

PROGRAM STRUCTURE AND SYLLABUS

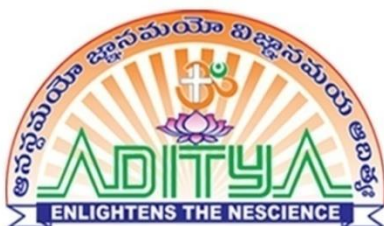
(I & II Semesters)

**COMPUTER SCIENCE &
ENGINEERING**

for

B. TECH. FOUR YEAR DEGREE PROGRAM

(Applicable for the batches admitted from 2023-24)



ADITYA ENGINEERING COLLEGE

An Autonomous Institution

Approved by AICTE, Permanently Affiliated to JNTUK & Accredited by NAAC with 'A++' Grade

Recognized by UGC under the sections 2(f) and 12(B) of UGC act 1956

Aditya Nagar, ADB Road, Surampalem - 533 437

VISION & MISSION OF THE INSTITUTE

VISION

To emerge as a premier institute for quality technical education and innovation.

MISSION

M1: Provide learner centric technical education towards academic excellence

M2: Train on technology through collaborations

M3: Promote innovative research & development

M4: Involve industry institute interaction for societal needs

VISION & MISSION OF THE DEPARTMENT

VISION

To emerge as a competent Centre of excellence in the field of Computer Science and Engineering for industry and societal needs.

MISSION

M1. Impart quality and value based education.

M2. Inculcate the inter personal skills and professional ethics

M3. Enable research through state-of-the-art infrastructure

M4. Collaborate with industries, government and professional societies

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of the Program will

PEO 1	Adopt new technologies and provide innovative solutions.
PEO 2	Be employable, become an entrepreneur or researcher for a successful career.
PEO 3	Demonstrate interpersonal, multi-disciplinary skills and professional ethics to serve society.

PROGRAM OUTCOMES (POs)

After successful completion of the program, the graduates will be able to

PO1	Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, research literature and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems: Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project Management and Finance: Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments.

PO12	Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
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PROGRAM SPECIFIC OUTCOMES (PSOs)

After successful completion of the program, the graduates will be able to

PSO1	Develop efficient solutions to real world problems using the domains of Algorithms, Networks, database management and latest programming tools and techniques.
PSO2	Provide data centric business solutions through emerging areas like IoT, AI , data analytics and Block Chain technologies.

Mission of the department – PEOs mapping

PEO's Statements		M1	M2	M3	M4
PEO 1:	Adopt new technologies and provide innovative solutions.	2	2	3	3
PEO 2:	Be employable, become an entrepreneur or researcher for a successful career.	2	3	2	2
PEO 3:	Demonstrate interpersonal, multi-disciplinary skills and professional ethics to serve society.	2	3	2	2

Note:.

Mapping / Correlation levels
1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)

INDUCTION PROGRAMME

S.No.	Course Name	L-T-P-C
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	0-0-6-0
2	Career Counselling	2-0-2-0
3	Orientation to all branches -- career options, tools etc.	3-0-0-0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	2-0-3-0
5	Proficiency Modules & Productivity Tools	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	2-0-3-0
7	Remedial Training in Foundation Courses	2-1-2-0
8	Human Values & Professional Ethics	3-0-0-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	2-1-2-0
10	Concepts of Programming	2-0-2-0

PROGRAM STRUCTURE**I Semester**

S. No.	Course Code	Course Title	Course Component	L	T	P	Credits
1	231BS1T03	Chemistry	BSC	3	0	0	3
2	231BS1T02	Linear Algebra & Calculus	BSC	3	0	0	3
3	231ES1T03	Basic Electrical and Electronics Engineering	ESC	3	0	0	3
4	231ES1T04	Introduction to Programming	ESC	3	0	0	3
5	231HS1T01	Communicative English	HSMC	2	0	0	2
6	231ES1L03	Electrical and Electronics Engineering Lab	ESC	0	0	3	1.5
7	231ES1L04	Computer Programming Lab	ESC	0	0	3	1.5
8	231BS1L02	Chemistry Lab	BSC	0	0	2	1
9	231ES1L01	IT Workshop	ESC	0	0	2	1
10	231HS1L03	NSS/NCC/Scouts & Guides/Community Service	HSMC	0	0	1	0.5
11	231MC1T02	Constitution of India	MC	2	0	0	0
TOTAL							19.5

II Semester

S. No.	Course Code	Course Title	Course Component	L	T	P	Credits
1	231BS2T02	Engineering Physics	BSC	3	0	0	3
2	231BS2T03	Differential Equations & Vector Calculus	BSC	3	0	0	3
3	231ES2T03	Basic Civil and Mechanical Engineering	ESC	3	0	0	3
4	231ES2T04	Engineering Graphics	ESC	1	0	4	3
5	231CS2T01	Data Structures	PCC	3	0	0	3
6	231BS2L02	Engineering Physics Lab	BSC	0	0	2	1
7	231ES2L03	Engineering Workshop	ESC	0	0	3	1.5
8	231CS2L01	Data Structures Lab	PCC	0	0	3	1.5
9	231HS2L01	Communicative English Lab	HSMC	0	0	2	1
10	231HS2L02	Health and wellness, Yoga and sports	HSMC	0	0	1	0.5
11	231MC2T02	Environmental Science	MC	2	0	0	0
TOTAL							20.5

Course Code and Definition:

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
C	Credits
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management Courses
PCC-CS	Professional Core Courses
PEC-CS	Professional Elective Courses
OEC-CS	Open Elective Courses
MC	Mandatory Courses

CHEMISTRY
(Common to CSE, IT, AI&ML, CSE (DS))

I Semester
Course Code: 231BS1T03

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

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

- CO1** Summarize the fundamentals of bonding models.
- CO2** Discuss the fundamentals and applications of polymers.
- CO3** Outline the difference between primary and secondary cells.
- CO4** Interpret the various modern engineering materials and their applications
- CO5** Illustrate about Spectroscopic Methods and Chromatographic Techniques.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	2	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-

Unit-I:

Structure and Bonding Models

Valence bond theory, Hybridisation - Types of hybridizations - Molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of H₂, B₂, N₂, O₂ and CO, NO. π -molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II:

Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and methods of polymerization (Suspension polymerization and Emulsion Polymerization)

Plastics: Thermoplastics and Thermosetting polymers, Preparation, properties, and applications of PVC, Teflon, Bakelite, Nylon-6,6.

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 L-Lactic Acid (PLA).

UNIT III:**Electrochemistry and Applications**

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, 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:**Modern Engineering materials**

Semiconductors, band diagram in solids, Semiconductor devices (p-n junction diode as rectifier and transistors)

Super conductors-Introduction, types, and applications.

Supercapacitors: Introduction, Basic Concept-Classification and applications.

Nano materials: Introduction, Preparation of nano materials by Sol-Gel method, Applications of Fullerenes, carbon nano tubes and Graphene nanoparticles.

Unit-V:**Instrumental Methods and Applications**

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

Text Books:

1. Prasanta Rath, S. Aruna Kumari Engineering Chemistry, CENGAGE Learning,
2. Shikha Agarwal, Engineering Chemistry Fundamentals and Applications, Cambridge 2nd Edition.

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. Dr S.S.Dara, Dr S.S.Umare , A Textbook of Engineering Chemistry, S.Chand Publication, 2022 .

Web Links:

1. <https://archive.nptel.ac.in/courses/104/106/104106096/>
2. <https://archive.nptel.ac.in/courses/104/105/104105124/>
3. <https://archive.nptel.ac.in/courses/104/106/104106137/>
4. <https://nptel.ac.in/courses/118102003>
5. <https://archive.nptel.ac.in/courses/104/106/104106075/>

LINEAR ALGEBRA AND CALCULUS (Common to all branches)

I Semester**Course Code: 231BS1T02****L****3****T****0****P****0****C****3**

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

- CO1:** Solve the system of Linear equations
CO2: Calculate Eigen values and Eigen vectors
CO3: Apply Mean value theorems for given functions
CO4: Calculate the Maximum value and Minimum value of a function of several variables
CO5: Compute areas and volumes using multiple integrals

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Unit-I:

Matrices :

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:

Eigen values, Eigen vectors and Orthogonal Transformation :

Eigen values, Eigen vectors 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 :

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) :**

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) :**

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).

