COURSE STRUCTURE OF SRK 23

CIVIL ENGINEERING

I YEAR –I SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	COMMUNICATIVE ENGLISH	2	0	0	2
2	ENGINEERING PHYSICS	3	0	0	3
3	LINEAR ALGEBRA AND CALCULUS	3	0	0	3
4	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	0	3
5	ENGINEERING GRAPHICS	2	0	2	3
6	COMMUNICATIVE ENGLISH LAB	0	0	2	1
7	ENGINEERING PHYSICS LAB	0	0	2	1
8	IT WORKSHOP	0	0	2	1
9	ENGINEERING WORKSHOP	0	0	3	1.5
10	HEALTH AND WELLNESS, YOGA AND SPORTS	-	-	-	0.5
TOTAL		13	0	11	19

I YEAR –II SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	3	0	0	3
2	ENGINEERING CHEMISTRY	3	0	0	3
3	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3
4	INTRODUCTION TO PROGRAMMING	3	0	0	3
5	ENGINEERING MECHANICS	3	0	0	3
6	ENGINEERING CHEMISTRY LAB	0	0	2	1
7	COMPUTER PROGRAMMING LAB	0	0	3	1.5
8	EM & BUILDING PRACTICE LAB	0	0	3	1.5
9	ELECTRICAL AND ELECTRONICS ENGINEERING LAB	0	0	3	1.5
10	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	-	-	-	0.5
TOTAL		15	0	11	21

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L	T	P	C
2	0	0	2

COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the content, topic, and pieces of specific information from social 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.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi **(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: Skimmimg 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 comprehensions/ 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

Textbooks:

1.Pathfinder: Communicative English for Undergraduate: Student, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)

2.Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1.Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

2.Bailey, Stephen. Academic writing: A Handbook for International Students, ROUTLEDGE, 2014.

3.Murphy, Raymond, English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.

4.Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslod.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

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3	0	0	3

ENGINEERING PHYSICS

(Common for all branches of Engineering)

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:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO2: Familiarize with the basics of crystal and their structures.

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials.

CO4: Explain the fundamentals of quantum mechanics and apply it to one dimensional motion of particles.

CO5: Identify the type of semiconductors using Hall effect.

UNIT-I: Wave Optics

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

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

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

UNIT – II: Crystallography and X- ray diffraction

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

Dielectric Materials: Introduction - Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector- - Relation between the electric vectors – Types of polarization – Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) –

Lorentz internal field - Clausius – Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss.

Magnetic Materials: introduction – Magnetic dipole moment – magnetization – Magnetic susceptibility 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

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

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

UNIT – V: Semiconductors

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

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)

Reference Books:

1. Engineering Physics P.K. Palanisamy (Sci Tech Publications (India) Pvt. Ltd Second Edition 2008).
2. Engineering Physics – B. K. Pandey and S, Chaturvedi, Cengage Learning 2021.
3. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. Engineering Physics – Sanjay D. Jain, D. Sahasrabudhe and Girish , University Press. 2014.
5. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resource: https:// www.loc.gov/rr/scitech/selected-internet/physics.html

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LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Course Objectives:

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

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications.

CO2: Determine whether a given matrix is diagonalizable, evaluate inverse and power of the matrix by Cayley Hamilton Theorem.

CO3: Utilize mean value theorems to real life problems.

CO4: Familiarize with functions of several variables which is useful in optimization. Learn important tools of calculus in higher dimensions.

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

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 Seidal Iteration methods.

UNIT II: Eigen values, Eigenvectors and Orthogonal Transformation

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

UNIT III: Calculus

Mean Value Theorems: Rolle's theorem, Lagranges mean value theorem with their geometrical interpretation, Cauch's mean value theorem, Taylor's and Maclaurin theorem 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 Langrange multiplier.

UNIT V: Multiple Integrals (Multi variable Calculus)

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

Textbooks:

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, Micheael Greenberg, Pearson Publishers, 9th Edition.
5. Advanced Engineering Mathematics, H. K. Das, Er. Ranjnish Verma, S.Chand

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BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to All Branches of Engineering)

PART A

Course Objectives:

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

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of water storage and conveyance structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT I

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

UNIT II

Introduction to 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

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

Introduction to Water Resources and Environmental Engineering: 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 Engineering, M.S.Palanisamy, Tata McGraw Hill Publications (India) Pvt.Ltd. Fourth Edition.
2. Engineering Materials by Rangwala S C, (36th Edition), AnandCharotar Publishing House.
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 – SPECIFICATIONS IS 10500-2012.

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PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:

1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2. Explain different engineering materials and different manufacturing processes.
3. Provide an overview of different thermal and mechanical transmission system and introduce basics of robotics and its application.

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand the different manufacturing process.

CO2: Demonstrate the working of different mechanical power transmission systems.

CO3: Describe the basics of robotics and its applications.

CO4: Explain the basics of thermal engineering and its applications.

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: Classification of Engineering Materials & their applications: Metals – Ferrous and Non-ferrous, Ceramics, Composites, Smart materials, Definition of Strength, Hardness, Ductility and Toughness.

UNIT-II

Manufacturing Process: 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

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

Thermal Engineering – Working principle of Boilers (Cochran boiler, Babcock and Wilcox boiler, La Mont boiler), Refrigeration cycle (Ideal Vapour Compression refrigeration cycle) and air- conditioning system (Summer air-conditioning system), IC Engines, Otto Cycle, Diesel cycle, 2-Stroke and 4-Stroke Engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

(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)

Textbooks:

1. Internal Combustion Engines by V. Ganesan, By Tata McGraw Hill Publications (India) Pvt.Ltd.
2. A Tear 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, Cengagelearing India Pvt. Ltd.

Reference Books:

1. AppuuKuttan 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 RathoreTata 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.

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ENGINEERING GRAPHICS

(Common to All branches of Engineering)

Course Objectives:

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

Course outcomes

Upon successful completion of the course, the student will be able to

CO1: Constructions of various engineering curves.

CO2: Apply the principle of orthographic projection to points and lines.

CO3: Understand and draw the projection of planes and solids inclined to both planes in first quadrant.

CO4: Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications

CO5: Develop isometric drawings of simple objects reading the orthographic projection of those objects.

SYLLABUS (First angle projection only)

UNIT-1

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.Curves: construction of ellipse, parabola and hyperbola by general method (Eccentricity method), Cycloids, Involutes, Normal and tangent to Curves.

UNIT-II

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

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.

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

UNIT-IV

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 cube, prism, cylinder, pyramid and cone in simple position only.

UNIT-V

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)

Learning Resources

Text books:

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

Reference books:

1. Engineering Drawing, K.L.Narayana and P.Kannaiah, Tata McGraw Hill,2013.

2. Engineering Drawing, M.B.Shah and B.C.Rana,Pearson Education Inc,2009

3. Engineering Drawing with an Introduction to Auto CAD, Dhananjay Jolhe,
Tata McGraw Hill,2017.

4. AutoCAD 2018 Training Guide (English, Paperback, Sagar Linkan)

Websites

1. https:// www.autodesk.com.au/campaigns/autocad-tutorials

2. https:/nptel.ac.in/courses/112104172

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0	0	2	1

COMMUNICATIVE ENGLISH LAB

(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

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 syllabic division for better listening and speaking comprehension..

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.

CO5: Create effective Course Objectives:

List of Topics:

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

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

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

Web Resources:
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
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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ENGINEERING PHYSICS LAB

(Common to All Branches of Engineering)

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 effects in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The student will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.

CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.

CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor.

CO6: Identify the type of semiconductors using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelength 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 B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's method.
11. Determination of Hall voltage and Hall Coefficient of a given semiconductor using Hall effect.
12. Determination of Temperature coefficient of a thermistor.
13. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
14. Determination of magnetic susceptibility by Kund's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.

17. Determination of Young's modulus for the given material of wooden scale by nonuniform bending method.

18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any ten of the listed experiments are to be conducted. Out of which any Two experiments may be conducted in virtual mode.

References:

A textbook of Practical Physics – S Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources:

www.vlab.co.in

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

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IT WORKSHOP

(Common to All Branches Of Engineering)

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- To Demonstrate Configuring the Systems Dual boot both Windows and Other Operating Style msViz. Linux,BOSS.
- To Teach Basic Command line Interface Commands on Linux.
- To Teach the Usage of Internet for Productivity and Self-Paced Life-long Learning.
- To Introduce Compression, Multimedia and Antivirus tools and Office Tools Such as Word processors,Spread sheets and Presentation Tools

Course Outcomes:

CO1: Perform Hard Water Trouble Shooting.

CO2: Understand Hardware Components and Inter Dependencies.

CO3: Safe guard Computer Systems.

CO4: Document Presentation Preparation.

CO5: Perform Calculations Using Spread sheets.

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions.

Draw the Block Diagram of the CPU along with the Configuration of Each Peripheral and Submit to your Instructor.

Task 2: Every student should dissemble 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 a part of the course content.

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

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

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

Internet & World Wide Web:

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP settings. Finally students should demonstrate, to the instructor, how to access the Websites and E-mail. If there is no internet connectivity preparations need to be made by the Instructor to Simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search tool bars and Popup Blockers. Also,plug-ins like Macromedia Flash and JRE for applets should be configured.

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

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

LaTEx and WORD

Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft(MS) Office or equivalent(FOSS) tool Word: Importance of La TeX and MS Office or equivalent(FOSS)tool Word as Word Processors, Details of the four tasks and features that would be covered in each, using La TeX and Word-Accessing, overview of tool bars, saving files, using help and resourses, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered: Formatting Fonts in word, Drop Cap in Word, Applying Text Effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time Option in both La TeX and Word.

Task 3: Creating project abstract features to be covered: Formatting Styles, Inserting table, Bullet Sand Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: 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 be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

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

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

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

POWER POINT

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

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

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

AI TOOLS – ChatGPT

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

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

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

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

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

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

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 Hand Book, Kate J.Chase, PHI(Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme.-CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan-CISCO Press, Pearson Education, 3rd edition

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ENGINEERING WORKSHOP

(Common to ALL branches of Engineering)

Course Objectives:

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

Course Outcomes:

Upon successful completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities.

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

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

List of Experiments:

(Student has to complete Two experiments in each Trade)

1. Demonstration: Safety practices and precautions to be observed in the workshop

2. Wood Working: Familiarity with different types of woods and tools used in woodworking and make following joints. a) Half-Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. Sheet Metal Working: Familiarity with different types of tools used in sheet metal Working, Developments of following sheet metal job from GI sheets a) Taperedz tray b) Conical funnel c) Elbow pipe d) Brazing

4. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre.

5. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires.

6. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of green sand moulds for given Patterns.

7. Welding shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. Plumbing: Demonstration and practice of Plumbing tools, preparation of pipe joints with coupling for same diameter and with reducer for different diameters.

Textbooks:

1. Basic Workshop Technology: Manufacturing process, Fleix W.; Independently Publised, 2019.

Workshop Processes, Practices and Materials; Bruce J.Black, Rutledge publishers, 5th Edn.2015.

2. A course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

References Books:

1. Elements of Workshop Technology, Vol I. by S. K. Hajra Choudary & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H.S. Bawa, Tata-McGraw Hill, 2004.
3. Writing Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A; Atul Prakshan.

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II SEMESTER

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches of Engineering)

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

CO1: Solve the differential equations related to various engineering fields.

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

CO3: Identify solution methods for partial differential equations that model physical processes.

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

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

UNIT I: Differential equations of first order and first degree

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

UNIT II: Linear differential equations of higher order (constant coefficients)

Definitions, homogeneous and non-homogeneous, 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 applies to scalar point functions-Gradient, Directional derivative, Del applied to vector point functions-Divergence and Curl, 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.

Textbooks:

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. Advanced Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

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ENGINEERING CHEMISTRY

(Common to Civil & Mechanical branches)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the Students on the principles and applications of electrochemistry. Polymers, surface chemistry and modern engineering materials

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

CO1: Analyze the suitable method of water treatment depending on the quality treatment.

CO2: Familiarize construction of electrochemical cells and understand corrosion mechanism and Prevention.

CO3: Explain applications of polymers and concept of fuel technology.

CO4: Explain advanced applications of engineering materials like composites, refractories, lubricants, cements.

CO5: summarize the concepts of colloids, micelles and nanomaterials.

UNIT I: Water Technology

Soft and hardwater Estimation of hardness of water by EDTA method, Estimation of dissolved Oxygen - Boiler troubles. Priming, forming, scale and sludge, Caustic embrittlemet, Industrial water treatment specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, Ion exchange process: desalination of brackish water, reverse osmosis (RO) and electrodialysis.

UNIT II: Electrochemistry and Applications

Electrodes- electro chemical cell, Nernst equation, cell potential calculations.
Primary cells — Zinc-air battery, Secondary cells — Nickel-Cadmium (NiCad),and lithium ion batteries-working principle of the batteries including cell reactions; Fuel cells Basic Concepts, the principle and working of hydrogen-Oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical Corrosion, pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT III: Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization

Thermoplastics and Thermo-setting plastics: Preparation, properties and applications of polystyrene. PVC Nylon 6,6 and Bakelite.

Elastomers-preparation, properties and applications of Buna-S, Buna-N, Thiokol rubbers.

Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

UNIT IV: Modern Engineering Materials

Composites- Definition, Constituents. Classification- Particle, Fibre and Structural reinforced composites. Properties and Engineering applications

Refractories- Classification. properties, factors affecting the refactory materials and Applications.

Lubricants-Classification, Functions of lubricants , Mechanism, properties of lubricating oils viscosity, viscosity Index, Flashpoint, Firepoint, cloud point, saponification and Applications.

Building materials -Portland Cement, constituents, Setting and Hardening of cement.

UNIT V: Surface Chemistry and Nano materials

Introduction to surface chemistry, colliods, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs method), chemical and biological method of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials - catalysis, medicine, sensors, etc.

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth- Heineman, 1992.
3. Textbook of Polymer Science, Fred W. BillmayerJr, 3rd Edition

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to All branches of Engineering)

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:

After the completion of the course students will be able to

CO1: Understand the concepts of AC and DC electrical Circuits.

CO2: Understand the construction and working principles of Electrical Machines and Measuring instruments.

CO3: Compare various electrical Power Generation systems and their Equipment Safety Measures.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I: 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, 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

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 wattmeter.

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, 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: Electrical Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

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

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw 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. Bhatacharya, Person Publishers, 2018, Second Edition.

Web Resources:

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

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PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

Objectives of this course are

- To teach the fundamentals of semi-conductor devices and its applications, principles of digital electronics.

Course Outcomes:

The student will be able to:

CO4: Identify electronic components and the simple analysis of diodes and transistor.
CO5: Demonstrate the working of electronic circuits and the measuring instruments.
CO6: Recognize the concepts of digital electronics.

UNIT I: SEMICONDUCTOR DEVICES

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

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

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3code, 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 Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Textbooks:

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

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions and arrays.
- To encourage collaborative learning and teamwork in coding projects.

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

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

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), pseudocode. 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, 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 Array and Strings

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

UNIT IV Pointers & User-Defined Data types

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

UNIT V Functions & File Handling

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

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

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw Hill Education, 1996.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E, McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja , Oxford, 2016, 2^{nd} edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3^{rd} edition.

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ENGINEERING MECHANICS

(Common To Civil And Mechanical Engineering)

Course Objectives:

1. To get familiarized with different types of force systems.
2. To draw a accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
3. To teach the basic principles of centroid and centre of gravity.
4. To determine the moment of inertia of different composite figures and bodies.
5. To understand the kinematics and kinetics of translational and rotational motion of particle and rigid bodies.

Course Outcomes: upon successful completion of course,the student will be able to analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.

1. CO1: understand the fundamental concepts in mechanics and equilibrium of system of forces.
2. CO2: determine the frictional forces for bodies in contact and analysis of trusses.
3. CO3: calculate centroids centre of gravity of different geometrical shapes.
4. CO4: calculate the moment of inertia of different geometrical shapes.
5. CO5:apply the principals of work –energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle &rigid body.

