 hours**

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

**UNIT V**

**9 hours**

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (Not for end examination).

**Course Outcomes:**

Students will use the Auto CAD software and will be able to

CO1: Construct the geometrical constructions, engineering curves and scales.

CO2: Draw the projections of points, straight lines and planes

CO3: Draw the projections of solids in various positions

CO4: Sketch the sections of solids and developments of surfaces

CO5: Draw the conversion of the isometric views to orthographic views and vice versa.

**Text Books:**

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

**Reference Books:**

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

**Mode of Evaluation:** Day-to-day Evaluation, Mid Term Tests and End Semester Examination.

**B. Tech I Year II Semester**

**23EEE101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

L	T	P	C
3	0	0	3

**Course Objectives:**

- To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

**PART A: BASIC ELECTRICAL ENGINEERING**

**UNIT I DC & AC CIRCUITS 8 hours**

**DC Circuits:** Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

**AC Circuits:** A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

**UNIT II MACHINES AND MEASURING INSTRUMENTS 8 hours**

**Machines:** Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

**Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

**UNIT III ENERGY RESOURCES, ELECTRICITY BILL & SAFETY MEASURES 8 hours**

**Energy Resources:** Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

**Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

**Equipment Safety Measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock

**Course Outcomes:**

After the completion of the course students will be able to

CO1: Infer the basic AC and DC electrical circuits.

CO2: Analyze construction and operation of AC and DC machines, different electrical measuring instruments.

CO3: Illustrate operation of various power generating stations, energy consumption and electrical safety.

**Text Books:**

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

**Reference Books:**

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition.

**Web Resources:**

1. <https://nptel.ac.in/courses/108105053>
2. <https://nptel.ac.in/courses/108108076>

**PART B: BASIC ELECTRONICS ENGINEERING**

**Course Objectives:**

This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

**UNIT I SEMICONDUCTOR DEVICES 8 hours**

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

**UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION 8 hours**

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

**UNIT III DIGITAL ELECTRONICS 8 hours**

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables

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and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

### **Course Outcomes:**

After the completion of the course students will be able to

CO1: Explain the theory, construction, and operation of electronic devices.

CO2: Apply the concept of science and mathematics to explain the working of diodes, transistors, and their applications.

CO3: Analyze logic gates and its applications in design of combinational circuits.

### **Text Books:**

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4<sup>th</sup> Edition, Tata Mc Graw Hill, 2009

### **Reference Books:**

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.



**B. Tech I Year II Semester**

**23CSE102 DATA STRUCTURES**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

- To attain proficiency in essential knowledge and skills for effectively employing linear data structures and making informed decisions when utilizing them to tackle real-world practical challenges.
- To gain a comprehensive understanding of linked lists, including their different types, operations, and practical applications.
- To explore stacks properties, operations and how stacks are utilized for the evaluation of mathematical expressions, including infix, postfix, and prefix notations.
- To understand the concepts of queues, their operations, and their applications in areas like breadth-first search and scheduling.
- To Provide an overview of Trees and Hashing as a technique for data organization.

**UNIT I**

**9 hours**

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort.

**UNIT II**

**9 hours**

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists  
Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists

**UNIT III**

**9 hours**

Applications of stacks in expression evaluation, backtracking, reversing list etc.  
Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.  
Deque: Introduction to deque (double-ended queues), Operations on deque and their applications.

**UNIT IV**

**9 hours**

Trees: Introduction to Trees, Binary Tree, Tree Traversal, Binary Search Tree – Insertion, Deletion & Traversal, Height Balanced Trees, Heap Tree, Heap Sort

**UNIT V**

**9 hours**

Graphs: Representations, Biconnected components, Topological sort.  
Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

**Course Outcomes:**

At the end of the course, Student will be able to

CO1: Apply their knowledge and skills in the context of linear data structures, algorithmic analysis, searching, and sorting, enabling them to solve practical problems.

CO2: Implement linked lists, stack and their applications.

CO3: Implement queues and its applications.