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, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Michael Greenberg, , Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)

Web Links:

1. <https://archive.nptel.ac.in/courses/111/104/111104137/>
2. <https://archive.nptel.ac.in/courses/111/107/111107108/>

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CSE, IT, AIML & CSE(DS))

I Semester

Course Code: 231ES1T03

L	T	P	C
3	0	0	3

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

CO1: Analyze the concepts associated to AC and DC circuits.

CO2: Explain the operating principles of motors, generators and measuring instruments.

CO3: Analyze the Different Energy Resources and Equipment Safety Measures.

CO4: Explain the concept and the applications of semiconductor Diodes.

CO5: Analyze the Basic Electronic Circuits and Instrumentation.

CO6: Interpret numeric information in different code formats.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	1	-	-	-	-	-	-	-	-	-
CO2	2	3	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-
CO6	2	3	1	-	-	-	-	-	-	-	-	-

PART A: BASIC ELECTRICAL ENGINEERING

UNIT-1 DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, source transformation technique, 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 series RLC circuit only (Simple Numerical problems).

UNIT-II Machines and Measuring Instruments

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 digital multi meter, Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge. Tong tester and megger.

UNIT-III Energy Resources, Electricity Bill & Safety Measures

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.

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.

Text Books:

1. Basic Electrical and Electronics Engineering, Ramana Pilla, Venkata Lalitha Narla, Gulivindala suresh, S. Chand Publications.
2. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
3. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
4. 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 Links:

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

PART B: BASIC ELECTRONICS ENGINEERING**UNIT I SEMICONDUCTOR DEVICES**

Introduction - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION

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.

Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits – Half and Full Adders

Text Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, . Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th 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.

Web Links:

1. https://www.electronics-tutorials.ws/diode/diode_2.html
2. <http://fourier.eng.hmc.edu/e84/lectures/ch4/node3.html>
3. <http://nptel.ac.in/courses/117103063/11> by Dr. Chitralekha Mahanta, IIT Guwahati.

INTRODUCTION TO PROGRAMMING (Common to CSE, IT, AIML & CSE (DS))

I semester

Course Code: 231ES1T04

L	T	P	C
3	0	0	3

Course Outcomes: After completion of the course the student will be able to

- CO1:** Develop optimal problem-solving skills by understanding the computer basics, algorithms and flowcharts.
- CO2:** Make use of an appropriate control statement to optimise a program.
- CO3:** Solve complex problems using Arrays and Strings.
- CO4:** Develop modular programming using functions and dynamic memory allocation using pointers.
- CO5:** Utilize structure, union and file operations to handle heterogeneous data and files.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	2	-	-	-	-	-	-	-
CO2	2	2	2	-	1	-	-	-	-	-	-	-
CO3	2	2	2	-	1	-	-	-	-	-	-	-
CO4	2	3	2	-	1	-	-	-	-	-	-	-
CO5	2	2	2	-	1	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	3	-
CO3	3	-
CO4	3	-
CO5	3	-

UNIT I Introduction to Programming and Problem Solving

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

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

UNIT III Arrays and Strings

Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings, string handling functions.

UNIT IV Functions & Pointers

Functions: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, arrays as parameters, Scope and Lifetime of Variables, recursion.

Pointers: Introduction to Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, modifying parameters inside functions using pointers, Command line Arguments.

UNIT V User Defined Data types & File Handling

Structures, Unions, Bit Fields: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type – enum variables, Using Typedef keyword, Bit Fields.

Data Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

Text Books:

1. Programming in C, Rema Theraja, Oxford, 3rd edition.
2. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
3. Let Us C Yashwanth Kanetkar, Eighth edition, BPB Publications.
4. Programming for problem solving using C Behrouz A. Forouzan. Richard F. Gilberg.
5. How to Solve it by Computer, R.G. Dromey, Pearson Education

Web Links:

1. <https://www.hackerrank.com/>
2. <https://www.codechef.com/>
3. <https://www.topcoder.com/>
4. <https://code-cracker.github.io/>
5. https://onlinecourses.nptel.ac.in/noc22_cs40/preview
6. <https://archive.nptel.ac.in/courses/106/104/106104128/>

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

COMMUNICATIVE ENGLISH**(Common to all branches)**

I Semester	L	T	P	C
Course Code:231HS1T01	2	0	0	2

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

- CO1:** Understand the context, topic, and pieces of specific information from social or Transactional dialogues.
- CO2:** Apply grammatical structures to formulate sentences and correct word forms.
- CO3:** Analyze discourse markers to speak clearly on a specific topic in informal discussions.
- CO4:** Evaluate reading/ listening texts and to write summaries based on global comprehension of these texts.
- CO5:** Create a coherent paragraph, essay, and resume.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-

UNIT I**Lesson: HUMAN VALUES: The Gift of The Magi by O. Henry (Short Story)****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)****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

- 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

- 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)

- 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

Text Books:

1. Pathfinder: Communicative English for Undergraduate Students, 1st

- Edition, OrientBlack 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 Links:**GRAMMAR:**

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

VOCABULARY

1. <https://www.youtube.com/c/DailyVideoVocabulary/videos>
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

ELECTRICAL & ELECTRONICS ENGINEERING LAB
(Common to CSE, IT, AIML & CSE(DS))

I Semester

Course Code: 231ES1L03

L	T	P	C
0	0	3	1.5

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

- CO1:** Analyze the circuits by using KCL, KVL & Superposition theorem to electrical circuits.
- CO2:** Analyze the active and reactive power using one wattmeter method.
- CO3:** Determine the resistance using Wheat stone bridge and Megger.
- CO4:** Analyze the characteristics of diodes and BJT.
- CO5:** Analyze the characteristics of Rectifiers and amplifier.
- CO6:** Examine the operation of logic gates.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	2	-	-	-	-	1	1	-	1
CO2	2	3	1	2	-	-	-	-	1	1	-	1
CO3	2	3	1	1	-	-	-	-	1	1	-	1
CO4	2	3	1	2	-	-	-	-	1	1	-	1
CO5	2	3	1	2	-	-	-	-	1	1	-	1
CO6	2	3	1	2	-	-	-	-	1	1	-	1

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Power and Power factor using Single-phase wattmeter
4. Measurement of Resistance using Wheat stone bridge
5. Measurement of Insulation Resistance using Megger.

List of Augmented Experiments:

(Any one of the following experiment can be performed)

6. Calculation of Electrical Energy for Domestic Premises.
7. Verification of KCL, KVL and ohm's law using simulation.
8. Magnetization Characteristics of DC shunt Generator.

Reference 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

Web Links:

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

PART B: ELECTRONICS ENGINEERING LAB

List of Experiments:

1. V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. V-I characteristics of Zener Diode and its application as voltage Regulator.
3. Input & Output characteristics of BJT in CE configuration.
4. Implementation of half wave and full wave rectifiers (ripple factor & waveform analysis)
5. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.

List of Augmented Experiments:

(Any one of the following experiment can be performed)

6. Input & Output characteristics of BJT in CB configuration.
7. Design and verify Half Adder and Full Adder circuits.

Reference Books:

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

Web Links:

1. https://www.electronics-tutorials.ws/diode/diode_2.html
2. <http://fourier.eng.hmc.edu/e84/lectures/ch4/node3.html>
3. <http://nptel.ac.in/courses/117103063/11> by Dr. Chitralkha Mahanta, IIT Guwahati.