SYLLABUS

UNIT-I

Introduction to Engineering Machanics: Basic concepts, scope and applications,

System of forces: coplanar concurrent forces ,components in space ,resultant, moment of force and its applications, couples and resultant to force system in plane and space.

Equilibrium of System of Forces: Definition, equation of equilibrium , equilibrium of coplanar concurrent and parallel force systems.

UNIT-II

Equation of equilibrium for spatial system of forces numerical examples on spatial system of forces using vector approach.**Friction:** Introduction, coefficient of friction, cone of static function ,application to simple systems, connected systems and Ladder friction. Analysis of planet trusses by method of joints and method of sections.

UNIT-III

Centroid: Centroids of simple figures (from basic principals), Centroids of composite figures **Centre of gravity:** centre of gravity of simple body(from basic principals), centre of gravity of composite bodies, Pappus theorems.

UNIT-IV

Area moments of Inertia: Definition of polar moment of inertia, transfer theorem, moments of inertia of composite figures. **Products of Inertia:** transfer formula for products of inertia.

Mass moments of inertia: moment of inertia of masses, transfer formula for mass moments of inertia ,mass moments of inertia of composite bobies.

UNIT-V

Rectilinear and curvylinear motion of particle: kinematics of particle with constant & variable acceleration in linear and angular motion, projectile motion. D'Alembert's principle, work energy method and impulse momentum method.

Kinematics and kinetics of rigid body: Rotation about fixed axis and plane motion, work energy method and impulse momentum method.

Learning Resources Textbook:

1. Engineering Mechanics, S.Timoshenoko ,D.H.Young ,J.V.Rao,S.Pati. 5th Edition 2017,McGrawHill Education.
2. Engineering Mechanics, P.C.Dumir. S.Sengupta and Srinivas V Veeravalli,University press .2020.1st Edition.
3. A text book of Engineering Mechanics,S.S.Bhavikatti ,new age international publications 2018. 4th Edition.
4. Reddy Vijaya Kumar k.and K.Suresh Kumar (2010),Singers Engineering Mechanics.

Reference Books

1. Engineering Mechanics,Statics and Dynamics,Rogers and MA Nelson ,Mc Graw Hill Education.2017.1st Edition.
2. Engineering Mechanics,Statics and Dynamics,J.H.Shames,PHI,2002,4TH Edition.
3. Engineering Mechanics,volume-I:statics, ,volume- II:Dynamics, J.L.MeriamandL.G.Kraige., JohnWiley, 2008.6thEdition
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition.
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C.,Pearson Education, Inc., NewDelhi, 2022, 14thEdition.

Websites

1. http://nptel.ac.in/
2. http://mhrd.gov.in/e-contents

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ENGINEERING CHEMISTRY LAB

(Common to Civil & Mechanical branches)

Course Objectives:

- To verify the fundamental concepts with experiments.

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer materials.

CO3: Determine the physical properties like surface tension, adsorption and viscosity.

CO4: Estimate the Iron and Calcium in cement.

CO5: Calculate the hardness of water.

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Determination of Strength of an acid in Pb-Acid battery.
4. Preparation of a polymer (Bakelite).
5. Determination of percentage of Iron in Cement sample by colorimetry.
6. Estimation of Calcium in port land Cement.
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating Oil by Redwood Viscometer I
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter

Reference:

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

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COMPUTER PROGRAMMING LAB

Course Objectives:

The Course aims to give students hands- on experience and train them on the concepts of the C-programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the application of arrays, functions, basic concepts of pointers in C.

UNIT: I

WEEK: 1

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

Suggested Experiments/ Activities:

Tutorial 1: Problem- solving using Computers.

Lab 1: Familiarization with programming environment

1. Basic Linux Environment and its editors like VI, Vim & Emacs etc.
2. Exposure to Turbo C, gcc
3. Writing Simple programs using printf( ), scanf( )

WEEK: 2

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

Suggested Experiments/ Activities:

Tutorial 2: Problem- solving using Algorithms and flow charts.

Lab 2: Converting algorithms/ flow charts into C Source code

Developing the algorithm/ flow charts for the following sample programs

1. Sum and average of 3 numbers
2. Conversion of Fahrenheit of Celsius and vice versa
3. Simple interest calculation

WEEK: 3

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

Suggested Experiments/ Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

1. Finding the square root of a given number
2. Finding compound interest
3. Area of triangle using heron's formulae
4. Distance travelled by an object

UNIT: II

WEEK: 4

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

Suggested Experiments/ Activities:

Tutorial 4: Operators and the precedence and as associatively:

Lab 4: Simple computational problems using the operator' precedence and associatively

1. Evaluate the following expressions.

a. A+B*C+(D*E)+F*G

b. A/B*C-B+A*D/3

c. A+++B---A

d. J=(i++)+(++i)

2. Find the maximum of three numbers using conditional operator
3. Take marks of 5 subjects in integers, and find the total , average in float.

WEEK: 5

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

Suggested Experiments/ Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: **Problems involving if- then – else structures.**

a) Write a C program to find the max and min of four numbers using if-else.
b) Write a C program to generate electricity bill.
c) Find the roots of the quadratic equation.

d) Write a C program to simulate a calculator using switch case.

e) Write a C program to find the given year is a leap year or not.

WEEK: 6

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

Suggested Experiments/ Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

a) Find the factorial of given number using any loop.

b) Find the given number is a prime or not.

c) Compute sine and cos series

d) Checking a number palindrome

e) Construct a pyramid of numbers.

UNIT: III

WEEK: 7

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

Suggested Experiments/ Activities:

Tutorial 7: 1 D Arrays: searching

Lab 7: 1D Array manipulation, linear search

a) Find the min and max of a 1-D integer array.

b) Perform linear search on1D array.

c) The reverse of a 1D integer array

d) Find 2's complement of the given binary number.

e) Eliminate duplicate elements in an array.

WEEK: 8

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

Suggested Experiments/ Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

a) Addition of two matrices
b) Multiplication two matrices
c) Sort array elements using bubble sort
d) Concatenate two strings without built-in functions
e) Reverse a string using built-in and without built-in string function.

UNIT: IV

WEEK: 9

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

Suggested Experiments/ Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereferences.

a) Write a C program to find the sum of a 1D array using malloc().
b) Write a C program to find the total, average of n students using structures
c) Enter n students data using calloc () and display failed students list.
d) Read student name and marks from the command line and display the student details along with the total.
e) Write a C program to implement realloc().

WEEK: 10

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

Suggested Experiments/ Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists.

Lab 10: Bit fields, linked lists

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

a) Create and display a singly linked list using self-referential structure.
b) Demonstrate the differences between structures and unions using a C program.
c) Write a C program to shift/rotate using bit fields.
d) Write a C program to copy one structure variable to another structure of the same type.

UNIT: V

WEEK: 11

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

Suggested Experiments/ Activities:

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

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

a) Write a C function to calculate NCR value.
b) Write a C function to find the length of a string.
c) Write a C function to transpose of a matrix.
d) Write a C function to demonstrate numerical integration of differential equations using Euler's method.

WEEK: 12

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

Suggested Experiments/ Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

a) Write a recursive function to generate Fibonacci series.
b) Write a recursive function to find the LCM of two numbers.
c) Write a recursive function to find the factorial of a number.
d) Write a C Program to implement Ackermann function using recursion.
e) Write a recursive function to find the sum of series.

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

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

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

a) Write a C program to write and read text into a file.

b) Write a C program to write and read text into a binary file using fread() and fwrite()

c) Copy the contents of one file to another file.

d) Write a C program to merge two files into the third file using command-line arguments.

e) Find no. of lines, words and characters in a file

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

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

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

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

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L	T	P	C
0	0	3	1.5

ENGINEERING MECHANICS & BUILDING PRACTICES LAB

(Civil Engineering & Allied branches)

Course Objectives: The student completing the course are expected to

- Verify the Law of Parallelogram of Forces and Lami's theorem.
- Determine the coefficient of friction of static and Rolling friction and Centre of gravity of different plane Lamina.
- Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.

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

CO1: Evaluate the coefficient of friction between the inclined plane and the roller.

CO2: Verify Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever.

CO3: Determine the Centre of gravity different configurations and

CO4: Understand the types of bricks, bonds and sizes.

CO5: Exposure to precautions in the construction industry.

Students have to perform any 10 of the following Experiments:

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Centre of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Natural Aggregates – Fine and Coarse - Sources and Properties
9. Field Identification of different types of Soils.
10. Safety Precautions in Construction Sites.
11. Manufacturing of Bricks and Precast Elements.
12. Mega Low Cost Housing Projects Planning.
13. Concrete Preparation Ready Mix Plant.

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ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Common to all branches of engineering)

Course Objectives:

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

Course Outcomes:

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 principle 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 measurements of resistance, power and power factor.

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

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

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop

Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, Screw Driver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc

- Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of measuring instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function, Generator, Frequency, counter.

- Provide some exercises so that measuring instruments are learned to be used by the students.

3. Components:

- Familiarization/ Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
- Testing of components like Resistor, Capacitor, Diodes, transistors, IC's etc- Compare values of components like resistors, inductors, capacitor 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. Demonstration and study of commonly used electrical workshop Tools.
   (Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, Screw Driver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc)
4. Determination of current in series and Parallel Circuits.
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, 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

Note: Minimum six experiments to be performed. All the experiments shall be implemented using both hardware and software.

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PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

Objectives of this course are

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

Course Outcomes:

The student will be able to:

CO4: Identify & testing of various electronic components.
CO5: Plot and discuss the characteristics of various electronic devices.
CO6: Explain the operation of a digital circuit.

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 gates using ICs.

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COURSE STRUCTURE

EEE

I YEAR –I SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	COMMUNICATIVE ENGLISH	2	0	0	2
2	ENGINEERING PHYSICS	3	0	0	3
3	LINEAR ALGEBRA AND CALCULUS	3	0	0	3
4	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3
5	ENGINEERING GRAPHICS	2	0	2	3
6	COMMUNICATIVE ENGLISH LAB	0	0	2	1
7	ENGINEERING PHYSICS LAB	0	0	2	1
8	ELECTRICAL AND ELECTRONICS ENGINEERING LAB	0	0	3	1.5
9	ENGINEERING WORKSHOP	0	0	3	1.5
10	HEALTH AND WELLNESS, YOGA AND SPORTS	-	-	-	0.5
TOTAL		13	0	12	19.5

I YEAR –II SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	3	0	0	3
2	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	0	3
3	CHEMISTRY	3	0	0	3
4	INTRODUCTION TO PROGRAMMING	3	0	0	3
5	ELECTRICAL CIRCUIT ANALYSIS - I	3	0	0	3
6	CHEMISTRY LAB	0	0	2	1
7	COMPUTER PROGRAMMING LAB	0	0	3	1.5
8	ELECTRICAL CIRCUIT ANALYSIS - I LAB	0	0	3	1.5
9	IT WORKSHOP	0	0	2	1
10	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	-	-	-	0.5
TOTAL		15	0	10	20.5

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2	0	0	2

COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the content, topic, and pieces of specific information from social 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.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi **(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: Skimmimg 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 comprehensions/ 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

Textbooks:

1.Pathfinder: Communicative English for Undergraduate: Student, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)

2.Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1.Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

2.Bailey, Stephen. Academic writing: A Handbook for International Students, ROUTLEDGE, 2014.

3.Murphy, Raymond, English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.

4.Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslod.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

Verified by
Y. Ramanaiah

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L	T	P	C
3	0	0	3

ENGINEERING PHYSICS

(Common for all branches of Engineering)

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:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO2: Familiarize with the basics of crystal and their structures.

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials.

CO4: Explain the fundamentals of quantum mechanics and apply it to one dimensional motion of particles.

CO5: Identify the type of semiconductors using Hall Effect.

UNIT-I: Wave Optics

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 and double refraction – Nicol's Prism - Half wave and Quarter wave plates.

UNIT – II: Crystallography and X- ray diffraction

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

Dielectric Materials: Introduction - Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector- - Relation between the electric vectors – Types of polarization – Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) – Lorentz

internal field - Clausius – Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss.

Magnetic Materials: introduction – Magnetic dipole moment – magnetization – Magnetic susceptibility 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

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

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

UNIT – V: Semiconductors

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

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)

Reference Books:

1. Engineering Physics P.K. Palanisamy (Sci Tech Publications (India) Pvt. Ltd Second Edition 2008).
2. Engineering Physics – B. K. Pandey and S, Chaturvedi, Cengage Learning 2021.
3. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. Engineering Physics – Sanjay D. Jain, D. Sahasrabudhe and Girish , University Press. 2014.
5. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resource:

https:// www.loc.gov/rr/scitech/selected-internet/physics.html

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LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Course Objectives:

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

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications.

CO2: Determine whether a given matrix is diagonalizable, evaluate inverse and power of the matrix by Cayley Hamilton Theorem.

CO3: Utilize mean value theorems to real life problems.

CO4: Familiarize with functions of several variables which is useful in optimization. Learn important tools of calculus in higher dimensions.

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

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 Seidal Iteration methods.

UNIT II: Eigen values, Eigenvectors and Orthogonal Transformation

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

UNIT III: Calculus

Mean Value Theorems: Rolle's theorem, Lagranges mean value theorem with their geometrical interpretation, Cauch's mean value theorem, Taylor's and Maclaurin theorem 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 Langrange multiplier.

UNIT V: Multiple Integrals (Multi variable Calculus)

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

Textbooks:

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, Micheael Greenberg, Pearson Publishers, 9th Edition.
5. Advanced Engineering Mathematics, H. K. Das, Er. Ranjnish Verma, S.Chand

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Common to All branches of Engineering)

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:

After the completion of the course students will be able to

CO1: Understand the concepts of AC and DC electrical Circuits.

CO2: Understand the construction and working principles of Electrical Machines and Measuring instruments.

CO3: Compare various electrical Power Generation systems and their Equipment Safety Measures.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I: 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, 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

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 wattmeter.

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, 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: Electrical Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

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

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw 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. Bhatacharya, Person Publishers, 2018, Second Edition.

Web Resources:

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

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PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

Objectives of this course are

- To teach the fundamentals of semi-conductor devices and its applications, principles of digital electronics.

Course Outcomes:

The student will be able to:

CO4: Identify electronic components and the simple analysis of diodes and transistor.
CO5: Demonstrate the working of electronic circuits and the measuring instruments.
CO6: Recognize the concepts of digital electronics.

UNIT I: SEMICONDUCTOR DEVICES

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

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

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3code, 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 Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata McGraw 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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L	T	P	C
2	0	2	3

ENGINEERING GRAPHICS

(Common to All branches of Engineering)

Course Objectives:

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

Course outcomes

Upon successful completion of the course, the student will be able to

CO1: Constructions of various engineering curves.

CO2: Apply the principle of orthographic projection to points and lines.

CO3: Understand and draw the projection of planes and solids inclined to both planes in first quadrant.

CO4: Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications

CO5: Develop isometric drawings of simple objects reading the orthographic projection of those objects.

SYLLABUS (First angle projection only)

UNIT-1

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

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

UNIT-II

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

Projections of Straight Lines: Projection 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.

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.

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

UNIT-IV

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 cube, prism, cylinder, pyramid and cone in simple position only.

UNIT-V

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)

Learning Resources

Text books:

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

Reference books

1. Engineering Drawing, K.L.Narayana and P.Kannaiah, Tata McGraw Hill,2013.

2. Engineering Drawing, M.B.Shah and B.C.Rana,Pearson Education Inc,2009

3. Engineering Drawing with an Introduction to Auto CAD, Dhananjay Jolhe,
Tata McGraw Hill,2017.

4. AutoCAD 2018 Training Guide (English, Paperback, Sagar Linkan)

Websites :

1. https:// www.autodesk.com.au/campaigns/autocad-tutorials
2. https:/nptel.ac.in/courses/112104172

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COMMUNICATIVE ENGLISH LAB

(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

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 syllabic division for better listening and speaking comprehension..

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.

CO5: Create effective Course Objectives:

List of Topics:

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

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

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

Web Resources:

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
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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ENGINEERING PHYSICS LAB

(Common to All Branches of Engineering)

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 effects in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The student will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.

CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.

CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor.