CO4: Implement tree operations for binary tree, binary search tree, height balanced trees and heap tree.

CO5: Design graph and analyse various collision resolution techniques for hashing.

**Text Books:**

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2<sup>nd</sup> Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

**Reference Books:**

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year II Semester**

**23PHY201 ENGINEERING PHYSICS LABORATORY**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

**List of Experiments:**

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a Compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

**Note:** Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

**Course Outcomes:**

**CO1:** Know the various phenomena of light practically and gain knowledge about various optical technique methods.

**CO2:** Verify the theoretical concepts of optics, magnetism and dielectrics by hands on experiment.

**CO3:** Apply the scientific process in the conduct of semiconductor experiments and report the experimental findings.

**CO4:** Understand mechanical phenomena by instruments and apply them in real time applications.

**CO5:** Acquire and interpret experimental data to examine the physical laws.

**Web Resources:**

www.vlab.co.in

<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

**Reference Books:**

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; AtulPrakashan, 2021-22.

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination

**B. Tech I Year II Semester**

**23EEE201 ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

**Activities:**

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
  - Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
  - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
  - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
  - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

**PART A: ELECTRICAL ENGINEERING LABORATORY**

**List of experiments:**

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum Six Experiments to be performed.

**Course Outcomes:**

At the end of the course, the student will be able to

CO1: Analyze basic DC circuits.

CO2: Understand the usage of common electrical & electronic measuring instruments.

CO3: Understand the basic characteristics of electrical machines and perform energy calculations.

**PART B: ELECTRONICS ENGINEERING LABORATORY**

**Course Objectives:**

- To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

**List of Experiments:**

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifier.
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

**Tools / Equipment Required:** DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

**Note:** Minimum Six Experiments to be performed. All the experiments shall be implemented using Hardware / Software.

**Course Outcomes:**

At the end of the course, the student will be able to

CO1: Plot and discuss the characteristics of various electron devices.

CO2: Explain the operation of a digital circuit.

**Reference Books:**

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4<sup>th</sup> Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination

**B. Tech I Year II Semester**

**23CSE202 IT WORKSHOP**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS To teach basic command line interface commands on Linux.
- To teach the usage of Internet for productivity and self-paced life-long learning
- To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

**PC Hardware & Software Installation**

**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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Task 5:** Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

**Internet & World Wide Web**

**Task 1:** 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.

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**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 browsers to block pop 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 La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX 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 La TeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 2:** Using La TeX 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 La TeX 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, Paragraphs and Mail Merge in word.

### **EXCEL**

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as 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

### **POWER POINT**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic power point 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.

### **AI TOOLS – ChatGPT**

**Task 1:** Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.



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- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

**Task 2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

**Task 3:** Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

### Course Outcomes:

CO1: Gain expertise in computer hardware, assembly, and dual-boot OS configuration, enhancing their ability to manage and troubleshoot computer systems effectively.

CO2: Learn to connect to the LAN, configure browsers, use search engines effectively, and practice cyber hygiene for secure internet use.

CO3: Create well-formatted documents and presentations using Microsoft Office and Latex

CO4: Gain proficiency in using Excel or its FOSS equivalent for tasks like scheduling, GPA calculation, data manipulation, and formatting.

CO5: Craft effective and tailored inputs to obtain desired responses from AI tools like ChatGPT.

### Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
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, David Anfins on and KenQuamme. – CISCO Press, Pearson Education, 3<sup>rd</sup> edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3<sup>rd</sup> edition

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination

**B. Tech I Year II Semester**

**23CSE203 DATA STRUCTURES LABORATORY**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

**List of Experiments:**

**Exercise 1: Array Manipulation**

- i) Write a program to reverse an array.
- ii) C Programs to implement the Searching Techniques – Linear & Binary Search
- iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

**Exercise 2: Linked List Implementation**

- i) Implement a singly linked list and perform insertion and deletion operations.
- ii) Develop a program to reverse a linked list iteratively and recursively.
- iii) Solve problems involving linked list traversal and manipulation.

