GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY

Unit of USHODAYA EDUCATIONAL SOCIETY

An ISO 9001:2015 certified Institution: Recognized under Sec. 2(f)& 12(B) of UGC Act, 1956

3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137

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B.Tech – I Year I Semester

S.No.	Category	Course Code	Title	L/D	T	P	Credits
1	BS&H	23A0009T	Communicative English	2	0	0	2
2	BS&H	23A0004T	Chemistry	3	0	0	3
3	BS&H	23A0001T	Linear Algebra & Calculus	3	0	0	3
4	Engineering Science	23A0101T	Basic Civil & Mechanical Engineering	3	0	0	3
5	Engineering Science	23A0501T	Introduction to Programming	3	0	0	3
6	BS&H	23A0010P	Communicative English Lab	0	0	2	1
7	BS&H	23A0007P	Chemistry Lab	0	0	2	1
8	Engineering Science	23A0302P	Engineering Workshop	0	0	3	1.5
9	Engineering Science	23A0502P	Computer Programming Lab	0	0	3	1.5
10	BS&H	23AYG01P	Health and wellness, Yoga and Sports	-	-	1	0.5
Total				**14**	**00**	**11**	**19.5**

B.Tech – I Year II Semester

S.No.	Category	Course Code	Title	L/D	T	P	Credits
1	BS&H	23A0003T	Engineering Physics	3	0	0	3
2	BS & H	23A0002T	Differential Equations & Vector Calculus	3	0	0	3
3	Engineering Science	23A0201T	Basic Electrical and Electronics Engineering	3	0	0	3
4	Engineering Science	23A0301T	Engineering Graphics	1	0	4	3
5	Engineering Science	23A0503P	IT Workshop	0	0	2	1
6	Professional Core	23A0504T	Data Structures	3	0	0	3
7	BS&H	23A0006P	Engineering Physics Lab	0	0	2	1
8	Engineering Science	23A0202P	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	Professional Core	23A0505P	Data Structures Lab	0	0	3	1.5
10	BS&H	23ANS01P	NSS/NCC/Scouts & Guides/ Community Service	-	-	1	0.5
Total				**13**	**00**	**15**	**20.5**

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ENGINEERING PHYSICS
(Common to all branches)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23A0003T	3:0:0	3	CIE: 30 SEE:70	3 Hours	BS&H

Course Objectives:

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

Course Outcomes (CO):

On completion of this course, the students are able to:

CO-1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO-2: Familiarize with the basics of crystals and their structures.

CO-3: Summarize various types of polarization of dielectrics and classify the magnetic materials.

CO-4: Apply fundamentals of quantum mechanics to band theory of solids.

CO-5: Identify the type of semiconductor using Hall Effect.

Syllabus		Total Hours:48
Unit- I	**WAVE OPTICS**	**10**

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

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction andDouble refraction - Nicol's Prism -Half wave and Quarter wave plates

Unit- II	**CRYSTALLOGRAPHY AND X-RAY DIFFRACTION**	**8**

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

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

Unit- III	**DIELECTRIC AND MAGNETIC MATERIALS**	**10**

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

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials

Unit- IV	QUANTUM MECHANICS AND FREE ELECTRON THEORY	10

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

Free Electron Theory: Classical free electron theory1 (Qualitative with discussion of merits and demerits – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Unit- V	SEMICONDUCTORS	10

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

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II

superconductors – BCS theory – High T_c superconductors– Applications of superconductors

Textbooks:

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

Reference Books:

5. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning
6. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
7. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
8. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

E-resources:

3. https://www.textbooks.com/Catalog/MG5/Applied-Physics.php
4. https://edurev.in/courses/9596_Electromagnetic-Theory-Notes--Videos--MCQs--PPTs
5. https://libguides.ntu.edu.sg/c.php?g=867756&p=6226561
6. https://bookauthority.org/books/best-applied-physics-books
7. https://www.electronicsforu.com/resources/16-free-ebooks-on-material-science/2

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to all branches)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23A0002T	3:0:0	3	CIE: 30 SEE:70	3 Hours	BS&H

Course Objectives:

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

Course Outcomes (CO):

CO1: Solve the first order differential equations related to various engineering fields.
CO2: Solve the linear differential equations of higher order with constant coefficients
CO3: Identifysolutionmethodsforpartialdifferentialequationsthatmodelphysical processes.
CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO5: Apply Green's, Stokes and Divergence theorem in work done, circulation, flux and triple integrals.

Syllabus		Total Hours:45
Unit- I	**Differential equations of first order and first degree**	**9**

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

Unit- II	**Linear differential equations of higher order (Constant Coefficients)**	**9**

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

Unit- III	**Partial Differential Equations**	**9**

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

Unit- IV	**Vector differentiation**	**9**

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

Unit- V	**Vector integration**	**9**

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

Textbooks:

3. 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:

4. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
5. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
6. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
7. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
8. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017
9. 6. Engineering Mathematics I by T.K.V. Iyengar, B.Krishna Gandhi,, S. Chand Publications, 2015 Edition.