CO6: Identify the type of semiconductors using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelength 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 B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's method.
11. Determination of Hall voltage and Hall Coefficient of a given semiconductor using Hall effect.
12. Determination of Temperature coefficient of a thermistor.
13. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
14. Determination of magnetic susceptibility by Kund's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.

17. Determination of Young's modulus for the given material of wooden scale by nonuniform bending method.

18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any ten of the listed experiments are to be conducted. Out of which any Two experiments may be conducted in virtual mode.

References:

A textbook of Practical Physics – S Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources:

www.vlab.co.in

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

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ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Common to all branches of engineering)

Course Objectives:

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

Course Outcomes:

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 principle 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 measurements of resistance, power and power factor.

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

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

Activities:

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

Note: Minimum six experiments to be performed. All the experiments shall be implemented using both hardware and software.

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PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

Objectives of this course are

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

Course Outcomes:

The student will be able to:

CO4: Identify & testing of various electronic components.
CO5: Plot and discuss the characteristics of various electronic devices.
CO6: Explain the operation of a digital circuit.

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 gates using ICs.

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ENGINEERING WORKSHOP

(Common to ALL branches of Engineering)

Course Objectives:

1. To familiarize students with wood working, sheet metal operations, fitting and electrical house Wiring skills

Course Outcomes:

Upon successful completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities.

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

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

List of Experiments:

(Student has to complete Two experiments in each Trade)

1. Demonstration: Safety practices and precautions to be observed in the workshop

2. Wood Working: Familiarity with different types of woods and tools used in woodworking and make following joints. a) Half-Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. Sheet Metal Working: Familiarity with different types of tools used in sheet metal Working, Developments of following sheet metal job from GI sheets a) Taperedz tray b) Conical funnel c) Elbow pipe d) Brazing

4. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre.

5. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires.

6. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of green sand moulds for given Patterns.

7. Welding shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. Plumbing: Demonstration and practice of Plumbing tools, preparation of pipe joints with coupling for same diameter and with reducer for different diameters.

Textbooks:

1. Basic Workshop Technology: Manufacturing process, Fleix W.; Independently Publised, 2019. Workshop Processes, Practices and Materials; Bruce J.Black, Rutledge publishers, 5th Edn.2015.

2. A course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

References Books:

1. Elements of Workshop Technology, Vol I. by S. K. Hajra Choudary & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H.S. Bawa, Tata-McGraw Hill, 2004.
3. Writing Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A; Atul Prakshan.

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II SEMESTER

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches of Engineering)

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

CO1: Solve the differential equations related to various engineering fields.

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

CO3: Identify solution methods for partial differential equations that model physical processes.

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

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

UNIT I: Differential equations of first order and first degree

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

UNIT II: Linear differential equations of higher order (constant coefficients)

Definitions, homogeneous and non-homogeneous, 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 applies to scalar point functions-Gradient, Directional derivative, Del applied to vector point functions-Divergence and Curl, 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.

Textbooks:

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. Advanced Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

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L	T	P	C
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BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to All Branches of Engineering)

PART A

Course Objectives:

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

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of water storage and conveyance structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT I

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

UNIT II

Introduction to 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

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

Introduction to Water Resources and Environmental Engineering: 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 Engineering, M.S.Palanisamy, Tata McGraw Hill Publications (India) Pvt.Ltd. Fourth Edition.
2. Engineering Materials by Rangwala S C, (36th Edition), AnandCharotar Publishing House.
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 – SPECIFICATIONS IS 10500-2012.

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PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:

1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2. Explain different engineering materials and different manufacturing processes.
3. Provide an overview of different thermal and mechanical transmission system and introduce basics of robotics and its application.

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand the different manufacturing process.

CO2: Demonstrate the working of different mechanical power transmission systems.

CO3: Describe the basics of robotics and its applications.

CO4: Explain the basics of thermal engineering and its applications.

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: Classification of Engineering Materials & their applications: Metals – Ferrous and Non-ferrous, Ceramics, Composites, Smart materials, Definition of Strength, Hardness, Ductility and Toughness.

UNIT-II

Manufacturing Process: 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

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

Thermal Engineering – Working principle of Boilers (Cochran boiler, Babcock and Wilcox boiler, La Mont boiler), Refrigeration cycle (Ideal Vapour Compression refrigeration cycle) and air- conditioning system (Summer air-conditioning system), IC Engines, Otto Cycle, Diesel cycle, 2-Stroke and 4-Stroke Engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

(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)

Textbooks:

1. Internal Combustion Engines by V. Ganesan, By Tata McGraw Hill Publications (India) Pvt.Ltd.
2. A Tear 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, Cengagelearing India Pvt. Ltd.

Reference Books:

1. AppuuKuttan 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 RathoreTata 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.

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CHEMISTRY

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

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

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

CO1: Explain basic concepts of quantum mechanics and molecular and bonding.

CO2: Apply the principle of band diagrams in the application of conductors and semiconductors.

CO3: Compare the materials of construction for battery and electrochemical sensors.

CO4: Explain preparation, properties, and applications of thermoplastics & thermosetting & elastomers, conducting polymers.

CO5: Explain the principles of spectrometry, hplc in separation of solid and liquid mixtures.

UNIT I: Structure and Bonding Models:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II: Modern Engineering materials

Semiconductors – Introduction, basic concept, application

Super conductors-Introduction basic concept, applications.

Supercapacitors: Introduction, Basic Concept-Classification – Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles.

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-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT IV: Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

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.

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

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

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INTRODUCTION TO PROGRAMMING

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions and arrays.
- To encourage collaborative learning and teamwork in coding projects.

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

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

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), pseudocode. 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, 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 Array and Strings

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

UNIT IV Pointers & User-Defined Data types

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

UNIT V Functions & File Handling

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

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

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw Hill Education, 1996.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E, McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja , Oxford, 2016, 2^{nd} edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3^{rd} edition.

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ELECTRICAL CIRCUIT ANALYSIS-1

(EEE & allied branches)

Course Objectives:

To develop and understanding of the fundamental laws, elememts of electrical circuits and to apply circuit analysis to DC AND AC circuits

Course Outcomes:

CO1: Remembering the basic electrical elements and different fundamental laws.

CO2: Understand the network reduction techniques, transformations, concept of self-inductance and mutual inductance, phasor diagrams ,resonance and network theorms.

CO3: Apply the concepts too various mathematical and graphical representations.

CO4: Analyzenodalandmesh networks, series and parallel circuits, steady stateresponce ,different circuit topologies(with R,L and C components).

CO5: Evaluation of Network theorms , electrical magnetic and single-phasecircuits.

UNIT-I INTRODUCTION TO ELECTRICAL CIRCUITS

Basic Concept of passive elements of R, L,C and their V-I relations, Sources(dependent and independent) Kirchoff 's laws, Network reduction techniques(series,parallel,series-parallel,star-to-delta and delta-to-star transformations), sourse transformation technique, nodal analysis and meshanalysis to DC networks with dependentand independent voltage and current sources, node and mesh analysis.

UNIT-II MAGNETIC CIRCUITS

Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Fara day 's law of electromagnetic induction – concept of self and mutual inductance, Dotconvention- coefficient of coupling and composite magnetic circuit, analysis of series and paralle magnetic circuits.

UNIT-III SINGLE PHASECIRCUITS

Characteristics of periodic functions Average value , R.M.S revalue, form factor, representation of a sine function , concept of phasor diagrams, node and mesh analysis. Steady state analysis of R,L and C circuts to

sinusoidalexcitions response of pure resistance, inductance,capacitance, series RL circuit, series RC circuit, series RLC circuit ,parallel RL circuit, RC circuit

UNIT-IV RESONANCE AND LOCUS DIAGRAMS

Series Resonance: Characteristics of a series resonant circuit ,Q-factor, selectivity and bandwidth expression for half power frequencies; parallel resonance: Q-factor, selectivity and band width; Locus diagram:RL,RC,RLC with R, L and C variables.

UNIT-V NETWORK THEORMS(DC&AC EXCITATIONS)

Superposition theorems,Thevenin 's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem,Millman 's theorem and compensation theorem

Text Books:

1.Engineering circuits analysis, jack Kemmerly, William Haytandsteven Durbin,TataMcGRAHILL Eduction,2005 sixth edition.

2. Network Analysis, M.E.VanValkenburg,pearson eduction,2019, Revised thirid edition

Reference Books:

1.Fundamentals of electrical circuits ,Charles Alexanderand Mathew N.O.Sadku, Mc Graw hill Education(India) ,2013,fifth Education

2.Electric circuits(Schaum' soutline series) Mahmood Nhvi ,Joseph Edminister , and K.Rao,Mc Graw Hill Education , 2017,fifth Education.

3.Electric circuits, David A.Bell, Oxford University press,2009,seventh education.

4.Introductory circuit analysis Robert Boylestad, pearson Publications,2023,Fourteeth Education.

5.Circuit Theory: Analysis and synthesis, A.Chakrabarti,Dhanpat Rai &Co, 2018, seventh revised educatin

Web Resources:

1.https//onlinecourses.nptel.ac.in/noc23 ee81/preview

2.https//nptel.ac.in/courses/108104139

3. https//nptel.ac.in/courses/108106172

4. https//nptel.ac.in/courses/108106108

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CHEMISTRY LAB

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

- Verify the fundamental concepts with experiments.

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer Bakelite materials.

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

CO4: Analyse the IR spectra of some organic compounds.

CO5: Calculate strength of acid in Pb-Acid battery.

List of Experiments:

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

Reference:

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

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COMPUTER PROGRAMMING LAB

Course Objectives:

The Course aims to give students hands- on experience and train them on the concepts of the C-programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the application of arrays, functions, basic concepts of pointers in C.

UNIT: I

WEEK: 1

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

Suggested Experiments/ Activities:

Tutorial 1: Problem- solving using Computers.

Lab 1: Familiarization with programming environment

1. Basic Linux Environment and its editors like VI, Vim & Emacs etc.
2. Exposure to Turbo C, gcc
3. Writing Simple programs using printf( ), scanf( )

WEEK: 2

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

Suggested Experiments/ Activities:

Tutorial 2: Problem- solving using Algorithms and flow charts.

Lab 2: Converting algorithms/ flow charts into C Source code

Developing the algorithm/ flow charts for the following sample programs

1. Sum and average of 3 numbers
2. Conversion of Fahrenheit of Celsius and vice versa
3. Simple interest calculation

WEEK: 3

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

Suggested Experiments/ Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

1. Finding the square root of a given number
2. Finding compound interest
3. Area of triangle using heron's formulae
4. Distance travelled by an object

UNIT: II

WEEK: 4

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

Suggested Experiments/ Activities:

Tutorial 4: Operators and the precedence and as associatively:

Lab 4: Simple computational problems using the operator' precedence and associatively

1. Evaluate the following expressions.

a. A+B*C+(D*E)+F*G

b. A/B*C-B+A*D/3

c. A+++B---A

d. J=(i++)+(++i)

2. Find the maximum of three numbers using conditional operator
3. Take marks of 5 subjects in integers, and find the total , average in float.

WEEK: 5

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

Suggested Experiments/ Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if- then – else structures.

a) Write a C program to find the max and min of four numbers using if-else.
b) Write a C program to generate electricity bill.
c) Find the roots of the quadratic equation.

d) Write a C program to simulate a calculator using switch case.

e) Write a C program to find the given year is a leap year or not.

WEEK: 6

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

Suggested Experiments/ Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

a) Find the factorial of given number using any loop.

b) Find the given number is a prime or not.

c) Compute sine and cos series

d) Checking a number palindrome

e) Construct a pyramid of numbers.

UNIT: III

WEEK: 7

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

Suggested Experiments/ Activities:

Tutorial 7: 1 D Arrays: searching

Lab 7: 1D Array manipulation, linear search

a) Find the min and max of a 1-D integer array.

b) Perform linear search on1D array.

c) The reverse of a 1D integer array

d) Find 2's complement of the given binary number.

e) Eliminate duplicate elements in an array.

WEEK: 8

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

Suggested Experiments/ Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

a) Addition of two matrices
b) Multiplication two matrices
c) Sort array elements using bubble sort
d) Concatenate two strings without built-in functions
e) Reverse a string using built-in and without built-in string function.

UNIT: IV

WEEK: 9

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

Suggested Experiments/ Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereferences.

a) Write a C program to find the sum of a 1D array using malloc().
b) Write a C program to find the total, average of n students using structures
c) Enter n students data using calloc () and display failed students list.
d) Read student name and marks from the command line and display the student details along with the total.
e) Write a C program to implement realloc().

WEEK: 10

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

Suggested Experiments/ Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists.

Lab 10: Bit fields, linked lists

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

a) Create and display a singly linked list using self-referential structure.
b) Demonstrate the differences between structures and unions using a C program.
c) Write a C program to shift/rotate using bit fields.
d) Write a C program to copy one structure variable to another structure of the same type.

UNIT: V

WEEK: 11

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

Suggested Experiments/ Activities:

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

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

a) Write a C function to calculate NCR value.
b) Write a C function to find the length of a string.
c) Write a C function to transpose of a matrix.
d) Write a C function to demonstrate numerical integration of differential equations using Euler's method.

WEEK: 12

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

Suggested Experiments/ Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

a) Write a recursive function to generate Fibonacci series.
b) Write a recursive function to find the LCM of two numbers.
c) Write a recursive function to find the factorial of a number.
d) Write a C Program to implement Ackermann function using recursion.
e) Write a recursive function to find the sum of series.

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

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

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

a) Write a C program to write and read text into a file.

b) Write a C program to write and read text into a binary file using fread() and fwrite()

c) Copy the contents of one file to another file.

d) Write a C program to merge two files into the third file using command-line arguments.

e) Find no. of lines, words and characters in a file

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

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

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

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

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ELECTRICAL CIRCUIT ANALYSIS-I LAB

(EEE & Allied Branches)

Course Objectives:

To impact hands on experience in verification oh circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics. It also gives practical exposure to the usage of different circuits with different conditions.

Courese Outcomes:

CO1:Understand the concept of network theorems, node and mesh networks, series and parallel resonance and Locus diagrams.

CO2: Apply various theorems to compare practical results obtained with theoretical calculations.

CO3:Determine self mutual inductance and coefficient of coupling values, parameters of choke coil.

CO4:Analyze different circuit characteristics with the help of fundamental laws and various configurations.

CO5: Create locus diagram of RL, RC series circuits and examine series and parallel resonance

List of Experiments:

1.Verification of Kirchoff ;s laws.

2.Verification of node and mesh analysis.

3.Verification of network reduction techniques'

4.Determination of cold and hot resistance of an electric lamp.

5.Detremination of parameters of a choke coil.

6.Detremination of self, mutual inductance, and coefficient of coupling.

7.Series and parallel resonance

8. Locusdiagrams of R-L (Variable) and R-C (Variable) series circuits.

9.Verification of superposition theorem

10. Verification of Thevenin 's and Norton 's theorems.

11.Verification of Maximum power transfer theorem.

12. Verification of Compensation theorem.

13.Verification of Rciprocity and Millman 's theorems.

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Reference Books:

1.Engineering circuits analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata McGraw Hill Education, 2005,sixth edition.

2. Network Analysis , M.E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition.

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IT WORKSHOP

(Common to All Branches of Engineering)

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- To Demonstrate Configuring the Systems Dual boot both Windows and Other Operating Style msViz. Linux,BOSS.
- To Teach Basic Command line Interface Commands on Linux.
- To Teach the Usage of Internet for Productivity and Self-Paced Life-long Learning.
- To Introduce Compression, Multimedia and Antivirus tools and Office Tools Such as Word processors,Spread sheets and Presentation Tools

Course Outcomes:

CO1: Perform Hard Water Trouble Shooting.

CO2: Understand Hardware Components and Inter Dependencies.

CO3: Safe guard Computer Systems.

CO4: Document Presentation Preparation.

CO5: Perform Calculations Using Spread sheets.

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions.

Draw the Block Diagram of the CPU along with the Configuration of Each Peripheral and Submit to your Instructor.

Task 2: Every student should dissemble 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 a part of the course content.

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

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

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

Internet & World Wide Web:

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP settings. Finally students should demonstrate, to the instructor, how to access the Websites and E-mail. If there is no internet connectivity preparations need to be made by the Instructor to Simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search tool bars and Popup Blockers. Also,plug-ins like Macromedia Flash and JRE for applets should be configured.