COMPUTER PROGRAMMING LAB

(Common to CSE, IT, AIML & CSE(DS))

I Semester

L T P C

Course Code 231ES1L04

0 0 3 1.5

Course Outcomes: After completion of the course the student will be able to

- CO1:** Develop the basic C programs in different environments.
CO2: Utilize appropriate control structures, arrays and strings for problem solving.
CO3: Develop modular programming using functions.
CO4: Apply pointers for dynamic memory allocation and file operations for file handling.
CO5: Make use of structures and unions to handle heterogeneous data.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	1	-	-	-	2	2	-	-
CO2	2	2	3	-	1	-	-	-	2	2	-	-
CO3	2	2	3	-	1	-	-	-	2	2	-	-
CO4	2	3	3	-	1	-	-	-	2	2	-	-
CO5	2	2	3	-	1	-	-	-	2	2	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	3	-
CO3	3	-
CO4	3	-
CO5	3	-

1. Week 1: Explore different platforms

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- Explore to Hacker Rank or any other Online coding platform and compiler environment.
- “Hello World” in C
Objective: Learn about the syntax of reading from stdin and writing to stdout.
<https://www.hackerrank.com/challenges/hello-world-c/problem?isFullScreen=true>
- Write a simple program to read int, float, char and string using scanf() and display using printf() in all the above given platforms.

2. Week 2: Basics and Operators

- Sum and Difference of 2 numbers
Objective: Learn int and float data types.
<https://www.hackerrank.com/challenges/sum-numbers-c/problem?isFullScreen=true>
- Playing with Characters

Objective: Learn how to take a character, a string and a sentence as input in C.

<https://www.hackerrank.com/challenges/playing-with-characters/problem?isFullScreen=true>

c. Bitwise Operators

Objective: Learn how to work with bits (0,1) and bitwise operators.

<https://www.hackerrank.com/challenges/bitwise-operators-in-c/problem?isFullScreen=true>

d. Conversion of Fahrenheit to Celsius and vice versa.

e. Distance travelled by an object.

f. Calculate Simple interest and compound interest.

3. Week 3: Operators and Expressions, Variables and Type conversions

a. Evaluate the following expressions

i. $a/b*c-b+a*d/3$

ii. $j = (i++) + (++i)$

b. Square root of a given number.

c. Find the area of circle, square, rectangle and triangle.

d. Find the maximum of three numbers using conditional operator.

e. Take marks of 5 subjects in integers, find the total in integer and average in float.

4. Week 4: Conditional Statements

a. Conditional statements in C.

Objective: Understand *if* and *else*.

<https://www.hackerrank.com/challenges/conditional-statements-in-c/problem?isFullScreen=true>

b. Roots of a Quadratic Equation.

c. Generate electricity bill.

d. Simulate a calculator using switch case.

e. Find the given year is a leap year or not.

5. Week 5: Loops

a. “for” Loop in C.

Objective: Learn the usage of the *for* loop.

<https://www.hackerrank.com/challenges/for-loop-in-c/problem?isFullScreen=true>

b. Sum of the digits of a 5-digit number.

Objective: Learn the usage of while loop and usage of operators - % and /.

<https://www.hackerrank.com/challenges/sum-of-digits-of-a-five-digit-number/problem?isFullScreen=true>

c. Given number is a prime or not. (Also Prime numbers between a given range.)

d. Armstrong Number or not.

e. Palindrome or not.

f. Printing patterns using Loops.

Objective: Print a pattern of numbers.

<https://www.hackerrank.com/challenges/printing-pattern-2/problem?isFullScreen=true>

g. Construct a Pyramid pattern.

6. Week 6: Arrays

a. 1D Arrays in C

Objective: Print the sum and free the memory where the array is stored.

<https://www.hackerrank.com/challenges/1d-arrays-in-c/problem?isFullScreen=true>

b. Array reversal

Objective: Working with indices in array

<https://www.hackerrank.com/challenges/reverse-array-c/problem?isFullScreen=true>

c. Search an element in array (Linear Search)

d. Find min and max elements in array

e. Insert an element into array

f. Eliminate duplicate elements from array

g. Sorting of elements in an array using Bubble sort

7. Week 7: 2-D Arrays

a. Sum of two 2-D arrays

b. Multiplication of two 2-D arrays

c. Transpose of a Matrix

d. Trace of a Matrix

e. Lower Triangular Matrix

8. Week 8: Strings

a. Printing Tokens

Objective: print each word of the sentence in a new line

<https://www.hackerrank.com/challenges/printing-tokens-/problem?isFullScreen=true>

b. Count number of alphabets (lowercase, uppercase, consonants, vowels) and digits

Objective:

c. Lowercase to Uppercase, Uppercase to Lowercase, Toggle case, Sentential case

Objective:

d. Digit Frequency

Objective: find the frequency of each digit in the given string.

<https://www.hackerrank.com/challenges/frequency-of-digits-1/problem?isFullScreen=true>

e. Find string length, concatenate 2 strings, reverse a string using built-in and without built-in string functions.

9. Week 9: Functions and Recursion

a. Functions in C

Objective: Learn simple usage of functions.

<https://www.hackerrank.com/challenges/functions-in-c/problem?isFullScreen=true>

b. Fibonacci Numbers

Objective: Complete the recursive function.

<https://www.hackerrank.com/challenges/ctci-fibonacci-numbers/problem>

c. Factorial

Objective: N! (N factorial) using recursion.

<https://www.hackerrank.com/contests/ccc-veltech-practice-set-ende/challenges/factorial-using-recursion-1>

d. Digit Sum

Objective: find the *super digit* of the integer.

<https://www.hackerrank.com/challenges/recursive-digit-sum/problem>

e. LCM

- f. Calculate the Nth term
Objective: Find the Nth term.
<https://www.hackerrank.com/challenges/recursion-in-c/problem?isFullScreen=true>

10. Week 10: Pointers

- a. Pointers in C
Objective: learn to implement the basic functionalities of pointers in C.
<https://www.hackerrank.com/challenges/pointer-in-c/problem?isFullScreen=true>
- b. Students Marks Sum
Objective: Learn using Pointers with Arrays and Functions
<https://www.hackerrank.com/challenges/students-marks-sum/problem?isFullScreen=true>
- c. Sorting Array of Strings
Objective: sort a given array of strings into lexicographically increasing order or into an order in which the string with the lowest length appears first.
<https://www.hackerrank.com/challenges/sorting-array-of-strings/problem?isFullScreen=true>
- d. Find the sum of a 1D array using malloc()
- e. Swap two numbers using functions and pointers - call by value and reference.
- f. Dynamic Array in C
Objective: Handling requests by a Librarian to place the books in the shelves.
<https://www.hackerrank.com/challenges/dynamic-array-in-c/problem?isFullScreen=true>

11. Week 11: Structure, Union, typedef, bit-fields and enum

- a. Write a C program to find the total, average of n students using structures
- b. Boxes through a Tunnel
Objective: Using a structure for transporting some boxes through a tunnel
<https://www.hackerrank.com/challenges/too-high-boxes/problem?isFullScreen=true>
- c. Post Transition
Objective: Storing and transferring packages using pointers in structures.
<https://www.hackerrank.com/challenges/post-transition/problem?isFullScreen=true>
- d. Copy one structure variable to another structure of the same type.
- e. Read student name and marks from the command line and display the student details along with the total.
- f. Shift/rotate using bitfields.

12. Week 12: Files

- a. Write text into and read text from a file
- b. Write into text and read text from a binary file using fread() and fwrite()
Objective:
- c. Copy the contents of one file to another file.
- d. Merge two files into the third file using command-line arguments.
- e. Find no. of lines, words and characters in a file

Week 13-17: Logic Building – Augmented Experiments (Complete any 2)

13 Variadic functions in C

Objective: Understanding variable number of arguments

<https://www.hackerrank.com/challenges/variadic-functions-in-c/problem?isFullScreen=true>

14 Querying the Document

Objective: representing the words, sentences, paragraphs, and documents using pointers.

<https://www.hackerrank.com/challenges/querying-the-document/problem?isFullScreen=true>

15 Structuring the Document

Objective: Using structure with pointers

<https://www.hackerrank.com/challenges/structuring-the-document/problem?isFullScreen=true>

16 Small Triangles, Large Triangles

Objective: Print sorted by their areas

<https://www.hackerrank.com/challenges/small-triangles-large-triangles/problem?isFullScreen=true>

17 Permutations of Strings

Objective: print all strings permutations in strict lexicographical order

<https://www.hackerrank.com/challenges/permutations-of-strings/problem?isFullScreen=true>

Reference Books:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
2. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
3. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
4. Let Us C Yashwanth Kanetkar, Eighth edition, BPB Publications.
5. Programming in C A-Practical Approach Ajay Mittal. Pearson Education

Web Links:

1. <https://www.hackerrank.com/>
2. <https://www.codechef.com/>
3. <https://www.topcoder.com/>
4. <https://code-cracker.github.io/>
5. <https://nptel.ac.in/courses/106105085/2>

NOTE: The Students are expected to complete C Programming with five star badge in Hacker Rank Platform.