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to all branches)					
Course Code	**L:T:P**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
23A0201T	**3:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**ES**

Course Objectives:

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

Course Outcomes (CO):

On completion of this course, the students are able to:

CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.

CO2: Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.

CO3: Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout CO5: Develop problem-solving skills and the ability to debug and optimize the code.

CO4: Analyze different electrical circuits, performance of machines and measuring instruments.

CO5: Evaluate different circuit configurations, Machine performance and Power systems operation.

Syllabus		**Total Hours:48**
Unit- I	**DC & AC Circuits**	**10**

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

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

Unit- II	**Machines and Measuring Instruments**	**8**

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

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

Unit- III	**Energy Resources, Electricity Bill & Safety Measures**	**10**

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

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

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

Textbooks:

3. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
4. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti,Dhanpat Rai & Co, 2013
5. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.
6. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications,2018, Second Edition.

Web Resources:

4. https://nptel.ac.in/courses/108105053
5. https://nptel.ac.in/courses/108108076

Reference Books:

5. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019,Fourth Edition
6. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
7. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford UniversityPress, 2017

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

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

Course Outcomes (CO):

On completion of this course, the students are able to:

CO1: Apply the concept of science and mathematics to understand the working of diodes, transistors, and their applications.

CO2: Explain the characteristics of diodes and transistors.

CO3: Familiarize with the number systems, codes, Boolean algebra and logic gates.

CO4: Understand the working mechanism of different combinational, sequential circuits andtheir role in the digital systems.

Syllabus		
]Unit- I	**Semiconductor Devices**	**10**

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

Unit- II	**Basic Electronic Circuits and Instrumentation**	**8**

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

Unit- III	**DIGITAL ELECTRONICS**	**10**

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters(Elementary Treatment only)

Textbooks:

4. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
5. 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.

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ENGINEERING GRAPHICS
(Common to all branches)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23A0101T	1:0:4	3	CIE: 30 SEE:70	3 Hours	ES

Course Objectives:

The students completing the course are expected to:

- Understand the basic principles and conventions of engineering drawing use engineering instruments and draw engineering curves.
- Use orthographic projections and make the students draw the projections of lines and planes inclined to both the planes.
- Draw the projections of the solids in different positions with respect to the reference planes.
- Understand the importance of sectioning and concept of development of surfaces.
- Represent and convert isometric views to orthographic views and vice versa

Course Outcomes (CO):

On completion of this course, the students are able to:

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.

CO3: Understandandapplyconceptsofsectionalviewstorepresentdetailsofsolidsinsimple positions.

CO4: Gain a clear understanding of the principles behind development of surfaces and to understand how to unfold basic geometric shapes into flat patterns.

CO5: Developtheabilitytodrawisometricviewsandorthographicviewsandshouldbeable to convert isometric views to orthographic views and vice versa.

Syllabus	Total Hours:48
Unit- I	**10**

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

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

Scales: Plain scales, diagonal scales and vernier scales.

Unit- II	8

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

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

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

Unit- III		10
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 other and axes inclined to both the reference planes.		
Unit- IV		**10**
Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only. **Development of Surfaces:** Methods of Development Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.		
Unit- V		**10**
Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views. **Computer graphics**: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).		
Textbooks: 3. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.		
Reference Books: 1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013. 2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson EducationInc, 2009. 3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.		

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IT WORKSHOP
(Common to all branches)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23A0503P	0:0:2	1	CIE: 30 SEE:70	3 Hours	ES

Course Objectives:

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

Course Outcomes (CO):

On completion of this course, the students are able to:

CO1: Perform Hardware trouble shooting.
CO2: Understand Hardware components and interdependencies.
CO3: Safeguard computer systems from viruses/worms.
CO4: Document/ Presentation preparation.
CO5: Perform calculations using spreadsheets.

Syllabus

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task2: Every student should is assemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

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

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

Task5: Every student should install BOSS on the computer. The system should be configured as dual boot (VM Ware) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is No internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task3: Search Engines &Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be expose[1]d[4]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.

Task 5:
Install any anti-virus software on your computer

LaTeX and WORD
Task 1: Word Orientation: The mentor needs to give an overview of Latex and Microsoft(MS)office or equivalent(FOSS) tool word: Importance of Latex and MS office or equivalent(FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using Latex and word– Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
/
Task 2: Using Latex and Word to create a project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.

Task3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table,BulletsandNumbering,ChangingTextDirection,Cellalignment,Footnote,Hyperlink,Symbols,Spell Check, Track Changes.

Task4: Creating a News letter: Features to be covered:-Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL
Excel Orientation: The mentor needs to tell the importance of MS office or equivalent(FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would becoveredineach.UsingExcel–Accessing,overviewoftoolbars,savingexcelfiles,Using help and resources.
Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

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

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

POWERPOINT
Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, WordArt, Formatting Text, Bullets and Numbering, AutoShapes, Lines and Arrows in PowerPoint.