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

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

LaTEx and WORD

Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft(MS) Office or equivalent(FOSS) tool Word: Importance of La TeX and MS Office or equivalent(FOSS)tool Word as Word Processors, Details of the four tasks and features that would be covered in each, using La TeX and Word- Accessing, overview of tool bars, saving files, using help and resourses, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered: Formatting Fonts in word, Drop Cap in Word, Applying Text Effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time Option in both La TeX and Word.

Task 3: Creating project abstract features to be covered: Formatting Styles, Inserting table, Bullet Sand Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: 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 be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

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

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

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

POWER POINT

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

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

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

AI TOOLS – ChatGPT

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

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

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

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

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

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

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 Hand Book, Kate J.Chase, PHI(Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme.-CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan-CISCO Press, Pearson Education, 3rd edition

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COURSE STRUCTURE

ME

I YEAR –I SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	COMMUNICATIVE ENGLISH	2	0	0	2
2	ENGINEERING PHYSICS	3	0	0	3
3	LINEAR ALGEBRA AND CALCULUS	3	0	0	3
4	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	0	3
5	ENGINEERING GRAPHICS	2	0	2	3
6	COMMUNICATIVE ENGLISH LAB	0	0	2	1
7	ENGINEERING PHYSICS LAB	0	0	2	1
8	IT WORKSHOP	0	0	2	1
9	ENGINEERING WORKSHOP	0	0	3	1.5
10	HEALTH AND WELLNESS, YOGA AND SPORTS	-	-	-	0.5
TOTAL		13	0	11	19

I YEAR –II SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	3	0	0	3
2	ENGINEERING CHEMISTRY	3	0	0	3
3	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3
4	INTRODUCTION TO PROGRAMMING	3	0	0	3
5	ENGINEERING MECHANICS	3	0	0	3
6	ENGINEERING CHEMISTRY LAB	0	0	2	1
7	COMPUTER PROGRAMMING LAB	0	0	3	1.5
8	ENGINEERING MECHANICS LAB	0	0	3	1.5
9	ELECTRICAL AND ELECTRONICS ENGINEERING LAB	0	0	3	1.5
10	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	-	-	-	0.5
TOTAL		15	0	11	21

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L	T	P	C
2	0	0	2

COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the content, topic, and pieces of specific information from social 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.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi **(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: Skimmimg 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 comprehensions/ 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

Textbooks:

1.Pathfinder: Communicative English for Undergraduate: Student, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)

2.Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1.Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

2.Bailey, Stephen. Academic writing: A Handbook for International Students, ROUTLEDGE, 2014.

3.Murphy, Raymond, English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.

4.Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslod.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

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L	T	P	C
3	0	0	3

ENGINEERING PHYSICS

(Common for all branches of Engineering)

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:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO2: Familiarize with the basics of crystal and their structures.

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials.

CO4: Explain the fundamentals of quantum mechanics and apply it to one dimensional motion of particles.

CO5: Identify the type of semiconductors using Hall effect.

UNIT-I: Wave Optics

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

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

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

UNIT – II: Crystallography and X- ray diffraction

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

Dielectric Materials: Introduction - Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector- - Relation between the electric vectors – Types of

polarization – Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) – Lorentz internal field - Clausius – Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss.

Magnetic Materials: introduction – Magnetic dipole moment – magnetization – Magnetic susceptibility 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

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

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

UNIT – V: Semiconductors

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

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)

Reference Books:

1. Engineering Physics P.K. Palanisamy (Sci Tech Publications (India) Pvt. Ltd Second Edition 2008).
2. Engineering Physics – B. K. Pandey and S, Chaturvedi, Cengage Learning 2021.
3. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. Engineering Physics – Sanjay D. Jain, D. Sahasrabudhe and Girish , University Press. 2014.
5. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resource:

https:// www.loc.gov/rr/scitech/selected-internet/physics.html

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LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Course Objectives:

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

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications.

CO2: Determine whether a given matrix is diagonalizable, evaluate inverse and power of the matrix by Cayley Hamilton Theorem.

CO3: Utilize mean value theorems to real life problems.

CO4: Familiarize with functions of several variables which is useful in optimization. Learn important tools of calculus in higher dimensions.

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

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 Seidal Iteration methods.

UNIT II: Eigen values, Eigenvectors and Orthogonal Transformation

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

UNIT III: Calculus

Mean Value Theorems: Rolle's theorem, Lagranges mean value theorem with their geometrical interpretation, Cauch's mean value theorem, Taylor's and Maclaurin theorem 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 Langrange multiplier.

UNIT V: Multiple Integrals (Multi variable Calculus)

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

Textbooks:

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, Micheael Greenberg, Pearson Publishers, 9th Edition.
5. Advanced Engineering Mathematics, H. K. Das, Er. Ranjnish Verma, S.Chand

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BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to All Branches of Engineering)

PART A

Course Objectives:

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

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of water storage and conveyance structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT I

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

UNIT II

Introduction to 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

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

Introduction to Water Resources and Environmental Engineering: 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 Engineering, M.S.Palanisamy, Tata McGraw Hill Publications (India) Pvt.Ltd. Fourth Edition.
2. Engineering Materials by Rangwala S C, (36th Edition), AnandCharotar Publishing House.
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 – SPECIFICATIONS IS 10500-2012.

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PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:

1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2. Explain different engineering materials and different manufacturing processes.
3. Provide an overview of different thermal and mechanical transmission system and introduce basics of robotics and its application.

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand the different manufacturing process.

CO2: Demonstrate the working of different mechanical power transmission systems.

CO3: Describe the basics of robotics and its applications.

CO4: Explain the basics of thermal engineering and its applications.

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: Classification of Engineering Materials & their applications: Metals – Ferrous and Non-ferrous, Ceramics, Composites, Smart materials, Definition of Strength, Hardness, Ductility and Toughness.

UNIT-II

Manufacturing Process: 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

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

Thermal Engineering – Working principle of Boilers (Cochran boiler, Babcock and Wilcox boiler, La Mont boiler), Refrigeration cycle (Ideal Vapour Compression refrigeration cycle) and air- conditioning system (Summer air-conditioning system), IC Engines, Otto Cycle, Diesel cycle, 2-Stroke and 4-Stroke Engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

(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)

Textbooks:

1. Internal Combustion Engines by V. Ganesan, By Tata McGraw Hill Publications (India) Pvt.Ltd.
2. A Tear 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, Cengagelearing India Pvt. Ltd.

Reference Books:

1. AppuuKuttan 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 RathoreTata 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.

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L	T	P	C
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ENGINEERING GRAPHICS

(Common to All branches of Engineering)

Course Objectives:

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

Course outcomes

Upon successful completion of the course, the student will be able to

CO1: Constructions of various engineering curves.

CO2: Apply the principle of orthographic projection to points and lines.

CO3: Understand and draw the projection of planes and solids inclined to both planes in first quadrant.

CO4: Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications

CO5: Develop isometric drawings of simple objects reading the orthographic projection of those objects.

SYLLABUS (First angle projection only)

UNIT-1

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

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

UNIT-II

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

Projections of Straight Lines: Projection 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.

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.

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

UNIT-IV

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 cube, prism, cylinder, pyramid and cone in simple position only.

UNIT-V

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)

Learning Resources

Text books:

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

Reference books

1. Engineering Drawing, K.L.Narayana and P.Kannaiah, Tata McGraw Hill,2013.

2. Engineering Drawing, M.B.Shah and B.C.Rana,Pearson Education Inc,2009

3. Engineering Drawing with an Introduction to Auto CAD, Dhananjay Jolhe,
Tata McGraw Hill,2017.

4. AutoCAD 2018 Training Guide (English, Paperback, Sagar Linkan)

Websites

1. https:// www.autodesk.com.au/campaigns/autocad-tutorials

2. https:/nptel.ac.in/courses/112104172

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L	T	P	C
0	0	2	1

COMMUNICATIVE ENGLISH LAB

(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

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 syllabic division for better listening and speaking comprehension..

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.

CO5: Create effective Course Objectives:

List of Topics:

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

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

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

Web Resources:

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
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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ENGINEERING PHYSICS LAB

(Common to All Branches of Engineering)

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 effects in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The student will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.

CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.

CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor.

CO6: Identify the type of semiconductors using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelength 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 B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's method.
11. Determination of Hall voltage and Hall Coefficient of a given semiconductor using Hall effect.
12. Determination of Temperature coefficient of a thermistor.
13. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
14. Determination of magnetic susceptibility by Kund's tube method.

15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of Young's modulus for the given material of wooden scale by nonuniform bending method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any ten of the listed experiments are to be conducted. Out of which any Two experiments may be conducted in virtual mode.

References:

A textbook of Practical Physics – S Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources:

www.vlab.co.in

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

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IT WORKSHOP

(Common to All Branches Of Engineering)

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- To Demonstrate Configuring the Systems Dual boot both Windows and Other Operating Style msViz. Linux,BOSS.
- To Teach Basic Command line Interface Commands on Linux.
- To Teach the Usage of Internet for Productivity and Self-Paced Life-long Learning.
- To Introduce Compression, Multimedia and Antivirus tools and Office Tools Such as Word processors,Spread sheets and Presentation Tools

Course Outcomes:

CO1: Perform Hard Water Trouble Shooting.

CO2: Understand Hardware Components and Inter Dependencies.

CO3: Safe guard Computer Systems.

CO4: Document Presentation Preparation.

CO5: Perform Calculations Using Spread sheets.

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions.

Draw the Block Diagram of the CPU along with the Configuration of Each Peripheral and Submit to your Instructor.

Task 2: Every student should dissemble 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 a part of the course content.

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

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

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

Internet & World Wide Web:

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP settings. Finally students should demonstrate, to the instructor, how to access the Websites and E-mail. If there is no internet connectivity preparations need to be made by the Instructor to Simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search tool bars and Popup Blockers. Also,plug-ins like Macromedia Flash and JRE for applets should be configured.

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

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

LaTEx and WORD

Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft(MS) Office or equivalent(FOSS) tool Word: Importance of La TeX and MS Office or equivalent(FOSS)tool Word as Word Processors, Details of the four tasks and features that would be covered in each, using La TeX and Word-Accessing, overview of tool bars, saving files, using help and resourses, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered: Formatting Fonts in word, Drop Cap in Word, Applying Text Effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time Option in both La TeX and Word.

Task 3: Creating project abstract features to be covered: Formatting Styles, Inserting table, Bullet Sand Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: 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 be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

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

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

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

POWER POINT

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

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

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

AI TOOLS – ChatGPT

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

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

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

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

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

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

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 Hand Book, Kate J.Chase, PHI(Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme.-CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan-CISCO Press, Pearson Education, 3rd edition

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ENGINEERING WORKSHOP

(Common to ALL branches of Engineering)

Course Objectives:

1. To familiarize students with wood working, sheet metal operations, fitting and electrical house Wiring skills

Course Outcomes:

Upon successful completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities.

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

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

List of Experiments:

(Student has to complete Two experiments in each Trade)

1. Demonstration: Safety practices and precautions to be observed in the workshop

2. Wood Working: Familiarity with different types of woods and tools used in woodworking and make following joints. a) Half-Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. Sheet Metal Working: Familiarity with different types of tools used in sheet metal Working, Developments of following sheet metal job from GI sheets a) Taperedz tray b) Conical funnel c) Elbow pipe d) Brazing

4. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre.

5. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires.

6. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of green sand moulds for given Patterns.

7. Welding shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. Plumbing: Demonstration and practice of Plumbing tools, preparation of pipe joints with coupling for same diameter and with reducer for different diameters.

Textbooks:

1. Basic Workshop Technology: Manufacturing process, Fleix W.; Independently Publised, 2019. Workshop Processes, Practices and Materials; Bruce J.Black, Rutledge publishers, 5th Edn.2015.
2. A course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

References Books:

1. Elements of Workshop Technology, Vol I. by S. K. Hajra Choudary & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H.S. Bawa, Tata-McGraw Hill, 2004.
3. Writing Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A; Atul Prakshan.

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II SEMESTER

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches of Engineering)

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

CO1: Solve the differential equations related to various engineering fields.

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

CO3: Identify solution methods for partial differential equations that model physical processes.

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

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

UNIT I: Differential equations of first order and first degree

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

UNIT II: Linear differential equations of higher order (constant coefficients)

Definitions, homogeneous and non-homogeneous, 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 applies to scalar point functions-Gradient, Directional derivative, Del applied to vector point functions-Divergence and Curl, 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.

Textbooks:

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. Advanced Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

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ENGINEERING CHEMISTRY

(Common to Civil & Mechanical branches)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the Students on the principles and applications of electrochemistry. Polymers, surface chemistry and modern engineering materials

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

CO1: Analyze the suitable method of water treatment depending on the quality treatment.

CO2: Familiarize construction of electrochemical cells and understand corrosion mechanism and Prevention.

CO3: Explain applications of polymers and concept of fuel technology.

CO4: Explain advanced applications of engineering materials like composites, refractories, lubricants, cements.

CO5: summarize the concepts of colloids, micelles and nanomaterials.

UNIT I: Water Technology

Soft and hardwater Estimation of hardness of water by EDTA method, Estimation of dissolved Oxygen - Boiler troubles. Priming, forming, scale and sludge, Caustic embrittlemet, Industrial water treatment specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, Ion exchange process: desalination of brackish water, reverse osmosis (RO) and electrodialysis.

UNIT II: Electrochemistry and Applications

Electrodes- electro chemical cell, Nernst equation, cell potential calculations.
Primary cells — Zinc-air battery, Secondary cells — Nickel-Cadmium (NiCad),and lithium ion batteries-working principle of the batteries including cell reactions; Fuel cells Basic Concepts, the principle and working of hydrogen-Oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical Corrosion, pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electroless plating (Nickel and Copper).

UNIT III: Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization

Thermoplastics and Thermo-setting plastics: Preparation, properties and applications of polystyrene. PVC Nylon 6,6 and Bakelite.

Elastomers-preparation, properties and applications of Buna-S, Buna-N, Thiokol rubbers.

Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number-alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

UNIT IV: Modern Engineering Materials

Composites- Definition, Constituents. Classification- Particle, Fibre and Structural reinforced composites. Properties and Engineering applications

Refractories- Classification. properties, factors affecting the refactory materials and Applications.

Lubricants-Classification, Functions of lubricants , Mechanism, properties of lubricating oils viscosity, viscosity Index, Flashpoint, Firepoint, cloud point, saponification and Applications.

Building materials -Portland Cement, constituents, Setting and Hardening of cement.

UNIT V: Surface Chemistry and Nano materials

Introduction to surface chemistry, colliods, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs method), chemical and biological method of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials - catalysis, medicine, sensors, etc.

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth- Heineman, 1992.
3. Textbook of Polymer Science, Fred W. BillmayerJr, 3rd Edition

B. Sowjanya.

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to All branches of Engineering)

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:

After the completion of the course students will be able to

CO1: Understand the concepts of AC and DC electrical Circuits.

CO2: Understand the construction and working principles of Electrical Machines and Measuring instruments.

CO3: Compare various electrical Power Generation systems and their Equipment Safety Measures.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I: 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, 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

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 wattmeter.

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, 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: Electrical Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

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

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw 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. Bhatacharya, Person Publishers, 2018, Second Edition.

Web Resources:

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

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PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

Objectives of this course are

- To teach the fundamentals of semi-conductor devices and its applications, principles of digital electronics.

Course Outcomes:

The student will be able to:

CO4: Identify electronic components and the simple analysis of diodes and transistor.
CO5: Demonstrate the working of electronic circuits and the measuring instruments.
CO6: Recognize the concepts of digital electronics.

UNIT I: SEMICONDUCTOR DEVICES

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

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

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3code, 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 Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Textbooks:

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

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions and arrays.
- To encourage collaborative learning and teamwork in coding projects.

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

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

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), pseudocode. 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, 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 Array and Strings

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

UNIT IV Pointers & User-Defined Data types

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

UNIT V Functions & File Handling

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

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

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw Hill Education, 1996.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E, McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja , Oxford, 2016, 2^{nd} edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3^{rd} edition.