Practice Programs:

Write a C program to implement the following,

1. Print the values, address and size of variables of different data types.
2. Add, subtract, divide, multiply the given numbers.
3. Convert Centigrade to Fahrenheit.
4. Swap 2 numbers using 2 , 3 variables .
5. Find the area of the circle.
6. Find the simple interest and compound interest.
7. Convert the distance kms into mts, cms, mms and vice versa
8. Find the result of $(ax+b)/(ax-b)$.
9. Demonstrate arithmetic, assignment, increment/decrement relational ,logical Bitwise and conditional operators.
10. Find the total distance travelled by vehicle in 't' seconds is given by distance = $ut + \frac{1}{2}at^2$ where 'u' and 'a' are the initial velocity (m/sec) and acceleration (m/sec^2). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
11. Check the given number is even or odd.
12. Find the largest and smallest of 2 numbers and 3 numbers.
13. Find the student grade.
14. Calculate the income tax.
15. Print the given 3 numbers in ascending order.
16. Check the given year is a leap year or not.
17. Find roots of a Quadratic equation.
18. Print the given number in words using Switch statement.
19. Print the colour based on a given character.
20. Print from first 'n' natural numbers (1 2 3 10 & 10 9 8 1).
21. Find the sum of first 'n' natural numbers using do-while loop.
22. Find the squares of N numbers using do - while loop.
23. Find the sum of even and odd numbers & count number of even and odd numbers.
24. Find the factors and factorial of a given number
25. Find whether the given number is prime or not and within a given range.
26. Calculate the sum of the digits of a given number (Eg: 123 \rightarrow 1+2+3=6).
27. Display a given number in reverse order (Eg: 123 \rightarrow 321).
28. Display a given number is a Palindrome or not.
29. Find the given number is Armstrong or not.
30. Find the given number is Perfect or not.
31. Find the given number is Strong or not.
32. Calculate the sum of the digits of a given number upto single digit (Lucky Number)
33. Display the Fibonacci series [Hint: 0 1 1 2 3 5 ...(sum of the consecutive numbers)].
34. Display from 1 to 20 [Eg: 5 * 1 = 5 5 * 20 = 100].
35. display following format
1

- 1 2
 1 2 3
 1 2 3 n
36. display following format (Floyd's Triangle)
 1
 2 3
 4 5 6

 display following format
 1
 1 2
 1 2 3
n
 3 2 1
 2 1
 1
38. generate pyramid structure format
 0
 1 0 1
 2 1 0 1 2
 3 2 1 0 1 2 3
39. generate Pascal triangle format
 1
 1 1
 1 2 1
 1 3 3 1
 1 4 6 4 1
40. Find the value of ncr [Hint : $n!/r!(n-r)!$].
 41. Print the sum of the following series. $1 + x + x^2 + x^3 + \dots + x^n$
 42. Print the sum of the following series. $1 + x + x^2/2 + x^3/3 + \dots + x^n/n$
 43. Print the sum of the following series. $1 + x + x^2/2! + x^3/3! + \dots + x^n/n!$
 44. Print the sum of the following series. $X + x^3/3! + \dots + x^n/n!$
 45. Find LCM & GCD of given numbers.
 46. Convert decimal number to binary number and vice versa
 47. Convert Decimal number to Octal number and vice versa.
 48. Convert Decimal number to Hexa-Decimal number and vice versa.
 49. Read elements into array and display them.
 50. accept 'n' cells into integer array
 i) copy into another array in reverse order.
 ii) accept a number to search and how many times that number is found and print the positions at which it is found.
 iii) accept the delete position and delete that position value from the array.
 iv) accept a value and a position to insert the accepted value into that position.
 v) accept delete value and delete that value from array.
 vi) and place the even numbers in one array and odd numbers in another array.
 vii) count number of even, odd values and display.
 viii) find the Maximum and Minimum number of the array.

- ix) sort the elements in Ascending order.
- x) display elements in a right angle triangle format.
- 51. Read the order of a matrix and read elements into 2-D array and display in a Matrix format. Do the following Operations
 - i) Addition ii) Multiplication iii) Transpose iv) Trace v) Display Upper & Lower triangular vi) Symmetric matrix or not vii) Norm of a Matrix
- 52. Declare and initialize strings in different ways.
 [Hint : "hello", {'h','e','l','l','o','\0'}, {{'h'},{'e'},{'l'},{'l'},{'o'},{'\0'}}]
- 53. Read a string from keyboard in different ways.
- 54. Accept a string and
 - i) find its length and display.
 - ii) copy that string into another and display both strings
 - iii) copy that string into another in reverse order and display both strings.
 - iv) concatenate second string at the end of the first string.
 - v) count number of upper case, lower case, digits and special characters.
 - vi) count number of vowels, consonants and special characters.
 - vii) convert into upper case string.[eg: hello → HELLO]
 - viii) convert into lower case.[eg: HELLO → hello]
 - ix) convert into toggle case.[eg: hElLo→HeLlO : upper to lower & lower to upper]
 - x) convert into proper case.[eg: i TeAch cDs → I teach cds]
 - xi) count number of words in string.
 - xii) until we press ctrl+z and count number of lines, words and characters.
 - xiii) check whether that string is Palindrome or not.
 - xiv) display in the format.
 h
 h a
 h a i
 h a
 h
 - xv) insert second string into first string at a given position.
 - xvi) find a substring in each string.
 - xvii) perform sorting of strings and display them.
- 55. Explain 5 string-handling functions
- 56. Find one's and two's compliment.
- 57. Perform arithmetic operations using functions.
- 58. Demonstrate difference between local and global variables using functions.
- 59. Demonstrate all function prototypes.
- 60. Demonstrate "Call By Value" and "Call By Reference" in functions.
- 61. Find Factorial , Fibonacci series , Tower of Hanoi and GCD of a given number using Recursion.
- 62. Explain the concept of storage classes (auto, extern, static, register).
- 63. Explain the concept of User-Defined header files.
- 64. Explain about Built-in or Standard library functions.
- 65. Find sum of odd and even series using function with argument and with return value.
- 66. Write a program to evaluate the equation $s = \text{sqr}(m() + n())$ using function.
- 67. Generate Fibonacci series using "with argument and return type".

68. Find sum of given series by using function with argument and return value $e = 2$
 $+ 3/1! - 6/2! + 9/3! - 12/4! \dots$
69. The concept of pointers using
 - i) $\&$ (address) operator.
 - ii) malloc() i.e., dynamic allocation
 - iii) printing array elements using arrays and pointers
 - iv) Declare and read elements into array using dynamic pointers.
 - v) pointer variable to access array elements.
 - vi) a pointer to access 2-dimensional arrays.
 - vii) Access 2-dimensional array using array name itself as pointer.
70. Program to sort the string using array of pointers to functions.
71. Explain the concept of Command-Line Arguments
72. The concept of Structures
 - i) using arrays.
 - ii) within structures using local and global scope.
 - iii) functions and arrays.
 - iv) pointers and arrays.
 - v) pointers(dynamic memory allocation) as arrays.
 - vi) functions and pointers.
 - vii) arrays, functions and pointers.
 - viii) self-referential structures
 - ix) Unions
 - x) union of structures
 - xi) Unions within Structures.
 - xii) Unions within Unions.
73. “typedef to define datatypes” and “typedef to define structures”.
74. The concept of Bit fields.
75. The concept of enum (Enumerated datatypes).
76. Create and store information in a text file.
77. Read information from a text file.
78. Append information in a text file.
79. Copy a file to another file.
80. Merge two files and write them to another file.
81. fseek(), ftell() and rewind().