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

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slides lotter, notes etc), and Inserting–Background, textures, Design Templates, Hidden slides.

AITOOLS– Chat GPT

Task1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing in complete sentences to see how the model completes them.

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

Task2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

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

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

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

Reference Books:

4. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech, 2003
5. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dreamtech, 2013, 3rd edition
6. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
7. PC Hardware- A Handbook, Kate J. Chase, PHI(Microsoft)
8. LaTeX Companion, Leslie Lamport, PHI/Pearson.
9. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme.– CISCO Press, Pearson Education, 3rd edition
10. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan–CISCO Press, Pearson Education, 3rdedition

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DATA STRUCTURES
(Common to all branches)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23A0504T	3:0:0	3	CIE: 30 SEE:70	3 Hours	PCC

Course Objectives:

The students completing the course are expected to:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

Course Outcomes (CO):

On completion of this course, the students are able to:

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.

CO5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.

CO6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

Syllabus		Total Hours:48
Unit- I	**Introduction to Linear Data Structures**	**10**

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**	**8**

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**	**10**

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 & Deques**	**10**

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications

Unit- V		**10**

Trees: Introduction to Trees, Binary Tree-Insertion, Deletion & Traversal, Binary Search Tree – Insertion, Deletion & Traversal, Introduction to Graphs, Graph Traversals – BFS,DFS.

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

Textbooks:

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

Reference Books:

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

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ENGINEERING PHYSICS LAB
(Common to all branches)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23A0006P	0:0:2	1	CIE: 30 SEE:70	3 Hours	BS&H

Course Objectives:

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

Course Outcomes (CO):

CO1: Operate optical instruments like travelling microscope and spectrometer.
CO2: Estimate dielectric constant of capacitor and magnetic induction of current carrying coil
CO3: Identify the type of semiconductor and calculate band gap of it.
CO4: Evaluate different modulus of materials.
CO5: Measure the frequency of tuning fork and verify the laws in Sonometer

Syllabus | **Total Hours:48**

List of Experiments

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

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

Textbooks:

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

Reference Books:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. ChandPublishers, 2017.

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ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP
(Common to all branches)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23A0202P	0:0:3	1.5	CIE: 30 SEE:70	3 Hours	ES

Course Objectives:

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

Course Outcomes (CO):

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.

CO4: Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.

CO5: Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

Syllabus — **Total Hours:48**

Activities:

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

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator

5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, FirstEdition
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, ThirdEdition

PART B: ELECTRONICS ENGINEERING LAB (Common to all branches)

Course Objectives:

To impart knowledge on the principles of digital electronics and fundamentals ofelectron devices & its applications

Course Outcomes (CO):

At the end of the course, the student will be able to:
CO1: Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit

Syllabus	**Total Hours:48**

List of Experiments:

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

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

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

Reference Books:

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

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DATA STRUCTURES LAB
(Common to CSE, AI&ML, DS, CS, CE)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23A0505P	0:0:3	1.5	CIE: 30 SEE:70	3 Hours	PCC

Course Objectives:

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

Course Outcomes (CO):

On completion of this course, the students are able to:

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal ingraphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.

CO5: Recognize scenarios where hashing is advantageous, and design hash-based solutions forspecific problems.

Syllabus

Exercise 1: Array Manipulation

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

Exercise 2: Linked List Implementation

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

Exercise 3: Linked List Applications

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

Exercise 4: Double Linked List Implementation

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

Exercise 5: Stack Operations

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

Exercise 6: Queue Operations

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

Exercise 7: Stack and Queue Applications

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

Exercise 8: Binary Tree

i) Implementing a Binary tree using Linked List
ii) Traversing of Binary tree

Exercise 9: Binary Search Tree

i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise 10: Hashing

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

Textbooks:

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

Reference Books:

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

Web Resources:

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NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE
(Common to all branches)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
23ANS01P	0:0:1	0.5	CIE: 30 SEE:70	3 Hours	BS&H

Course Objectives:

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

Course Outcomes (CO):

On completion of this course, the students are able to:
CO-1: Understand the importance of discipline, character and service motto
CO-2: Solve some societal issues by applying acquired knowledge, facts, and techniques.
CO-3: Explore human relationships by analyzing social problems.
CO-4: Determine to extend their help for the fellow beings and downtrodden people.
CO-5: Develop leadership skills and civic responsibilities.

Syllabus

Unit- I

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.
Activities:
iv) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
v) Conducting orientations programs for the students –future plans-activities-releasing road map etc.
vi) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
vii) Conducting talent show in singing patriotic songs-paintings- any other contribution

Unit- II

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.
Write a summary on any book related to environmental issues.

Unit- III

Activities:
iii) 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.
iv) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
v) Conducting consumer Awareness. Explaining various legal provisions etc.
vi) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
vii) Any other programmes in collaboration with local charities, NGOs etc

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service SchemeVol;.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