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ENGINEERING MECHANICS

(Common To Civil And Mechanical Engineering)

Course Objectives:

1. To get familiarized with different types of force systems.
2. To draw a accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
3. To teach the basic principles of centroid and centre of gravity.
4. To determine the moment of inertia of different composite figures and bodies.
5. To understand the kinematics and kinetics of translational and rotational motion of particle and rigid bodies.

Course Outcomes: upon successful completion of course,the student will be able to analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.

1. CO1: understand the fundamental concepts in mechanics and equilibrium of system of forces.
2. CO2: determine the frictional forces for bodies in contact and analysis of trusses.
3. CO3: calculate centroids centre of gravity of different geometrical shapes.
4. CO4: calculate the moment of inertia of different geometrical shapes.
5. CO5:apply the principals of work –energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle &rigid body.

SYLLABUS

UNIT-I

Introduction to Engineering Machanics: Basic concepts, scope and applications,

System of forces: coplanar concurrent forces ,components in space ,resultant, moment of force and its applications, couples and resultant to force system in plane and space.

Equilibrium of System of Forces: Definition, equation of equilibrium , equilibrium of coplanar concurrent and parallel force systems.

UNIT-II

Equation of equilibrium for spatial system of forces numerical examples on spatial system of forces using vector approach.

Friction: Introduction, coefficient of friction, cone of static function ,application to simple systems, connected systems and Ladder friction. Analysis of planet trusses by method of joints and method of sections.

UNIT-III

Centroid: Centroids of simple figures (from basic principals), Centroids of composite figures C**entre of gravity:** centre of gravity of simple body(from basic principals), centre of gravity of composite bodies, Pappus theorems.

UNIT-IV

Area moments of Inertia: Definition of polar moment of inertia, transfer theorem, moments of inertia of composite figures. **Products of Inertia:** transfer formula for products of inertia.

Mass moments of inertia: moment of inertia of masses, transfer formula for mass moments of inertia ,mass moments of inertia of composite bobies.

UNIT-V

Rectilinear and curvylinear motion of particle: kinematics of particle with constant & variable acceleration in linear and angular motion, projectile motion. D'Alembert's principle, work energy method and impulse momentum method.

Kinematics and kinetics of rigid body: Rotation about fixed axis and plane motion, work energy method and impulse momentum method.

Learning Resources Textbook:

1. Engineering Mechanics, S.Timoshenoko ,D.H.Young ,J.V.Rao,S.Pati. 5th Edition 2017,McGrawHill Education.
2. Engineering Mechanics, P.C.Dumir. S.Sengupta and Srinivas V Veeravalli,University press .2020.1st Edition.
3. A text book of Engineering Mechanics,S.S.Bhavikatti ,new age international publications 2018. 4th Edition.
4. Reddy Vijaya Kumar k.and K.Suresh Kumar (2010),Singers Engineering Mechanics.

Reference Books

1. Engineering Mechanics,Statics and Dynamics,Rogers and MA Nelson ,Mc Graw Hill Education.2017.1st Edition.
2. Engineering Mechanics,Statics and Dynamics,J.H.Shames,PHI,2002,4TH Edition.
3. Engineering Mechanics,volume-I:statics, ,volume-II:Dynamics,J.L.MeriamandL.G.Kraige.,JohnWiley,2008.6thEdition
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition.
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C.,Pearson Education, Inc., NewDelhi, 2022, 14thEdition.

Websites

1. http://nptel.ac.in/
2. http://mhrd.gov.in/e-contents

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ENGINEERING CHEMISTRY LAB

(Common to Civil & Mechanical branches)

Course Objectives:

- To verify the fundamental concepts with experiments.

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer materials.

CO3: Determine the physical properties like surface tension, adsorption and viscosity.

CO4: Estimate the Iron and Calcium in cement.

CO5: Calculate the hardness of water.

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Determination of Strength of an acid in Pb-Acid battery.
4. Preparation of a polymer (Bakelite).
5. Determination of percentage of Iron in Cement sample by colorimetry.
6. Estimation of Calcium in port land Cement.
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating Oil by Redwood Viscometer I
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter

Reference:

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

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COMPUTER PROGRAMMING LAB

Course Objectives:

The Course aims to give students hands- on experience and train them on the concepts of the C-programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the application of arrays, functions, basic concepts of pointers in C.

UNIT: I

WEEK: 1

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

Suggested Experiments/ Activities:

Tutorial 1: Problem- solving using Computers.

Lab 1: Familiarization with programming environment

1. Basic Linux Environment and its editors like VI, Vim & Emacs etc.
2. Exposure to Turbo C, gcc
3. Writing Simple programs using printf( ), scanf( )

WEEK: 2

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

Suggested Experiments/ Activities:

Tutorial 2: Problem- solving using Algorithms and flow charts.

Lab 2: Converting algorithms/ flow charts into C Source code

Developing the algorithm/ flow charts for the following sample programs

1. Sum and average of 3 numbers
2. Conversion of Fahrenheit of Celsius and vice versa
3. Simple interest calculation

WEEK: 3

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

Suggested Experiments/ Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

1. Finding the square root of a given number
2. Finding compound interest
3. Area of triangle using heron's formulae
4. Distance travelled by an object

UNIT: II

WEEK: 4

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

Suggested Experiments/ Activities:

Tutorial 4: Operators and the precedence and as associatively:

Lab 4: Simple computational problems using the operator' precedence and associatively

1. Evaluate the following expressions.

a. A+B*C+(D*E)+F*G

b. A/B*C-B+A*D/3

c. A+++B---A

d. J=(i++)+(++i)

2. Find the maximum of three numbers using conditional operator
3. Take marks of 5 subjects in integers, and find the total , average in float.

WEEK: 5

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

Suggested Experiments/ Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if- then – else structures.

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

WEEK: 6

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

Suggested Experiments/ Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

a) Find the factorial of given number using any loop.
b) Find the given number is a prime or not.
c) Compute sine and cos series
d) Checking a number palindrome
e) Construct a pyramid of numbers.

UNIT: III

WEEK: 7

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

Suggested Experiments/ Activities:

Tutorial 7: 1 D Arrays: searching

Lab 7: 1D Array manipulation, linear search

a) Find the min and max of a 1-D integer array.
b) Perform linear search on1D array.
c) The reverse of a 1D integer array
d) Find 2's complement of the given binary number.
e) Eliminate duplicate elements in an array.

WEEK: 8

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

Suggested Experiments/ Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

a) Addition of two matrices
b) Multiplication two matrices
c) Sort array elements using bubble sort
d) Concatenate two strings without built-in functions
e) Reverse a string using built-in and without built-in string function.

UNIT: IV

WEEK: 9

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

Suggested Experiments/ Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereferences.

a) Write a C program to find the sum of a 1D array using malloc().
b) Write a C program to find the total, average of n students using structures
c) Enter n students data using calloc () and display failed students list.
d) Read student name and marks from the command line and display the student details along with the total.
e) Write a C program to implement realloc().

WEEK: 10

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

Suggested Experiments/ Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists.

Lab 10: Bit fields, linked lists

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

a) Create and display a singly linked list using self-referential structure.
b) Demonstrate the differences between structures and unions using a C program.
c) Write a C program to shift/rotate using bit fields.
d) Write a C program to copy one structure variable to another structure of the same type.

UNIT: V

WEEK: 11

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

Suggested Experiments/ Activities:

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

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

a) Write a C function to calculate NCR value.
b) Write a C function to find the length of a string.

c) Write a C function to transpose of a matrix.

d) Write a C function to demonstrate numerical integration of differential equations using Euler's method.

WEEK: 12

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

Suggested Experiments/ Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

a) Write a recursive function to generate Fibonacci series.

b) Write a recursive function to find the LCM of two numbers.

c) Write a recursive function to find the factorial of a number.

d) Write a C Program to implement Ackermann function using recursion.

e) Write a recursive function to find the sum of series.

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

a) Write a C program to swap two numbers using call by reference.

b) Demonstrate Dangling pointer problem using a C program.

c) Write a C program to copy one string into another using pointer.

d) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

a) Write a C program to write and read text into a file.

b) Write a C program to write and read text into a binary file using fread() and fwrite()

c) Copy the contents of one file to another file.

d) Write a C program to merge two files into the third file using command-line arguments.

e) Find no. of lines, words and characters in a file

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

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

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

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

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L	T	P	C
0	0	3	1.5

ENGINEERING MECHANICS LAB

Course Objectives: The students completing course are expected to:

1. Verify the Law of parallelogram and triangle of forces.
2. Determine the coefficients of friction of static and rolling friction and centre of gravity of different plane lamina.
3. Analysis the system of Pulleys and moment of inertia of compound pendulum and flywheel.

Course Outcomes: Upon successful completion of this course the student should be able to:

CO1:Analyze the coefficient of friction between two different surfaces and between the inclined plane and the roller.

CO2:Examine law of polygon of forces and law of moment using force polygon and bell cranklever.

CO3:Determine the centre of gravity and moment of inertia of different configurations.

CO4:Execute the equilibrium conditions of a rigid body under the action of different force systems.

Students must perform any 10 of the following Experiments:

List of Experiments:

1. Verification of law of parallelogram of forces.
2. Verification of law of triangle of forces.
3. Verification of law of polygon for coplanar –concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.
4. Determination of coefficient of static and rolling frictions.
5. Determination of centre of gravity of different shaped plane lamina.
6. Verification of condition of equilibrium of a rigid body under the action of coplanar non-concurrent parallel force systems with the help of a simply supported beam.
7. Study of the systems of pulleys and draw the free body diagram of the system.
8. Determine the acceleration due to gravity using a compound pendulum.
9. Determine the moment of inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass.
10. Determine the moment of inertia of a fly wheel.
11. Verification of law of moment using rotation disc apparatus and bell crank lever.

References:

- S.Timoshenoko ,D.H.Young ,J.V.Rao,S.Pati.,Engineering Machanics, 5th Edition ,McGrawHill Edution.
- Hibbeler R.C., Engineering Machanics:Statics and Dynamics, 14th Edition,pearson Education,inc.,NewDelhi,2002.

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ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Common to all branches of engineering)

Course Objectives:

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

Course Outcomes:

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 principle 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 measurements of resistance, power and power factor.

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

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

Activities:

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

Note: Minimum six experiments to be performed. All the experiments shall be implemented using both hardware and software.

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PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

Objectives of this course are

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

Course Outcomes:

The student will be able to:

CO4: Identify & testing of various electronic components.
CO5: Plot and discuss the characteristics of various electronic devices.
CO6: Explain the operation of a digital circuit.

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 gates using ICs.

S-Sri Gouri

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COURSE STRUCTURE

ECE, VLSI

I YEAR –I SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	COMMUNICATIVE ENGLISH	2	0	0	2
2	ENGINEERING PHYSICS	3	0	0	3
3	LINEAR ALGEBRA AND CALCULUS	3	0	0	3
4	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3
5	ENGINEERING GRAPHICS	2	0	2	3
6	COMMUNICATIVE ENGLISH LAB	0	0	2	1
7	ENGINEERING PHYSICS LAB	0	0	2	1
8	ELECTRICAL AND ELECTRONICS ENGINEERING LAB	0	0	3	1.5
9	ENGINEERING WORKSHOP	0	0	3	1.5
10	HEALTH AND WELLNESS, YOGA AND SPORTS	-	-	-	0.5
TOTAL		13	0	12	19.5

I YEAR –II SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	3	0	0	3
2	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	0	3
3	CHEMISTRY	3	0	0	3
4	INTRODUCTION TO PROGRAMMING	3	0	0	3
5	NETWORK ANALYSIS	3	0	0	3
6	CHEMISTRY LAB	0	0	2	1
7	COMPUTER PROGRAMMING LAB	0	0	3	1.5
8	NETWORK ANALYSIS LAB	0	0	3	1.5
9	IT WORKSHOP	0	0	2	1
10	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	-	-	-	0.5
TOTAL		15	0	10	20.5

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L	T	P	C
2	0	0	2

COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the content, topic, and pieces of specific information from social 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.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi **(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: Skimmimg 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 comprehensions/ 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

Textbooks:

1.Pathfinder: Communicative English for Undergraduate: Student, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)

2.Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1.Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

2.Bailey, Stephen. Academic writing: A Handbook for International Students, ROUTLEDGE, 2014.

3.Murphy, Raymond, English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.

4.Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslod.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

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L	T	P	C
3	0	0	3

ENGINEERING PHYSICS

(Common for all branches of Engineering)

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:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO2: Familiarize with the basics of crystal and their structures.

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials.

CO4: Explain the fundamentals of quantum mechanics and apply it to one dimensional motion of particles.

CO5: Identify the type of semiconductors using Hall effect.

UNIT-I: Wave Optics

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

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

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

UNIT – II: Crystallography and X- ray diffraction

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

Dielectric Materials: Introduction - Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector- - Relation between the electric vectors – Types of polarization – Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) –

Lorentz internal field - Clausius – Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss.

Magnetic Materials: introduction – Magnetic dipole moment – magnetization – Magnetic susceptibility 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

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

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

UNIT – V: Semiconductors

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

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)

Reference Books:

1. Engineering Physics P.K. Palanisamy (Sci Tech Publications (India) Pvt. Ltd Second Edition 2008).
2. Engineering Physics – B. K. Pandey and S, Chaturvedi, Cengage Learning 2021.
3. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. Engineering Physics – Sanjay D. Jain, D. Sahasrabudhe and Girish , University Press. 2014.
5. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resource: https:// www.loc.gov/rr/scitech/selected-internet/physics.html

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L	T	P	C
3	0	0	3

LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Course Objectives:

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

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications.

CO2: Determine whether a given matrix is diagonalizable, evaluate inverse and power of the matrix by Cayley Hamilton Theorem.

CO3: Utilize mean value theorems to real life problems.

CO4: Familiarize with functions of several variables which is useful in optimization. Learn important tools of calculus in higher dimensions.

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

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 Seidal Iteration methods.

UNIT II: Eigen values, Eigenvectors and Orthogonal Transformation

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

UNIT III: Calculus

Mean Value Theorems: Rolle's theorem, Lagranges mean value theorem with their geometrical interpretation, Cauch's mean value theorem, Taylor's and Maclaurin theorem 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 Langrange multiplier.

UNIT V: Multiple Integrals (Multi variable Calculus)

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

Textbooks:

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, Micheael Greenberg, Pearson Publishers, 9th Edition.
5. Advanced Engineering Mathematics, H. K. Das, Er. Ranjnish Verma, S.Chand

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Common to All branches of Engineering)

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:

After the completion of the course students will be able to

CO1: Understand the concepts of AC and DC electrical Circuits.

CO2: Understand the construction and working principles of Electrical Machines and Measuring instruments.

CO3: Compare various electrical Power Generation systems and their Equipment Safety Measures.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I: 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, 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

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 wattmeter.

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, 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: Electrical Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

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

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw 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. Bhatacharya, Person Publishers, 2018, Second Edition.

Web Resources:

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

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PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

Objectives of this course are

- To teach the fundamentals of semi-conductor devices and its applications, principles of digital electronics.

Course Outcomes:

The student will be able to:

CO4: Identify electronic components and the simple analysis of diodes and transistor.
CO5: Demonstrate the working of electronic circuits and the measuring instruments.
CO6: Recognize the concepts of digital electronics.

UNIT I: SEMICONDUCTOR DEVICES

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

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

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3code, 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 Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Textbooks:

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

Course Objectives:

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

Course outcomes

Upon successful completion of the course, the student will be able to

CO1: Constructions of various engineering curves.

CO2: Apply the principle of orthographic projection to points and lines.

CO3: Understand and draw the projection of planes and solids inclined to both planes in first quadrant.

CO4: Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications

CO5: Develop isometric drawings of simple objects reading the orthographic projection of those objects.

SYLLABUS (First angle projection only)

UNIT-1

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

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

UNIT-II

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

Projections of Straight Lines: Projection 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.

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.

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

UNIT-IV

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 cube, prism, cylinder, pyramid and cone in simple position only.