CHEMISTRY LAB**(Common to CSE, IT, AI&ML, CSE (DS))****I Semester****Course Code: 231BS1L02****L T P C****0 0 2 1****Course Outcomes:** At the end of the course, the students will be able to:**CO1** Analyze and improve the experimental skills.**CO2** Summarize parameters of water**CO3** Analyze the strength of acids by instrumentation.**CO4** Preparation of polymer and nano particles**CO5** Analysing the samples by Spectroscopic and chromatographic techniques**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	1	-	2	-	-	-
CO2	3	-	-	-	-	-	1	-	2	-	-	-
CO3	2	-	-	-	-	-	-	-	2	-	-	-
CO4	3	-	-	-	-	-	-	-	2	-	-	-
CO5	2	-	-	-	-	-	-	-	2	-	-	-

List of Experiments (Any ten Experiments):

1. Determination of Hardness of a ground water sample
2. Determination of Chloride content in given water sample
3. Estimation of dissolved oxygen in given water sample
4. Estimation of Vitamin-C in ascorbic acid
5. Preparation of a polymer (Bakelite)
6. Conductometric titration of strong acid vs strong base
7. Potentiometry - determination of strong acid -strong base
8. Paper chromatography technique
9. Preparation of nano particles by Green synthesis
10. Determination of Strength of an acid in Pb-Acid battery

Augmented Experiments (Any One Experiment to be conducted):

11. Wavelength measurement of sample through UV-Visible Spectroscopy
12. Identification of simple organic compounds by IR

Reference Books:

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

IT WORKSHOP
(Common to all branches)

I Semester**L T P C****Course Code: 231ES1L01****0 0 2 1****Course Outcomes: At the end of the Course, Student will be able to:**

- CO1:** Experiment with assembling, disassembling hardware components of a computer.
CO2: Explain the process of safeguarding a computer system or network from virus/worm.
CO3: Demonstrate virtual machine and software installation.
CO4: Develop a Document, Spreadsheet and Presentation using MS-Office and AI Tools.
CO5: Make use of GIT for version control and LaTeX for document preparation.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	2	-	-	-	2	2	-	-
CO2	2	2	3	-	2	-	-	-	2	2	-	-
CO3	2	2	3	-	2	-	-	-	2	2	-	-
CO4	2	3	3	-	2	-	-	-	2	2	-	-
CO5	2	2	3	-	2	-	-	-	2	2	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-

List of Experiments:

- 1. Week 1: Identification of peripherals of a computer**
 - a. Block diagram of the CPU along with the configuration of the each peripheral and its functions.
- 2. Week 2: System Assembling and Disassembling**
 - a. Disassembling the components of a PC.
 - b. Assembling the components back to working condition.
- 3. Week 3: Virtual Machine setup**
 - a. Setting up and configuring a new virtual machine.
- 4. Week 4: Installation of software**
 - a. Every student should individually install LINUX on the personal computer.

- b. Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

5. Week 5: Networking and Internet

- a. Networking commands.
- b. Exploring Internet and World Wide Web.
- c. Exploring Search Engines, Cyber hygiene.

6. Week 6: Text Editors

- a. Demonstration and Practice on Text Editors like Notepad++, Sublime Text, Atom, Brackets, Visual code, etc

7. Week 7: Word

- a. Demonstration and practice on Microsoft Word- Formatting, Page Borders, Reviewing, Equations, symbols.

8. Week 8: Excel

- a. Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text
- b. Calculating GPA - Features to be covered: Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function.

9. Week 9: Power Point

- a. 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.
- b. Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

10. Week 10: AI TOOLS – ChatGPT and Version Control - GITHUB

- a. 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.
- b. 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?'
- c. GIT Commands and GITHUB: config, init, clone, status, add, commit, push, branch, checkout, merge, pull, log

11. Week 11: LaTeX

- a. Installation of LaTeX and related Software's.
- b. Basic formatting using LaTeX.
- c. Handling the equations in LaTeX.

- d. Inserting the Tables in LaTeX.

12. Week 12: Internet & World Wide Web (WWW)

- a. 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.
- b. 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 downloads to avoid viruses and/or worms.

Week 13-16: List of Augmented Experiments: (Complete any 2)

- 13** Prepare a power point presentation for college information (Include 10 slides).
- 14** List the common computer hardware problem and write down the solutions.
- 15** Prepare your resume using MS-Word and LaTeX.
- 16** Upload all your documents into GIT and work with access permissions.

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. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand.

Web Links:

1. <https://assemblyourpc.net/>
2. <https://www.latex-tutorial.com/tutorials>
3. <http://www.teachmsoffice.com/>
4. <https://www.geeksforgeeks.org/top-12-most-used-git-commands-for-developers/>

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE
(Common to CSE, IT, AIML & CSE(DS))

I Semester	L	T	P	C
Course Code: 231HS1L03	0	0	1	0.5

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

- CO1:** Explain 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.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	2	-	1	-	1
CO2	-	-	-	-	-	2	1	1	1	-	-	-
CO3	-	-	-	-	-	2	-	-	2	2	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	-	1	1	-	3	3	-	-

UNIT I Orientation

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

Activities:

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

UNIT II Nature & Care

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**Activities:**

- i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in 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 Population Education.
- v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

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

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.

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CONSTITUTION OF INDIA

(Common to CSE, IT, AIML & CSE(DS))

I Semester
Course Code:231MC1T02

L T P C
2 0 0 0

Course Outcomes:

At the end of the Course, Student will be able to:

- CO1** Explain historical background of the constitution making and its importance for building a democratic India
- CO2** Compare the functioning of three wings of the government i.e., executive, legislative and judiciary
- CO3** Interpret the value of the fundamental rights and duties for becoming good citizen of India
- CO4** Compare the decentralization of power between central, state and local self-government
- CO5** Extend the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
- CO6** Understand the Electoral Process and Amendment procedure.

Mapping of course outcomes with program outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	-	-	-	-	-	3	-	1	2	-	-	-
CO2	-	-	-	-	-	2	-	1	3	-	-	-
CO3	-	-	-	-	-	3	-	2	3	-	-	-
CO4	-	-	-	-	-	3	-	2	1	-	-	-
CO5	-	-	-	-	-	2	-	1	3	-	-	-
CO6	-	-	-	-	-	3	-	1	2	-	-	-

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions.

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions.

UNIT-IV

Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission, Functions of Commissions for the welfare of SC/ST/OBC and women.

Text Books:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.

Reference Books:

1. J.A. Siwach, Dynamics of Indian Government & Politics.
2. D.C. Gupta, Indian Government and Politics.
3. H.M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication).
4. J.C. Johari, Indian Government and Politics Hans.

Web Links:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

ENGINEERING PHYSICS
(Common to CSE, IT, AIML & CSE(DS))

II Semester
Course Code: 231BS2T02

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

Course Outcomes:

At the end of the Course, Student will be able to:

- CO1** Apply the principles of interference and diffraction to design and enhance the resolving power of grating.
- CO2** Familiarize with the basics of crystals and their structures.
- CO3** Explain the fundamental concepts of Quantum behaviour of matter.
- CO4** Explain the basic concepts of Semiconductors and identify the type of semiconductors using Hall effect.
- CO5** Summarize various types of polarizations of dielectrics and classify the magnetic materials.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-

Unit– I Wave Optics

Interference : Introduction Principle of Superposition-Interference of light- Conditions for sustained Interference- Interference in thin films (reflected geometry) – Colours in thin films – Newton’s Rings (reflected geometry) – Determination of wavelength and refractive index.

Diffraction : Introduction – Fresnel and Fraunhofer Diffraction - Diffraction due to Single slit (quantitative), Double slit, N– Intensity distribution curves – Diffraction Grating formula – Grating spectrum– Rayleigh’s criterion – Resolving powers of grating(qualitative), dispersive power of grating.

Unit– II Crystallography and X-ray diffraction

Crystal Structure: Basis and lattice – Crystal Systems – Bravais Lattice - Unit cell-packing fraction – coordination number- Miller indices – Separation between successive (h k l) planes.

X-ray Diffraction : Bragg’s law-Bragg’s x-ray spectrometer – crystal structure determination by Laue’s and powder methods.