**Exercise 3: Linked List Applications**

- i) Create a program to detect and remove duplicates from a linked list.
- ii) Implement a linked list to represent polynomials and perform addition.
- iii) Implement a double-ended queue (deque) with essential operations.

**Exercise 4: Double Linked List Implementation**

- i) Implement a doubly linked list and perform various operations to understand its properties and applications.
- ii) Implement a circular linked list and perform insertion, deletion, and traversal.

**Exercise 5: Stack Operations**

- i) Implement a stack using arrays and linked lists.
- ii) Write a program to evaluate a postfix expression using a stack.
- iii) Implement a program to check for balanced parentheses using a stack.

**Exercise 6: Queue Operations**

- i) Implement a queue using arrays and linked lists.
- ii) Develop a program to simulate a simple printer queue system.
- iii) Solve problems involving circular queues.

**Exercise 7: Stack and Queue Applications**

- i) Use a stack to evaluate an infix expression and convert it to postfix.
- ii) Create a program to determine whether a given string is a palindrome or not.
- iii) Implement a stack or queue to perform comparison and check for symmetry.

**Exercise 8: Binary Tree & Binary Search Tree**

- i) Implement Binary tree using array and linked list.
- ii) Implement BST using Linked List.
- iii) Traversing of BST.

**Exercise 9: Hashing**

- i) Implement a hash table with collision resolution techniques.
- ii) Write a program to implement a simple cache using hashing.

**Course Outcomes:**

At the end of the course, Student will be able to

CO1: Implement different types of sorting and searching algorithms using array.

CO2: Demonstrating the different types of linked lists with its basic operations and applications.

CO3: Develop programs using stacks to handle evaluating expressions and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and other related real world problems.

CO5: Implement trees, graph and recognize scenarios where hashing is advantageous and design hash-based solutions for specific problems.

**Text Books:**

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2<sup>nd</sup> Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

**Reference Books:**

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination

**B. Tech I Year II Semester**

**23HUM202 NSS/NCC/SCOUTS AND GUIDES/COMMUNITY SERVICE**

**L T P C**  
**0 0 1 0.5**

**Course Objectives:**

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

**UNIT I ORIENTATION**

**5 hours**

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, careerguidance.

**Activities:**

- i) Conducting –ice breaking sessions-expectations from the course-knowing personaltalents and skills
- ii) Conducting orientations programs for the students –future plans-activities-releasingroad map etc.
- iii) Displaying success stories-motivational biopics- award winning movies on societalissues etc.
- iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

**UNIT II NATURE & CARE**

**5 hours**

**Activities:**

- i) Best out of waste competition.
- ii) Poster and signs making competition to spread environmental awareness.
- iii) Recycling and environmental pollution article writing competition.
- iv) Organising Zero-waste day.
- v) Digital Environmental awareness activity via various social media platforms.
- vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
- vii) Write a summary on any book related to environmental issues.

**UNIT III COMMUNITY SERVICE**

**5 hours**

**Activities:**

- i) Conducting One Day Special Camp in a village contacting village-area leaders-Surveyin the village, identification of problems- helping them to solve via media-authorities-experts-etc.
- ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- iii) Conducting consumer Awareness. Explaining various legal provisions etc.
- iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and PopulationEducation.
- v) Any other programmes in collaboration with local charities, NGOs etc.

**Course Outcomes:**

After completion of the course the students will be able to

**CO1:** Understand the importance of discipline, character and service motto.

**CO2:** Solve some societal issues by applying acquired knowledge, facts, and techniques.

**CO3:** Explore human relationships by analyzing social problems.

**CO4:** Determine to extend their help for the fellow beings and downtrodden people.

**CO5:** Develop leadership skills and civic responsibilities.

**Reference Books:**

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme*
2. Vol:I, Vidya Kutir Publication, 2021 ( ISBN 978-81-952368-8-6)
3. *Red Book - National Cadet Corps – Standing Instructions Vol I & II*, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
4. Davis M. L. and Cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
5. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007

**General Guidelines:**

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

**Evaluation Guidelines:**

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.