UNIT-V

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)

Learning Resources

Text books:

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

Reference books

1. Engineering Drawing, K.L.Narayana and P.Kannaiah, Tata McGraw Hill,2013.
2. Engineering Drawing, M.B.Shah and B.C.Rana,Pearson Education Inc,2009
3. Engineering Drawing with an Introduction to Auto CAD, Dhananjay Jolhe, Tata McGraw Hill,2017.
4. AutoCAD 2018 Training Guide (English, Paperback, Sagar Linkan)

Websites

1. https:// www.autodesk.com.au/campaigns/autocad-tutorials
2. https:/nptel.ac.in/courses/112104172

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COMMUNICATIVE ENGLISH LAB

(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

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 syllabic division for better listening and speaking comprehension..

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.

CO5: Create effective Course Objectives:

List of Topics:

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

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

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

Web Resources:

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
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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ENGINEERING PHYSICS LAB

(Common to All Branches of Engineering)

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 effects in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The student will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.

CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.

CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor.

CO6: Identify the type of semiconductors using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelength 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 B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's method.
11. Determination of Hall voltage and Hall Coefficient of a given semiconductor using Hall effect.
12. Determination of Temperature coefficient of a thermistor.
13. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
14. Determination of magnetic susceptibility by Kund's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.

17. Determination of Young's modulus for the given material of wooden scale by nonuniform bending method.

18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any ten of the listed experiments are to be conducted. Out of which any Two experiments may be conducted in virtual mode.

References:

A textbook of Practical Physics – S Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources:

www.vlab.co.in

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

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ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Common to all branches of engineering)

Course Objectives:

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

Course Outcomes:

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 principle 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 measurements of resistance, power and power factor.

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

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

Activities:

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

Note: Minimum six experiments to be performed. All the experiments shall be implemented using both hardware and software.

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PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

Objectives of this course are

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

Course Outcomes:

The student will be able to:

CO4: Identify & testing of various electronic components.
CO5: Plot and discuss the characteristics of various electronic devices.
CO6: Explain the operation of a digital circuit.

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 gates using ICs.

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ENGINEERING WORKSHOP

(Common to ALL branches of Engineering)

Course Objectives:

1. To familiarize students with wood working, sheet metal operations, fitting and electrical house Wiring skills

Course Outcomes:

Upon successful completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities.

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

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

List of Experiments:

(Student has to complete Two experiments in each Trade)

1. Demonstration: Safety practices and precautions to be observed in the workshop

2. Wood Working: Familiarity with different types of woods and tools used in woodworking and make following joints. a) Half-Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. Sheet Metal Working: Familiarity with different types of tools used in sheet metal Working, Developments of following sheet metal job from GI sheets a) Taperedz tray b) Conical funnel c) Elbow pipe d) Brazing

4. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre.

5. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires.

6. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of green sand moulds for given Patterns.

7. Welding shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. Plumbing: Demonstration and practice of Plumbing tools, preparation of pipe joints with coupling for same diameter and with reducer for different diameters.

Textbooks:

1. Basic Workshop Technology: Manufacturing process, Fleix W.; Independently Publised, 2019.

Workshop Processes, Practices and Materials; Bruce J.Black, Rutledge publishers, 5th Edn.2015.

2. A course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

References Books:

1. Elements of Workshop Technology, Vol I. by S. K. Hajra Choudary & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H.S. Bawa, Tata-McGraw Hill, 2004.
3. Writing Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A; Atul Prakshan.

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II SEMESTER

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches of Engineering)

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

CO1: Solve the differential equations related to various engineering fields.

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

CO3: Identify solution methods for partial differential equations that model physical processes.

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

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

UNIT I: Differential equations of first order and first degree

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

UNIT II: Linear differential equations of higher order (constant coefficients)

Definitions, homogeneous and non-homogeneous, 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 applies to scalar point functions-Gradient, Directional derivative, Del applied to vector point functions-Divergence and Curl, 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.

Textbooks:

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. Advanced Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

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BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to All Branches of Engineering)

PART A

Course Objectives:

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

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of water storage and conveyance structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT I

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

UNIT II

Introduction to 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

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

Introduction to Water Resources and Environmental Engineering: 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 Engineering, M.S.Palanisamy, Tata McGraw Hill Publications (India) Pvt.Ltd. Fourth Edition.
2. Engineering Materials by Rangwala S C, (36th Edition), AnandCharotar Publishing House.
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 – SPECIFICATIONS IS 10500-2012.

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PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:

1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2. Explain different engineering materials and different manufacturing processes.
3. Provide an overview of different thermal and mechanical transmission system and introduce basics of robotics and its application.

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand the different manufacturing process.

CO2: Demonstrate the working of different mechanical power transmission systems.

CO3: Describe the basics of robotics and its applications.

CO4: Explain the basics of thermal engineering and its applications.

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: Classification of Engineering Materials & their applications: Metals – Ferrous and Non-ferrous, Ceramics, Composites, Smart materials, Definition of Strength, Hardness, Ductility and Toughness.

UNIT-II

Manufacturing Process: 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

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

Thermal Engineering – Working principle of Boilers (Cochran boiler, Babcock and Wilcox boiler, La Mont boiler), Refrigeration cycle (Ideal Vapour Compression refrigeration cycle) and air- conditioning system (Summer air-conditioning system), IC Engines, Otto Cycle, Diesel cycle, 2-Stroke and 4-Stroke Engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

(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)

Textbooks:

1. Internal Combustion Engines by V. Ganesan, By Tata McGraw Hill Publications (India) Pvt.Ltd.
2. A Tear 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, Cengagelearing India Pvt. Ltd.

Reference Books:

1. AppuuKuttan 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 RathoreTata 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.

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CHEMISTRY

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

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

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

CO1: Explain basic concepts of quantum mechanics and molecular and bonding.

CO2: Apply the principle of band diagrams in the application of conductors and semiconductors.

CO3: Compare the materials of construction for battery and electrochemical sensors.

CO4: Explain preparation, properties, and applications of thermoplastics & thermosetting & elastomers, conducting polymers.

CO5: Explain the principles of spectrometry, hplc in separation of solid and liquid mixtures.

UNIT I: Structure and Bonding Models:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and $\Psi 2$, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II: Modern Engineering materials

Semiconductors – Introduction, basic concept, application

Super conductors-Introduction basic concept, applications.

Supercapacitors: Introduction, Basic Concept-Classification – Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles.

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-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT IV: Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

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.

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

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

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INTRODUCTION TO PROGRAMMING

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions and arrays.
- To encourage collaborative learning and teamwork in coding projects.

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

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

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), pseudocode. 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, 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 Array and Strings

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

UNIT IV Pointers & User-Defined Data types

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

UNIT V Functions & File Handling

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

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

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw Hill Education, 1996.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E, McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja , Oxford, 2016, 2^{nd} edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3^{rd} edition.

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NETWORK ANALYSIS
(ECE& allied Branches)

Course Objectives:

Objectives of this course are

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits.
- To impart knowledge on applying appropriate theorem for electrical circuit analysis.
- To explain transient behavior of circuits in time and frequency domains.
- To teach concepts of resonance.
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

Course Outcomes:

The students will be able to:

CO1: Understand basic electrical circuits with nodal and mesh analysis.

CO2: Analyze the circuit using network simplification theorems.

CO3: Find Transient response and Steady state response of network.

CO4: Analyze electrical networks in the Laplace domain.

CO5: Compute the parameters of a two-port network.

UNIT I

Types of circuit components, Types of Sources and Source Transformations, Mesh analysis and nodal analysis, problem solving with resistances only including dependent sources also. Principal of Dualitywith examples.

Network Theorems: Thevenin's,Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Maximum Power Transfer, Tellegens – problem solving using dependent sources also.

UNIT II

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogeneous, problem-solving using R-L-C elements with DC excitation and AC excitation. Response as related to s-plane rotation of roots.

Laplace Transform: Introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, Heaviside's expansions, problem solving using Laplace transform.

UNIT III

Steady State Analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving.Complex impedance phasor notation for R-L, R-C, R-L-C problem solving usingmesh and nodal analysis,Star-Delta conversion,problem solving using Laplace transforms also.

UNIT IV

Resonance: Introduction, definition of Q, Series resonance, parallel resonance, general case resistance present in both branches, antiresonance at all frequencies.

Coupled Circuits: Coupled circuits, self-inductance, Mutual-inductance, coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits-problem solving.

UNIT V

Two-port Networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Relationship Between parameter Sets, Parallel& series connection of two port networks, cascading of two port networks,problem solving using dependent sources also.

Image and iterative impedances. Image and iterative transfer constants. Insertion loss. Attenuators and pads. Lattice networks and its parameters. Impedance matching networks.

Textbooks:

1. **"Network Analysis" by A Sudhakar,Shyam Mohan S. Palli 2nd edition Mc Graw Hill Publications**
2. Network analysis-ME Van Valken burg, Prentice Hall of India, revised 3rd Edition, 2019.
3. EngineeringCircuit Analysis by William H.Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9thEdition 2020.
4. Network lines and Fields by John.D. Ryder 2ndEdition, PHI

ReferenceBooks:

1. D. Roy Choudhury, Networks and Systems,New Age International Publications, 2013.
2. Joseph Administer and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series,7th Edition, Tata Mc Graw Hill Publishing Company, New Delhi, 2017
3. Fundamentals Electric Circuits by Charles K. Alexander Matthew N.O. Sadiku, McGraw-Hill Education.

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CHEMISTRY LAB

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

- Verify the fundamental concepts with experiments.

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer Bakelite materials.

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

CO4: Analyse the IR spectra of some organic compounds.

CO5: Calculate strength of acid in Pb-Acid battery.

List of Experiments:

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

Reference:

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

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COMPUTER PROGRAMMING LAB

Course Objectives:

The Course aims to give students hands- on experience and train them on the concepts of the C-programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the application of arrays, functions, basic concepts of pointers in C.

UNIT: I

WEEK: 1

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

Suggested Experiments/ Activities:

Tutorial 1: Problem- solving using Computers.

Lab 1: Familiarization with programming environment

1. Basic Linux Environment and its editors like VI, Vim & Emacs etc.
2. Exposure to Turbo C, gcc
3. Writing Simple programs using printf( ), scanf( )

WEEK: 2

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

Suggested Experiments/ Activities:

Tutorial 2: Problem- solving using Algorithms and flow charts.

Lab 2: Converting algorithms/ flow charts into C Source code

Developing the algorithm/ flow charts for the following sample programs

1. Sum and average of 3 numbers
2. Conversion of Fahrenheit of Celsius and vice versa
3. Simple interest calculation

WEEK: 3

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

Suggested Experiments/ Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

1. Finding the square root of a given number
2. Finding compound interest
3. Area of triangle using heron's formulae
4. Distance travelled by an object

UNIT: II

WEEK: 4

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

Suggested Experiments/ Activities:

Tutorial 4: Operators and the precedence and as associatively:

Lab 4: Simple computational problems using the operator' precedence and associatively

1. Evaluate the following expressions.

a. A+B*C+(D*E)+F*G

b. A/B*C-B+A*D/3

c. A+++B---A

d. J=(i++)+(++i)

2. Find the maximum of three numbers using conditional operator
3. Take marks of 5 subjects in integers, and find the total , average in float.

WEEK: 5

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

Suggested Experiments/ Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: **Problems involving if- then – else structures.**

a) Write a C program to find the max and min of four numbers using if-else.
b) Write a C program to generate electricity bill.
c) Find the roots of the quadratic equation.

d) Write a C program to simulate a calculator using switch case.

e) Write a C program to find the given year is a leap year or not.

WEEK: 6

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

Suggested Experiments/ Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

a) Find the factorial of given number using any loop.

b) Find the given number is a prime or not.

c) Compute sine and cos series

d) Checking a number palindrome

e) Construct a pyramid of numbers.

UNIT: III

WEEK: 7

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

Suggested Experiments/ Activities:

Tutorial 7: 1 D Arrays: searching

Lab 7: 1D Array manipulation, linear search

a) Find the min and max of a 1-D integer array.

b) Perform linear search on1D array.

c) The reverse of a 1D integer array

d) Find 2's complement of the given binary number.

e) Eliminate duplicate elements in an array.

WEEK: 8

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

Suggested Experiments/ Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

a) Addition of two matrices
b) Multiplication two matrices
c) Sort array elements using bubble sort
d) Concatenate two strings without built-in functions
e) Reverse a string using built-in and without built-in string function.

UNIT: IV

WEEK: 9

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

Suggested Experiments/ Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereferences.

a) Write a C program to find the sum of a 1D array using malloc().
b) Write a C program to find the total, average of n students using structures
c) Enter n students data using calloc () and display failed students list.
d) Read student name and marks from the command line and display the student details along with the total.
e) Write a C program to implement realloc().

WEEK: 10

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

Suggested Experiments/ Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists.

Lab 10: Bit fields, linked lists

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

a) Create and display a singly linked list using self-referential structure.
b) Demonstrate the differences between structures and unions using a C program.
c) Write a C program to shift/rotate using bit fields.
d) Write a C program to copy one structure variable to another structure of the same type.

UNIT: V

WEEK: 11

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

Suggested Experiments/ Activities:

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

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

a) Write a C function to calculate NCR value.
b) Write a C function to find the length of a string.
c) Write a C function to transpose of a matrix.
d) Write a C function to demonstrate numerical integration of differential equations using Euler's method.

WEEK: 12

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

Suggested Experiments/ Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

a) Write a recursive function to generate Fibonacci series.
b) Write a recursive function to find the LCM of two numbers.
c) Write a recursive function to find the factorial of a number.
d) Write a C Program to implement Ackermann function using recursion.
e) Write a recursive function to find the sum of series.

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

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

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

a) Write a C program to write and read text into a file.

b) Write a C program to write and read text into a binary file using fread() and fwrite()

c) Copy the contents of one file to another file.

d) Write a C program to merge two files into the third file using command-line arguments.

e) Find no. of lines, words and characters in a file

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

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

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

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

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NETWORK ANALYSIS AND SIMULATION LABORATORY

(ECE & Allied branches)

Course Objectives:

Objectives of this course are

- To gain hands on experience in verifying Kirchhoff's laws and network theorems
- To analyze transient behavior of circuits
- To study resonance characteristics
- To determine 2-port network parameters

Course Outcomes:

The student will be able to:

CO1: Verify Kirchhoff's laws and network Theorems
CO2: Measure time constants of RL & RC circuits.
CO3: Analyze behavior of RLC circuits for different cases.
CO4: Design resonant circuit for given specifications.
CO5: Characterize and modal the network in terms of all network parameters.

The following experiments need to be performed using both hardware and software.
The experiments need to be simulated using software and same need to be verified using the hardware.

1. Study of components of a circuit and verification of KCL and KVL.
2. Verification of mesh and nodal analysis for AC circuits.
3. Verification of super position, Thevenin's & Norton's theorems for AC circuits.
4. Verification of maximum power transfer theorem for AC circuits.
5. Verification of Tellegens theorem for two networks of same topology.
6. Study of DC transients in RL, RC and RLC circuits.
7. To study frequency response of various 1st order RL & RC networks.
8. To study transient and study state response of second order circuit by varying its various parameters and studying their effects on responses.
9. Find the Q Factor and Bandwidth of a Seriesand Parallel Resonance circuit.
10. Determination of open circuit (Z) and short circuit (Y) parameters.
11. Determination of hybrid (H) and transmission (ABCD) parameters.
12. To measure two port parameters of at Twin–T network and study its frequency response.

Hardware Requirements:

Regulated power supplies, Analog/Digital Function Generators, Digital Millimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), and Active and Passive Electronic components.

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IT WORKSHOP

(Common to All Branches Of Engineering)

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- To Demonstrate Configuring the Systems Dual boot both Windows and Other Operating Style msViz. Linux,BOSS.
- To Teach Basic Command line Interface Commands on Linux.
- To Teach the Usage of Internet for Productivity and Self-Paced Life-long Learning.
- To Introduce Compression, Multimedia and Antivirus tools and Office Tools Such as Word processors,Spread sheets and Presentation Tools

Course Outcomes:

CO1: Perform Hard Water Trouble Shooting.

CO2: Understand Hardware Components and Inter Dependencies.

CO3: Safe guard Computer Systems.