Unit–III Quantum Mechanics and Free electron Theory

Quantum Mechanics: Introduction – Matter waves – de Broglie's hypothesis – Heisenberg's Uncertainty Principle – interpretation of wave function – Schrödinger Time Independent and Time Dependent wave equations– Particle in a potential box.

Free Electron Theory: Introduction–Classical free electron theory(merits and demerits only)- Fermi energy state – Fermi Dirac distribution function –Temperature dependence of Fermi-Dirac distribution function- Quantum Free electron theory–electrical conductivity based on quantum free electron theory–Density of states.

Unit– IV Semiconductors

Semiconductor Physics : Formation of energy bands in crystalline solids – classification of crystalline solids - Intrinsic semi-conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers -Dependence of Fermi energy on carrier concentration and temperature – Hall effect- Hall coefficient – Applications of Hall effect –Drift and Diffusion currents–Einstein's equation.

Unit– V Magnetic & Dielectric Materials

Magnetic materials : Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials :Dia, para & Ferro–Domain concept of Ferro magnetism Hysteresis–soft and hard magnetic materials–applications of Ferro magnetic material.

Dielectric Materials: Introduction - Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant - Relation between D, E & ϵ_0 -Types of polarizations- Electronic(Quantitative), Ionic(Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation –Ferro electric materials– Frequency dependence of polarization—complex dielectric constant- dielectric loss –Applications.

Text Books:

1. "A Textbook of Applied Physics"by P.K Palanisamy, Scitech Publishers
2. "Engineering Physics"by M.Arumugam,Anuradha publishers
3. "A Textbook of Engineering Physics"by M N Avadhanulu,P G Kshirsagar & T.V.S.ArunMurthy S Chand & Company Ltd, 11th edition

Reference Books:

1. "Engineering Physics"by M.R.Srinivasan, NewAge International publishers.
2. "Engineering Physics"by D.K.Bhattacharyaand PoonamTandon,Oxfordpress.
3. "Engineering Physics"by R.K Gaur.and S.LGupta.,-Dhanpat Rai publishers.

Web Links:

1. <http://nptel.ac.in/courses/122107035/11>
2. <http://nptel.ac.in/courses/115102023/>
3. <https://phet.colorado.edu/en/simulations/category/physics>
4. <http://physicsgecg.blogspot.in/p/reading-materials.html>
5. <https://sites.google.com/site/physicsbysureshsaganti/home>

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to all branches)

II Semester**Course Code:231BS2T03****L****3****T****0****P****0****C****3**

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

CO1: Solve Linear differential equations of first order

CO2: Solve Linear differential equations of higher order

CO3: Identify methods of solution for various partial differential equations

CO4: Calculate the gradient, divergence and curl

CO5: Compute work done, flux using vector integration

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Unit-I:

Differential equations of first order and first degree :

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 :

Definitions, homogenous and non-homogenous equations, 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 :

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 :**

Scalar and vector point functions, vector operator Del, Del applied to scalar point functions-Gradient and its applications, Directional derivative, del applied to vector point functions- Divergence and Curl, solenoidal and irrotational vectors, scalar potential, vector identities.

Unit-V:**Vector integration :**

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.

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

Web Links:

1. <https://archive.nptel.ac.in/courses/111/106/111106100/>
2. <https://archive.nptel.ac.in/courses/111/105/111105122/>

BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to CSE, IT, AIML & CSE(DS))

II Semester

L T P C

Course Code: 231ES2T03

3 0 0 3

Course Outcomes: On completion of the course, the student should be able to:

- CO1:** Explain various sub-divisions of Civil Engineering and basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.
- CO2:** Illustrate the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.
- CO3:** Describe the significance and Engineering aspects of transportation, water storage and water conveyance structures.
- CO4:** Explain the role and application of Mechanical Engineering and materials.
- CO5:** Explain the different manufacturing processes, mechanical power transmission systems and robotics.
- CO6:** Explain the working of IC Engines, Boilers and Power Plants.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	1	1	-	-	-	-	-
CO5	3	1	-	-	-	1	1	-	-	-	-	-
CO6	3	1	-	-	-	1	1	-	-	-	-	-

PART A: BASIC CIVIL ENGINEERING

UNIT I

Basics of Civil Engineering: 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: 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 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).

Text Books:

1. Basic Civil and Mechanical Engineering, Omni Srikanth, M. Sreenivasa Reddy, S. Chand Publications.
2. Basic Civil Engineering, M.S.Palanisamy, , Tata McGraw Hill publications (India) Pvt. Ltd. Fourth Edition.
3. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
4. 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. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc22_ce42/preview
2. https://www.youtube.com/watch?v=chhuq_t40rY&list=PL20A0651466E8A776
3. https://www.youtube.com/results?search_query=Transportation+engineering+NPTTEL
4. <https://www.mcgill.ca/civil/undergrad/areas/water>

PART B: BASIC MECHANICAL ENGINEERING

UNIT I

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

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

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their Applications.

Introduction to Robotics - Joints & Links, Configurations, and Applications of Robotics.

UNIT III

Thermal Engineering – I.C Engine: Heat Engine – Types of Heat Engine –Classification of I.C. Engine, Working principle of SI and CI Engines, Comparison of 2-Stroke and 4-Stroke engines, Components of Electric and Hybrid Vehicles.

Boilers: Classification of Boilers – Simple Vertical Boiler – Cochran Boiler –Babcock and Wilcox Boiler – Benson Boiler.

Power Plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants.

(**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).

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. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I.
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, 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.

Web Links:

1. <https://www.youtube.com/watch?v=q79bl99rWFM>
2. <https://sedyono.files.wordpress.com/2015/10/ch-02.pdf>
3. <https://www.cedengineering.com/userfiles/Mechanical%20Power%20Transmission%20Fundamentals-R1.pdf>
4. <https://ccsuniversity.ac.in/bridge-library/pdf/Lecture-3-Engine.pdf>
5. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/UNIT-5_14.pdf

ENGINEERING GRAPHICS
(Common to CSE, IT, AIML & CSE(DS))

II Semester

L T P C

Course Code: 231ES2T04

1 0 4 3

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

- CO 1:** Apply the principles of engineering drawing, to construct engineering curves and orthographic projection of points.
- CO 2:** Construct projections of Lines and planes in various positions in first quadrant.
- CO 3:** Construct projections of solids in various positions in first quadrant.
- CO 4:** Develop surfaces of the regular solids.
- CO 5:** Construct isometric and orthographic views of simple solids.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	2	-	-	-	-	1	-	-
CO2	3	2	1	-	2	-	-	-	-	1	-	-
CO3	3	2	1	-	2	-	-	-	-	1	-	-
CO4	3	2	1	-	2	-	-	-	-	1	-	-
CO5	3	2	1	-	2	-	-	-	-	1	-	-

UNIT I

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

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

UNIT II

Projections of Points: 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.

UNIT III

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 IV

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.

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

UNIT V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views. Creating 2D & 3D drawings of objects (prism, cylinder, pyramid and cone)

Text Books:

1. T Jeyapoovan, M. Sreenivasa Reddy, Computer Aided Engineering Graphics, Vikas Publications.
2. N. D. Bhatt, Engineering Drawing, Charotar Publishing House.
3. Venugopal, Engineering Drawing and Graphics, 2nd edition, New Age Publications, New Delhi.

Reference Books:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill.
4. Computer Aided Engineering Graphics, T. Jeyapoovan, Vikas Publishing house, New Delhi, First Edition.

Web Links:

1. <http://nptel.ac.in/courses/112103019>
2. <http://freevideolectures.com/Course/3420/Engineering-Drawing>
3. <http://engineeringdrawing.org>
4. <http://inoxwap.com/video/category/engineering-drawing-for-first-year-engineering.html>

DATA STRUCTURES
(Common to CSE, IT, AIML & CSE(DS))

II semester
Course Code: 231CS2T01

L T P C
3 0 0 3

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

- CO1:** Illustrate Time and Space complexities for different searching and sorting algorithms.
- CO2:** Demonstrate various operations on Linked Lists.
- CO3:** Explain different operations on Stack and its applications.
- CO4:** Illustrate different operations on queue and its applications
- CO5:** Demonstrate the importance and various operation on non-linear data structures and hashing.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	-	-	-	-	-
CO2	2	2	2	2	-	-	-	-	-	-	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	-
CO4	2	3	2	2	-	-	-	-	-	-	-	-
CO5	2	2	2	2	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	2	-
CO3	2	-
CO4	2	-
CO5	2	-

UNIT I

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

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT IV

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 V

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

Graphs: Introduction, Graph Terminology, Representation of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT)

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing.