CO4: Document Presentation Preparation.

CO5: Perform Calculations Using Spread sheets.

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions.

Draw the Block Diagram of the CPU along with the Configuration of Each Peripheral and Submit to your Instructor.

Task 2: Every student should dissemble 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 a part of the course content.

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

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

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

Internet & World Wide Web:

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP settings. Finally students should demonstrate, to the instructor, how to access the Websites and E-mail. If there is no internet connectivity preparations need to be made by the Instructor to Simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search tool bars and Popup Blockers. Also,plug-ins like Macromedia Flash and JRE for applets should be configured.

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

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

LaTEx and WORD

Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft(MS) Office or equivalent(FOSS) tool Word: Importance of La TeX and MS Office or equivalent(FOSS)tool Word as Word Processors, Details of the four tasks and features that would be covered in each, using La TeX and Word-Accessing, overview of tool bars, saving files, using help and resourses, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered: Formatting Fonts in word, Drop Cap in Word, Applying Text Effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time Option in both La TeX and Word.

Task 3: Creating project abstract features to be covered: Formatting Styles, Inserting table, Bullet Sand Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: 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 be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

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

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

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

POWER POINT

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

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

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

AI TOOLS – ChatGPT

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

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

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

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

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

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

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 Hand Book, Kate J.Chase, PHI(Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme.-CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan-CISCO Press, Pearson Education, 3rd edition

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COURSE STRUCTURE

CSE, CSE DS, CSE AI & ML

I YEAR –I SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	COMMUNICATIVE ENGLISH	2	0	0	2
2	CHEMISTRY	3	0	0	3
3	INTRODUCTION TO PROGRAMMING	3	0	0	3
4	LINEAR ALGEBRA AND CALCULUS	3	0	0	3
5	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	0	3
6	COMMUNICATIVE ENGLISH LAB	0	0	2	1
7	CHEMISTRY LAB	0	0	2	1
8	COMPUTER PROGRAMMING LAB	0	0	3	1.5
9	IT WORKSHOP	0	0	2	1
10	HEALTH AND WELLNESS, YOGA AND SPORTS	-	-	-	0.5
TOTAL		14	0	9	19

I YEAR –II SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	3	0	0	3
2	ENGINEERING PHYSICS	3	0	0	3
3	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3
4	ENGINEERING GRAPHICS	2	0	2	3
5	DATA STRUCTURES	3	0	0	3
6	ENGINEERING PHYSICS LAB	0	0	2	1
7	ELECTRICAL AND ELECTRONICS ENGINEERING LAB	0	0	3	1.5
8	ENGINEERING WORKSHOP	0	0	3	1.5
9	DS LAB	0	0	3	1.5
10	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	-	-	-	0.5
TOTAL		14	0	13	21

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L	T	P	C
2	0	0	2

COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the content, topic, and pieces of specific information from social 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.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi **(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: Skimmimg 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 comprehensions/ 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

Textbooks:

1.Pathfinder: Communicative English for Undergraduate: Student, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)

2.Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1.Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

2.Bailey, Stephen. Academic writing: A Handbook for International Students, ROUTLEDGE, 2014.

3.Murphy, Raymond, English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.

4.Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslod.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

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L	T	P	C
3	0	0	3

CHEMISTRY

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

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

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

CO1: Explain basic concepts of quantum mechanics and molecular and bonding.

CO2: Apply the principle of band diagrams in the application of conductors and semiconductors.

CO3: Compare the materials of construction for battery and electrochemical sensors.

CO4: Explain preparation, properties, and applications of thermoplastics & thermosetting & elastomers, conducting polymers.

CO5: Explain the principles of spectrometry, hplc in separation of solid and liquid mixtures.

UNIT I: Structure and Bonding Models:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II: Modern Engineering materials

Semiconductors – Introduction, basic concept, application

Super conductors-Introduction basic concept, applications.

Supercapacitors: Introduction, Basic Concept-Classification – Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles.

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-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT IV: Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

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.

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

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

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INTRODUCTION TO PROGRAMMING

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions and arrays.
- To encourage collaborative learning and teamwork in coding projects.

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

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

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), pseudocode. 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, 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 Array and Strings

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

UNIT IV Pointers & User-Defined Data types

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

UNIT V Functions & File Handling

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

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

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw Hill Education, 1996.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E, McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja , Oxford, 2016, 2^{nd} edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3^{rd} edition.

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LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Course Objectives:

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

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications.

CO2: Determine whether a given matrix is diagonalizable, evaluate inverse and power of the matrix by Cayley Hamilton Theorem.

CO3: Utilize mean value theorems to real life problems.

CO4: Familiarize with functions of several variables which is useful in optimization. Learn important tools of calculus in higher dimensions.

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

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 Seidal Iteration methods.

UNIT II: Eigen values, Eigenvectors and Orthogonal Transformation

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

UNIT III: Calculus

Mean Value Theorems: Rolle's theorem, Lagranges mean value theorem with their geometrical interpretation, Cauch's mean value theorem, Taylor's and Maclaurin theorem 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 Langrange multiplier.

UNIT V: Multiple Integrals (Multi variable Calculus)

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

Textbooks:

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, Micheael Greenberg, Pearson Publishers, 9th Edition.
5. Advanced Engineering Mathematics, H. K. Das, Er. Ranjnish Verma, S.Chand

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BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to All Branches of Engineering)

PART A

Course Objectives:

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

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of water storage and conveyance structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT I

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

UNIT II

Introduction to 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

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

Introduction to Water Resources and Environmental Engineering: 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 Engineering, M.S.Palanisamy, Tata McGraw Hill Publications (India) Pvt.Ltd. Fourth Edition.
2. Engineering Materials by Rangwala S C, (36th Edition), AnandCharotar Publishing House.
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 – SPECIFICATIONS IS 10500-2012.

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PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:

1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2. Explain different engineering materials and different manufacturing processes.
3. Provide an overview of different thermal and mechanical transmission system and introduce basics of robotics and its application.

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand the different manufacturing process.

CO2: Demonstrate the working of different mechanical power transmission systems.

CO3: Describe the basics of robotics and its applications.

CO4: Explain the basics of thermal engineering and its applications.

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: Classification of Engineering Materials & their applications: Metals – Ferrous and Non-ferrous, Ceramics, Composites, Smart materials, Definition of Strength, Hardness, Ductility and Toughness.

UNIT-II

Manufacturing Process: 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

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

Thermal Engineering – Working principle of Boilers (Cochran boiler, Babcock and Wilcox boiler, La Mont boiler), Refrigeration cycle (Ideal Vapour Compression refrigeration cycle) and air- conditioning system (Summer air-conditioning system), IC Engines, Otto Cycle, Diesel cycle, 2-Stroke and 4-Stroke Engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

(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)

Textbooks:

1. Internal Combustion Engines by V. Ganesan, By Tata McGraw Hill Publications (India) Pvt.Ltd.
2. A Tear 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, Cengagelearing India Pvt. Ltd.

Reference Books:

1. AppuuKuttan 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 RathoreTata 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.

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0	0	2	1

COMMUNICATIVE ENGLISH LAB

(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

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 syllabic division for better listening and speaking comprehension..

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.

CO5: Create effective Course Objectives:

List of Topics:

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

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

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

Web Resources:
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
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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L	T	P	C
0	0	2	1

CHEMISTRY LAB

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

- Verify the fundamental concepts with experiments.

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer Bakelite materials.

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

CO4: Analyse the IR spectra of some organic compounds.

CO5: Calculate strength of acid in Pb-Acid battery.

List of Experiments:

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

Reference:

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

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L	T	P	C
0	0	3	1.5

COMPUTER PROGRAMMING LAB

Course Objectives:

The Course aims to give students hands- on experience and train them on the concepts of the C- programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the application of arrays, functions, basic concepts of pointers in C.

UNIT: I

WEEK: 1

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

Suggested Experiments/ Activities:

Tutorial 1: Problem- solving using Computers.

Lab 1: Familiarization with programming environment

1. Basic Linux Environment and its editors like VI, Vim & Emacs etc.
2. Exposure to Turbo C, gcc
3. Writing Simple programs using printf( ), scanf( )

WEEK: 2

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

Suggested Experiments/ Activities:

Tutorial 2: Problem- solving using Algorithms and flow charts.

Lab 2: Converting algorithms/ flow charts into C Source code

Developing the algorithm/ flow charts for the following sample programs

1. Sum and average of 3 numbers
2. Conversion of Fahrenheit of Celsius and vice versa
3. Simple interest calculation

WEEK: 3

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

Suggested Experiments/ Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

1. Finding the square root of a given number
2. Finding compound interest
3. Area of triangle using heron's formulae
4. Distance travelled by an object

UNIT: II

WEEK: 4

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

Suggested Experiments/ Activities:

Tutorial 4: Operators and the precedence and as associatively:

Lab 4: Simple computational problems using the operator' precedence and associatively

1. Evaluate the following expressions.

a. A+B*C+(D*E)+F*G

b. A/B*C-B+A*D/3

c. A+++B---A

d. J=(i++)+(++i)

2. Find the maximum of three numbers using conditional operator
3. Take marks of 5 subjects in integers, and find the total , average in float.

WEEK: 5

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

Suggested Experiments/ Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: **Problems involving if- then – else structures.**

a) Write a C program to find the max and min of four numbers using if-else.
b) Write a C program to generate electricity bill.

c) Find the roots of the quadratic equation.

d) Write a C program to simulate a calculator using switch case.

e) Write a C program to find the given year is a leap year or not.

WEEK: 6

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

Suggested Experiments/ Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

a) Find the factorial of given number using any loop.

b) Find the given number is a prime or not.

c) Compute sine and cos series

d) Checking a number palindrome

e) Construct a pyramid of numbers.

UNIT: III

WEEK: 7

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

Suggested Experiments/ Activities:

Tutorial 7: 1 D Arrays: searching

Lab 7: 1D Array manipulation, linear search

a) Find the min and max of a 1-D integer array.

b) Perform linear search on1D array.

c) The reverse of a 1D integer array

d) Find 2's complement of the given binary number.

e) Eliminate duplicate elements in an array.

WEEK: 8

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

Suggested Experiments/ Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

a) Addition of two matrices
b) Multiplication two matrices
c) Sort array elements using bubble sort
d) Concatenate two strings without built-in functions
e) Reverse a string using built-in and without built-in string function.

UNIT: IV

WEEK: 9

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

Suggested Experiments/ Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereferences.

a) Write a C program to find the sum of a 1D array using malloc().
b) Write a C program to find the total, average of n students using structures
c) Enter n students data using calloc () and display failed students list.
d) Read student name and marks from the command line and display the student details along with the total.
e) Write a C program to implement realloc().

WEEK: 10

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

Suggested Experiments/ Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists.

Lab 10: Bit fields, linked lists

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

a) Create and display a singly linked list using self-referential structure.
b) Demonstrate the differences between structures and unions using a C program.

c) Write a C program to shift/rotate using bit fields.

d) Write a C program to copy one structure variable to another structure of the same type.

UNIT: V

WEEK: 11

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

Suggested Experiments/ Activities:

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

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

a) Write a C function to calculate NCR value.

b) Write a C function to find the length of a string.

c) Write a C function to transpose of a matrix.

d) Write a C function to demonstrate numerical integration of differential equations using Euler's method.

WEEK: 12

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

Suggested Experiments/ Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

a) Write a recursive function to generate Fibonacci series.

b) Write a recursive function to find the LCM of two numbers.

c) Write a recursive function to find the factorial of a number.

d) Write a C Program to implement Ackermann function using recursion.

e) Write a recursive function to find the sum of series.

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

a) Write a C program to swap two numbers using call by reference.

b) Demonstrate Dangling pointer problem using a C program.

c) Write a C program to copy one string into another using pointer.

d) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

a) Write a C program to write and read text into a file.

b) Write a C program to write and read text into a binary file using fread() and fwrite()

c) Copy the contents of one file to another file.

d) Write a C program to merge two files into the third file using command-line arguments.

e) Find no. of lines, words and characters in a file

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

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

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

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

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IT WORKSHOP

(Common to All Branches Of Engineering)

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- To Demonstrate Configuring the Systems Dual boot both Windows and Other Operating Style msViz. Linux,BOSS.
- To Teach Basic Command line Interface Commands on Linux.
- To Teach the Usage of Internet for Productivity and Self-Paced Life-long Learning.
- To Introduce Compression, Multimedia and Antivirus tools and Office Tools Such as Word processors,Spread sheets and Presentation Tools

Course Outcomes:

CO1: Perform Hard Water Trouble Shooting.

CO2: Understand Hardware Components and Inter Dependencies.

CO3: Safe guard Computer Systems.

CO4: Document Presentation Preparation.

CO5: Perform Calculations Using Spread sheets.

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions.

Draw the Block Diagram of the CPU along with the Configuration of Each Peripheral and Submit to your Instructor.

Task 2: Every student should dissemble 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 a part of the course content.

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

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

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

Internet & World Wide Web:

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP settings. Finally students should demonstrate, to the instructor, how to access the Websites and E-mail. If there is no internet connectivity preparations need to be made by the Instructor to Simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search tool bars and Popup Blockers. Also,plug-ins like Macromedia Flash and JRE for applets should be configured.

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

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

LaTEx and WORD

Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft(MS) Office or equivalent(FOSS) tool Word: Importance of La TeX and MS Office or equivalent(FOSS)tool Word as Word Processors, Details of the four tasks and features that would be covered in each, using La TeX and Word- Accessing, overview of tool bars, saving files, using help and resourses, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered: Formatting Fonts in word, Drop Cap in Word, Applying Text Effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time Option in both La TeX and Word.

Task 3: Creating project abstract features to be covered: Formatting Styles, Inserting table, Bullet Sand Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: 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 be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

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

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

LOOKUP/VLOOKUP

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

POWER POINT

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

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

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

AI TOOLS – ChatGPT

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

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

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

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

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

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

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 Hand Book, Kate J.Chase, PHI(Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme.-CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan-CISCO Press, Pearson Education, 3rd edition

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II SEMESTER

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches of Engineering)

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

CO1: Solve the differential equations related to various engineering fields.

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

CO3: Identify solution methods for partial differential equations that model physical processes.

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

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

UNIT I: Differential equations of first order and first degree

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

UNIT II: Linear differential equations of higher order (constant coefficients)

Definitions, homogeneous and non-homogeneous, 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 applies to scalar point functions-Gradient, Directional derivative, Del applied to vector point functions-Divergence and Curl, 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.

Textbooks:

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. Advanced Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

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ENGINEERING PHYSICS

(Common for all branches of Engineering)

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:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO2: Familiarize with the basics of crystal and their structures.

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials.

CO4: Explain the fundamentals of quantum mechanics and apply it to one dimensional motion of particles.

CO5: Identify the type of semiconductors using Hall effect.

UNIT-I: Wave Optics

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

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

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

UNIT – II: Crystallography and X- ray diffraction

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

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

Magnetic Materials: introduction – Magnetic dipole moment – magnetization – Magnetic susceptibility 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

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

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

UNIT – V: Semiconductors

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

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)

Reference Books:

1. Engineering Physics P.K. Palanisamy (Sci Tech Publications (India) Pvt. Ltd Second Edition 2008).
2. Engineering Physics – B. K. Pandey and S, Chaturvedi, Cengage Learning 2021.
3. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. Engineering Physics – Sanjay D. Jain, D. Sahasrabudhe and Girish , University Press. 2014.
5. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resource: https:// www.loc.gov/rr/scitech/selected-internet/physics.html

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to All branches of Engineering)

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:

After the completion of the course students will be able to

CO1: Understand the concepts of AC and DC electrical Circuits.

CO2: Understand the construction and working principles of Electrical Machines and Measuring instruments.

CO3: Compare various electrical Power Generation systems and their Equipment Safety Measures.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I: 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, 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

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 wattmeter.

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, 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: Electrical Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

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

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw 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. Bhatacharya, Person Publishers, 2018, Second Edition.

Web Resources:

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

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PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

Objectives of this course are

- To teach the fundamentals of semi-conductor devices and its applications, principles of digital electronics.