Text Books:

1. Data Structures Using C, Reema Thareja, Oxford University Press, 2nd Edition
2. “The Algorithm Design Manual”, Steven S. Skiena, Second Edition, Springer Publication

Reference Books:

1. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008
2. Data Structures and Algorithms by Maganti Venkatesh, Naresh Tangudu, A. Satish, K. Sujatha, D. Ganesh, Indo-Continental Academic Publishers.
3. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.
5. Art of Computer Programming, by Donald E. Knuth

Web Links:

1. <https://nptel.ac.in/courses/106102064>
2. <https://archive.nptel.ac.in/courses/106/105/106105225/>
3. <https://www.udemy.com/topic/data-structures/>
4. <https://www.coursera.org/specializations/data-structures-algorithms>
5. https://www.coursera.org/specializations/boulder-data-structures-algorithms?trk_location=query-summary-list-link

ENGINEERING PHYSICS LAB
(Common to CSE, IT, AIML & CSE(DS))

II Semester

L T P C

Course Code: 231BS2L02

0 0 2 1

Course Outcomes:**At the end of the Course, Student will be able to:****CO1:** Operate optical instruments like travelling microscope and spectrometer.**CO2:** Study Temperature Resistance Characteristics of different materials.**CO3:** Estimate magnetic field intensity, wave length and Frequency of electrical vibrator.**CO4:** Estimate acceleration due to gravity and Elastic moduli by oscillatory methods.**CO5:** Study voltage current characteristics of different semiconductors.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	-
CO5	2	1	-	-	-	-	-	-	-	-	-	-

List of Experiments:(Any **TEN** of the listed experiments are to be conducted)

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 Halleffect.
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 thickness of a thin wire by forming interference fringes.
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 single cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

List of Augmented Experiments:

(Any **TWO** of the listed experiments are to be conducted)

19. Resolving power of grating.
20. Determination of V-I characteristics and Breakdown voltage of Zener Diode.
21. Determination of spring constant of springs using coupled oscillators.

Reference Books:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers.
2. Engineering Physics Lab Manual by Dr.C.V.Madhusudhana Rao, V.Vasanth Kumar, Scitech Publications
3. Laboratory Manual Cum Record for Engineering Physics I & II by Dr.Y.Aparna, Dr.K.Venkateswara Rao, VGS Techno series.

Web Links:

1. www.vlab.co.in
2. <https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

ENGINEERING WORKSHOP
(Common to CSE, IT, AIML & CSE(DS))

II Semester**L T P C****Course Code: 231ES2L03****0 0 3 1.5****Course Outcomes:****CO 1:** Prepare various wooden joints**CO 2:** Develop various fitting joints**CO 3:** Develop surfaces for making the various sheet metal models**CO 4:** Develop basic knowledge for house wiring practice**CO 5:** Demonstrate and Practice on welding joints**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	-	-	-	-	-	-	2	1	-	1
CO2	1	1	-	-	-	-	-	-	2	1	-	1
CO3	2	1	-	-	-	-	-	-	2	1	-	1
CO4	1	-	-	-	-	-	-	-	2	1	-	1
CO5	2	-	-	-	-	-	-	-	2	1	-	1

Demonstration: Safety Practices and Precautions to be observed in workshop.**Carpentry:**

1. To make a T-Lap joint from the given size
2. To make a Dovetail joint from the given size

Fitting:

1. To make a V- fitting from the given two M.S pieces
2. To make a Square- fitting from the given two M.S pieces

Sheet Metal Work:

1. To make a Taper tray, using given sheet metal
2. To make a conical funnel, using given sheet metal

Electrical Wiring:

1. To give connection to three bulbs by Series
2. To give connection to three bulbs by Parallel

Welding:

1. To make a butt joint using given M.S pieces and by Arc Welding
2. To make a Lap joint using given M.S pieces and by Arc Welding

List of Augmented Experiments:

(Any two of the following experiment can be performed)

1. Demonstration and prepare a mould cavity (dumbbell) by using moulding tools and processes.
2. Demonstration and prepare a Elbow joint by using plumbing tools and processes.
3. To make a T joint using given M.S pieces and by Arc Welding

Reference Books:

1. Workshop Practice by H.S.Bawa, Tata-McGraw Hill, 2nd Edition.
2. Elements of Workshop Technology, VOL I by S.K. Hajra Choudhury & others 14th edition
3. Workshop Technology, Part 1, Fifth edition, W.A.J. Chapman.
4. Workshop Technology Manufacturing Processes by Dr. R. K. Singal, Vol II, Kat Books Publications.

DATA STRUCTURES LAB
(Common to CSE, IT, AIML & CSE(DS))

II semester
Course Code: 231CS2L01

L T P C
0 0 3 1.5

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

- CO1:** Make use of iterative and recursive procedures for problem solving.
- CO2:** Utilize appropriate searching and sorting techniques to search and sort elements.
- CO3:** Implement various operations in linear data structures.
- CO4:** Implement various operations in non-linear data structures.
- CO5:** Apply the appropriate data structure to solve different types of applications.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	1	-	-	-	2	2	-	-
CO2	2	2	3	2	1	-	-	-	2	2	-	-
CO3	2	2	3	2	1	-	-	-	2	2	-	-
CO4	2	3	3	2	1	-	-	-	2	2	-	-
CO5	2	2	3	2	1	-	-	-	2	2	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	3	-
CO3	3	-
CO4	3	-
CO5	3	-

List of Experiments:

- 1. Week 1: Array Manipulation and Searching Techniques**
 - a. Arrays – DS
Objective: Reverse array elements
<https://www.hackerrank.com/challenges/arrays-ds/problem?isFullScreen=true>
 - b. Linear Search
Objective: Find the position of number K in the given list
<https://www.hackerrank.com/contests/17cs1102/challenges/1-a-linear-search>
Write a simple program to read int, float, char and string using scanf() and display using printf() in all the above given platforms.
 - c. Binary Search – Basic
Objective: find index (0-based) of a given key in a sorted array
<https://www.hackerrank.com/contests/launchpad-1-winter-challenge/challenges/binary-search-basic>
 - d. Binary Search – Iterative

Objective: Given queries found in array elements or not.

<https://www.hackerrank.com/contests/17cs1102/challenges/1-b-binary-search-iterative>

e. Binary Search – Recursion

Objective: Given queries found in array elements or not.

<https://www.hackerrank.com/contests/17cs1102/challenges/1-c-binary-search-recursion>

2. Week 2: Sorting Techniques

a. Bubble Sort

Objective: Sort the array in ascending order

<https://www.hackerrank.com/challenges/ctci-bubble-sort/problem>

b. Insertion Sort

Objective: Implement insertion sort on array

<https://www.hackerrank.com/contests/17cs1102/challenges/3-a-implement-insertion-sort>

c. Selection Sort

Objective: Implement insertion sort on array.

<https://www.hackerrank.com/contests/17cs1102/challenges/3c-implement-selection-sort>

3. Week 3: Sorting Techniques – Divide and Conquer

a. Merge Sort

Objective: Implement merge sort on array.

<https://www.hackerrank.com/contests/17cs1102/challenges/merge-sort-6>

b. Quick Sort

Objective: Implement quick sort on array.

<https://www.hackerrank.com/contests/17cs1102/challenges/4a-quick-sort>

4. Week 4: Linked List

a. Single Linked List

Objective: Perform different operations in single linked list.

<https://www.hackerrank.com/contests/17cs1102/challenges/5a-single-linked-list>

b. Double Linked List

Objective: Perform different operations in double linked list.

<https://www.hackerrank.com/contests/17cs1102/challenges/5b-doubly-linked-list>

5. Week 5: Linked List Continued

a. Circular Linked List

Objective: Perform different operations in circular linked list.

<https://www.hackerrank.com/contests/17cs1102/challenges/5c-circular-linked-list>

b. Reverse a linked list

Objective: Reversing a single linked list

<https://www.hackerrank.com/challenges/reverse-a-linked-list/problem?isFullScreen=true>

c. Compare 2 linked list

Objective: Compare the data in the nodes of the linked lists to check if they are equal.

<https://www.hackerrank.com/challenges/compare-two-linked-lists/problem?isFullScreen=true>

6. Week 6: Linked List - Applications

- a. Implement a linked list to represent polynomials and perform addition.
- b. Delete duplicate-value nodes from a sorted linked list.
Objective: Delete nodes and return a sorted list with each distinct value in the original list.
<https://www.hackerrank.com/challenges/delete-duplicate-value-nodes-from-a-sorted-linked-list/problem?isFullScreen=true>

7. Week 7: Stack

- a. Stack and its operations using arrays
- b. Stack Using Linked List
Objective: Implement Stack using Linked List
<https://www.hackerrank.com/contests/17cs1102/challenges/6a-stack-using-linked-list>
- c. Stack using two Queues
Objective: Implement Stack using two Queues
<https://www.hackerrank.com/contests/17cs1102/challenges/6b-implement-stack-using-two-queues->

8. Week 8: Queue

- a. Queue and its operations using arrays
- b. Queue Using Linked List
Objective: Implement a queue using Linked List
<https://www.hackerrank.com/contests/17cs1102/challenges/7b-implement-a-queue-using-linked-list>
- c. Queue using two Stacks
Objective: Implement Queue using two Stacks
<https://www.hackerrank.com/contests/17cs1102/challenges/queue-using-two-stacks>
- d. Circular Queues
Objective: Implement Circular Queue using Arrays
<https://www.hackerrank.com/contests/17cs1102/challenges/7a-circular-queue-using-arrays>

9. Week 9: Stacks - Applications

- a. Towers of Hanoi Using Stack
Objective: Implement Towers of Hanoi using Stack
<https://www.hackerrank.com/contests/17cs1102/challenges/6c-towers-of-hanoi-using-stack>
- b. Balanced Brackets
Objective: Given strings of brackets, determine whether each sequence of brackets is balanced.
<https://www.hackerrank.com/contests/17cs1102/challenges/balanced-brackets>

10. Week 10: Stacks - Applications

- a. Infix to Postfix
Objective: Convert an infix expression into postfix expression.

<https://www.hackerrank.com/contests/17cs1102/challenges/8b-infix-to-postfix>

b. Postfix Expression Evaluation

Objective: Implement a program to evaluate a postfix expression.

<https://www.hackerrank.com/contests/17cs1102/challenges/8-c-postfix-expression-evaluation>

11. Week 11: Tree

a. Binary search tree (BST)

Objective: Implement Binary search tree (BST).

<https://www.hackerrank.com/contests/17cs1102/challenges/9a-implement-binary-search-tree>

b. Binary search Tree (BST) Traversals

Objective: Implement Binary search Tree (BST) Traversals.

<https://www.hackerrank.com/contests/17cs1102/challenges/9b-implement-binary-search-tree>

12. Week 12: Graphs and Hashing – Collision Resolution

a. BFS

Objective: Graph Traversal using BFS

<https://www.hackerrank.com/contests/17cs1102/challenges/13-a-breadth-first-search>

b. DFS

c. Open Hashing - Separate chaining

d. Closed Hashing - Open Addressing – Linear Probing

Week 13-16: List of Augmented Experiments (Complete any 2)

13 DeQueue Implementation

14 Fibonacci Search

15 Radix Sort

16 Quadratic Probing

Reference Books:

1. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008
2. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
3. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.

Web Links:

1. <https://nptel.ac.in/courses/106102064>
2. <https://archive.nptel.ac.in/courses/106/105/106105225/>
3. <https://www.udemy.com/topic/data-structures/>
4. <https://www.coursera.org/specializations/data-structures-algorithms>
5. https://www.coursera.org/specializations/boulder-data-structures-algorithms?trk_location=query-summary-list-link
6. Master Link: <https://www.hackerrank.com/contests/17cs1102/challenges>

NOTE: The Students are expected to complete Data Structure with five star badge in Hacker Rank Platform.

COMMUNICATIVE ENGLISH LAB
(Common to CSE, IT, AIML & CSE(DS))

II Semester	L	T	P	C
Course Code:231HS2L01	0	0	2	1

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

- CO1:** Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- CO2:** Apply communication skills through various language learning activities
- CO3:** Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- CO4:** Evaluate and exhibit professionalism in participating in debates and group discussions.
- CO5:** Develop the capacity to use various writing forms to achieve their professional needs.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	2	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	-

List of Topics:

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

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford University 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*, (2nd Ed),Kindle, 2013

Web Links:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. 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

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/UCNfm92h83W2i2ijc5Xwp_IA

HEALTH AND WELLNESS, YOGA AND SPORTS
(Common to CSE, IT, AIML & CSE(DS))

II semester
Course Code: 231HS2L02

L T P C
0 0 1 0.5

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

- CO1:** Explain 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

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	-	-	-	-	-	-	2	3	3	-	-
CO2	-	-	-	-	-	-	-	2	3	3	-	-
CO3	-	-	-	-	-	-	-	2	3	3	-	2
CO4	1	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	1	-	2	-	1

UNIT I

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

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

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. Practicing general
and specific warm up, aerobics
- ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

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, SAS Survival Handbook: The Ultimate Guide to Surviving
Anywhere Third Edition, William Morrow Paperbacks, 2014
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 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 viva voce on the subject.

ENVIRONMENTAL SCIENCE
(Common to CSE, IT, AIML & CSE(DS))

II Semester

Course Code: 231MC2T02

L	T	P	C
2	0	0	0

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

- CO1:** Outline the natural resources and their importance for the sustenance of the life
CO2: Explain about the biodiversity of India, threats and its conservation methods
CO3: Illustrate various attributes of the pollution, impacts and measures to control the pollution along with waste management practices
CO4: Describe social issues of both rural and urban environment to combat the challenges and the legislations of India in environmental protection
CO5: Explain the population growth and its implications
CO6: Summarize the Role of IT on Environment and Human Health

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	-	-	-	-	1	2	-	-	-	-	-
CO2	1	-	-	-	-	-	3	-	-	-	-	-
CO3	-	-	-	-	-	2	3	-	-	-	-	1
CO4	-	-	-	-	-	1	3	1	-	-	-	1
CO5	-	-	-	-	-	-	3	-	-	-	-	-
CO6	-	-	-	-	-	1	3	-	-	-	-	1

Unit - I

Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance, Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems.

Unit – II

Ecosystem, Biodiversity and Its Conservation:

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers, and decomposers. Food chains, food webs and ecological pyramids.

Biodiversity And Its Conservation: Defi

Unit – III

Environmental Pollution and Solid Waste Management:

Environmental Pollution: Definition, Cause, effects, and control measures of:

- a. Air Pollution.
- b. Water Pollution
- c. Soil Pollution
- d. Marine Pollution
- e. Noise Pollution

Solid Waste Management: Causes

Unit – IV

Social Issues and The Environment: Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to Energy & Water. Resettlement and rehabilitation of people, Environmental ethics, Climate change, global warming,

Unit – V

Human Population and The Environment: Population growth, variation among nations. Environment and human health, Human Rights, Value Education. Role of Information Technology in Environment and human health.

Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company.

Reference Books:

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2. Textbook of Environmental Sciences and Technology by M.Anji Reddy, B.S Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice Hall of India Private limited.
5. A Textbook of Environmental Studies by G.R.Chatwal, Himalaya Publishing House

Web Links:

1. <https://www.youtube.com/watch?v=mOwyPENHhbc>
2. https://www.youtube.com/watch?v=_mgvsPnCYj4
3. <https://www.youtube.com/watch?v=L5B-JMnBIyQ>
4. https://www.youtube.com/watch?v=3RDGV5i82_Q