Course Outcomes:

The student will be able to:

CO4: Identify electronic components and the simple analysis of diodes and transistor.
CO5: Demonstrate the working of electronic circuits and the measuring instruments.
CO6: Recognize the concepts of digital electronics.

UNIT I: SEMICONDUCTOR DEVICES

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

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

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3code, 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 Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Textbooks:

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

Course Objectives:

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

Course outcomes

Upon successful completion of the course, the student will be able to

CO1: Constructions of various engineering curves.

CO2: Apply the principle of orthographic projection to points and lines.

CO3: Understand and draw the projection of planes and solids inclined to both planes in first quadrant.

CO4: Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications

CO5: Develop isometric drawings of simple objects reading the orthographic projection of those objects.

SYLLABUS (First angle projection only)

UNIT-1

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

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

UNIT-II

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

Projections of Straight Lines: Projection 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.

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.

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

UNIT-IV

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 cube, prism, cylinder, pyramid and cone in simple position only.

UNIT-V

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)

Learning Resources

Text books:

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

Reference books

1. Engineering Drawing, K.L.Narayana and P.Kannaiah, Tata McGraw Hill,2013.

2. Engineering Drawing, M.B.Shah and B.C.Rana,Pearson Education Inc,2009

3. Engineering Drawing with an Introduction to Auto CAD, Dhananjay Jolhe,

Tata McGraw Hill,2017.

4. AutoCAD 2018 Training Guide (English, Paperback, Sagar Linkan)

Websites

1. https:// www.autodesk.com.au/campaigns/autocad-tutorials

2. https:/nptel.ac.in/courses/112104172

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DATA STRUCTURES

Course Objectives:

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

CO1: Explain the roll 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 stakes 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

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.

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

UNIT-V

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

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.

Text books:

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 Peter Sanders

2.C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman,and John E.Hopcroft

3.Problem Solving with Algorithms and Data Structures by Brad Miller and David Ranum

4.Introduction to Algorithms by Thomas H. Cormen, Charles E.Leiserson, Ronald L.Rivest, and Clifford Stein

5.Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.

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L	T	P	C
0	0	2	1

ENGINEERING PHYSICS LAB

(Common to All Branches of Engineering)

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 effects in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The student will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.

CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.

CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor.

CO6: Identify the type of semiconductors using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelength 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 B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's method.
11. Determination of Hall voltage and Hall Coefficient of a given semiconductor using Hall effect.
12. Determination of Temperature coefficient of a thermistor.
13. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
14. Determination of magnetic susceptibility by Kund's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.

17. Determination of Young's modulus for the given material of wooden scale by nonuniform bending method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any ten of the listed experiments are to be conducted. Out of which any Two experiments may be conducted in virtual mode.

References:

A textbook of Practical Physics – S Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources:

www.vlab.co.in

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

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ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Common to all branches of engineering)

Course Objectives:

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

Course Outcomes:

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 principle 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 measurements of resistance, power and power factor.

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

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

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop

Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, Screw Driver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc

- Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of measuring instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function, Generator, Frequency, counter.

- Provide some exercises so that measuring instruments are learned to be used by the students.

3. Components:

- Familiarization/ Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
- Testing of components like Resistor, Capacitor, Diodes, transistors, IC's etc- Compare values of components like resistors, inductors, capacitor 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. Demonstration and study of commonly used electrical workshop Tools.
   (Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, Screw Driver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc)
4. Determination of current in series and Parallel Circuits.
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, 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

Note: Minimum six experiments to be performed. All the experiments shall be implemented using both hardware and software.

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PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

Objectives of this course are

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

Course Outcomes:

The student will be able to:

CO4: Identify & testing of various electronic components.
CO5: Plot and discuss the characteristics of various electronic devices.
CO6: Explain the operation of a digital circuit.

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 gates using ICs.

S. Sri Gown

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ENGINEERING WORKSHOP

(Common to ALL branches of Engineering)

Course Objectives:

1. To familiarize students with wood working, sheet metal operations, fitting and electrical house Wiring skills

Course Outcomes:

Upon successful completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities.

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

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

List of Experiments:

(Student has to complete Two experiments in each Trade)

1. Demonstration: Safety practices and precautions to be observed in the workshop

2. Wood Working: Familiarity with different types of woods and tools used in woodworking and make following joints. a) Half-Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. Sheet Metal Working: Familiarity with different types of tools used in sheet metal Working, Developments of following sheet metal job from GI sheets a) Taperedz tray b) Conical funnel c) Elbow pipe d) Brazing

4. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre.

5. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires.

6. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of green sand moulds for given Patterns.

7. Welding shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. Plumbing: Demonstration and practice of Plumbing tools, preparation of pipe joints with coupling for same diameter and with reducer for different diameters.

Textbooks:

1. Basic Workshop Technology: Manufacturing process, Fleix W.; Independently Publised, 2019. Workshop Processes, Practices and Materials; Bruce J.Black, Rutledge publishers, 5th Edn.2015.

2. A course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

References Books:

1. Elements of Workshop Technology, Vol I. by S. K. Hajra Choudary & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H.S. Bawa, Tata-McGraw Hill, 2004.
3. Writing Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A; Atul Prakshan.

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DATA STRUCTURES LAB

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: At the end of the course, Student will be 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: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

List of Experiments:

Exercise 1: Array Manipulation

(i) Write a program to reverse an array.

(ii) C Programs to implement the searching Techniques – Linear & Binary Search.

(iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort.

Exercise 2: Linked List Implementation

(i) Implement a singly linked list and perform insertion and deletion operations.

(ii) Develop a program to reverse a linked list iteratively and recursively.

(iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

(i) Create a program to detect and remove duplicates from a linked list.

(ii) Implement a linked list to represent polynomials and perform addition.

(iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

(i) Implement a doubly linked list and perform various operations to understand its properties and applications.

(ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

(i) Implement a stack using arrays and linked lists .

(ii) Write a program to evaluate a postfix expression using a stack.

(iii) Implement a program to check for balanced parenthesis 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 Search Tree

(i) Implementing a BST using Linked List.

(ii) Traversing of BST.

Exercise 9: Hashing

(i) Implement a hash table with collision resolution techniques.

(ii) Write a program to implement a simple cache using hashing.

Text Books:

1. Data Structures and algorithms 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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COURSE STRUCTURE

IT

I YEAR –I SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	COMMUNICATIVE ENGLISH	2	0	0	2
2	ENGINEERING PHYSICS	3	0	0	3
3	INTRODUCTION TO PROGRAMMING	3	0	0	3
4	LINEAR ALGEBRA AND CALCULUS	3	0	0	3
5	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3
6	COMMUNICATIVE ENGLISH LAB	0	0	2	1
7	ENGINEERING PHYSICS LAB	0	0	2	1
8	COMPUTER PROGRAMMING LAB	0	0	3	1.5
9	ELECTRICAL AND ELECTRONICS ENGINEERING LAB	0	0	3	1.5
10	HEALTH AND WELLNESS, YOGA AND SPORTS	-	-	-	0.5
TOTAL		14	0	9	19.5

I YEAR –II SEMESTER

S.NO	SUBJECTS	L	T	P	CREDITS
1	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	3	0	0	3
2	CHEMISTRY	3	0	0	3
3	ENGINEERING GRAPHICS	2	0	2	3
4	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	0	3
5	DATA STRUCTURES	3	0	0	3
6	CHEMISTRY LAB	0	0	2	1
7	IT WORKSHOP	0	0	2	1
8	ENGINEERING WORKSHOP	0	0	3	1.5
9	DS LAB	0	0	3	1.5
10	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	-	-	-	0.5
TOTAL		14	0	12	20.5

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L	T	P	C
2	0	0	2

COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the content, topic, and pieces of specific information from social 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.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi **(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: Skimmimg 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 comprehensions/ 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

Textbooks:

1.Pathfinder: Communicative English for Undergraduate: Student, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)

2.Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1.Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

2.Bailey, Stephen. Academic writing: A Handbook for International Students, ROUTLEDGE, 2014.

3.Murphy, Raymond, English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.

4.Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslod.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

Verified by
Ye Ramanda

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ENGINEERING PHYSICS

(Common for all branches of Engineering)

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:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO2: Familiarize with the basics of crystal and their structures.

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials.

CO4: Explain the fundamentals of quantum mechanics and apply it to one dimensional motion of particles.

CO5: Identify the type of semiconductors using Hall effect.

UNIT-I: Wave Optics

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

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

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

UNIT – II: Crystallography and X- ray diffraction

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

Dielectric Materials: Introduction - Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector- - Relation between the electric vectors – Types of polarization

– Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) – Lorentz internal field - Clausius – Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss.

Magnetic Materials: introduction – Magnetic dipole moment – magnetization – Magnetic susceptibility 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

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

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

UNIT – V: Semiconductors

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

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)

Reference Books:

1. Engineering Physics P.K. Palanisamy (Sci Tech Publications (India) Pvt. Ltd Second Edition 2008).
2. Engineering Physics – B. K. Pandey and S, Chaturvedi, Cengage Learning 2021.
3. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. Engineering Physics – Sanjay D. Jain, D. Sahasrabudhe and Girish , University Press. 2014.
5. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resource: https:// www.loc.gov/rr/scitech/selected-internet/physics.html

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INTRODUCTION TO PROGRAMMING

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions and arrays.
- To encourage collaborative learning and teamwork in coding projects.

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

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

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), pseudocode. 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, 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 Array and Strings

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

UNIT IV Pointers & User-Defined Data types

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

UNIT V Functions & File Handling

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

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

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw Hill Education, 1996.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E, McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja , Oxford, 2016, 2^{nd} edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3^{rd} edition.

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LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Course Objectives:

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

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications.

CO2: Determine whether a given matrix is diagonalizable, evaluate inverse and power of the matrix by Cayley Hamilton Theorem.

CO3: Utilize mean value theorems to real life problems.

CO4: Familiarize with functions of several variables which is useful in optimization. Learn important tools of calculus in higher dimensions.

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

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 Seidal Iteration methods.

UNIT II: Eigen values, Eigenvectors and Orthogonal Transformation

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

UNIT III: Calculus

Mean Value Theorems: Rolle's theorem, Lagranges mean value theorem with their geometrical interpretation, Cauch's mean value theorem, Taylor's and Maclaurin theorem 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 Langrange multiplier.

UNIT V: Multiple Integrals (Multi variable Calculus)

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

Textbooks:

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, Micheael Greenberg, Pearson Publishers, 9th Edition.
5. Advanced Engineering Mathematics, H. K. Das, Er. Ranjnish Verma, S.Chand

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to All branches of Engineering)

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:

After the completion of the course students will be able to

CO1: Understand the concepts of AC and DC electrical Circuits.

CO2: Understand the construction and working principles of Electrical Machines and Measuring instruments.

CO3: Compare various electrical Power Generation systems and their Equipment Safety Measures.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I: 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, 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

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 wattmeter.

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, 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: Electrical Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

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

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw 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. Bhatacharya, Person Publishers, 2018, Second Edition.

Web Resources:

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

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PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

Objectives of this course are

- To teach the fundamentals of semi-conductor devices and its applications, principles of digital electronics.

Course Outcomes:

The student will be able to:

CO4: Identify electronic components and the simple analysis of diodes and transistor.
CO5: Demonstrate the working of electronic circuits and the measuring instruments.
CO6: Recognize the concepts of digital electronics.

UNIT I: SEMICONDUCTOR DEVICES

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

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

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3code, 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 Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Textbooks:

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

(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

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 syllabic division for better listening and speaking comprehension..

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.

CO5: Create effective Course Objectives:

List of Topics:

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

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

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

Web Resources:
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
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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ENGINEERING PHYSICS LAB

(Common to All Branches of Engineering)

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 effects in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The student will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.

CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.

CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor.

CO6: Identify the type of semiconductors using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelength 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 B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's method.
11. Determination of Hall voltage and Hall Coefficient of a given semiconductor using Hall effect.
12. Determination of Temperature coefficient of a thermistor.
13. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
14. Determination of magnetic susceptibility by Kund's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.

17. Determination of Young's modulus for the given material of wooden scale by nonuniform bending method.

18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any ten of the listed experiments are to be conducted. Out of which any Two experiments may be conducted in virtual mode.

References:

A textbook of Practical Physics – S Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources:

www.vlab.co.in

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

J. Asha

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COMPUTER PROGRAMMING LAB

Course Objectives:

The Course aims to give students hands- on experience and train them on the concepts of the C-programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the application of arrays, functions, basic concepts of pointers in C.

UNIT: I

WEEK: 1

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

Suggested Experiments/ Activities:

Tutorial 1: Problem- solving using Computers.

Lab 1: Familiarization with programming environment

1. Basic Linux Environment and its editors like VI, Vim & Emacs etc.
2. Exposure to Turbo C, gcc
3. Writing Simple programs using printf( ), scanf( )

WEEK: 2

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

Suggested Experiments/ Activities:

Tutorial 2: Problem- solving using Algorithms and flow charts.

Lab 2: Converting algorithms/ flow charts into C Source code

Developing the algorithm/ flow charts for the following sample programs

1. Sum and average of 3 numbers
2. Conversion of Fahrenheit of Celsius and vice versa
3. Simple interest calculation

WEEK: 3

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

Suggested Experiments/ Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

1. Finding the square root of a given number
2. Finding compound interest
3. Area of triangle using heron's formulae
4. Distance travelled by an object

UNIT: II

WEEK: 4

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

Suggested Experiments/ Activities:

Tutorial 4: Operators and the precedence and as associatively:

Lab 4: Simple computational problems using the operator' precedence and associatively

1. Evaluate the following expressions.

a. A+B*C+(D*E)+F*G

b. A/B*C-B+A*D/3

c. A+++B---A

d. J=(i++)+(++i)

2. Find the maximum of three numbers using conditional operator
3. Take marks of 5 subjects in integers, and find the total , average in float.

WEEK: 5

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

Suggested Experiments/ Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if- then – else structures.

a) Write a C program to find the max and min of four numbers using if-else.
b) Write a C program to generate electricity bill.

c) Find the roots of the quadratic equation.

d) Write a C program to simulate a calculator using switch case.

e) Write a C program to find the given year is a leap year or not.

WEEK: 6

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

Suggested Experiments/ Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

a) Find the factorial of given number using any loop.

b) Find the given number is a prime or not.

c) Compute sine and cos series

d) Checking a number palindrome

e) Construct a pyramid of numbers.

UNIT: III

WEEK: 7

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

Suggested Experiments/ Activities:

Tutorial 7: 1 D Arrays: searching

Lab 7: 1D Array manipulation, linear search

a) Find the min and max of a 1-D integer array.

b) Perform linear search on1D array.

c) The reverse of a 1D integer array

d) Find 2's complement of the given binary number.

e) Eliminate duplicate elements in an array.

WEEK: 8

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

Suggested Experiments/ Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

a) Addition of two matrices
b) Multiplication two matrices
c) Sort array elements using bubble sort
d) Concatenate two strings without built-in functions
e) Reverse a string using built-in and without built-in string function.

UNIT: IV

WEEK: 9

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

Suggested Experiments/ Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereferences.

a) Write a C program to find the sum of a 1D array using malloc().
b) Write a C program to find the total, average of n students using structures
c) Enter n students data using calloc () and display failed students list.
d) Read student name and marks from the command line and display the student details along with the total.
e) Write a C program to implement realloc().

WEEK: 10

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

Suggested Experiments/ Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists.

Lab 10: Bit fields, linked lists

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

a) Create and display a singly linked list using self-referential structure.
b) Demonstrate the differences between structures and unions using a C program.

c) Write a C program to shift/rotate using bit fields.

d) Write a C program to copy one structure variable to another structure of the same type.

UNIT: V

WEEK: 11

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

Suggested Experiments/ Activities:

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

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

a) Write a C function to calculate NCR value.

b) Write a C function to find the length of a string.

c) Write a C function to transpose of a matrix.

d) Write a C function to demonstrate numerical integration of differential equations using Euler's method.

WEEK: 12

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

Suggested Experiments/ Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

a) Write a recursive function to generate Fibonacci series.

b) Write a recursive function to find the LCM of two numbers.

c) Write a recursive function to find the factorial of a number.

d) Write a C Program to implement Ackermann function using recursion.

e) Write a recursive function to find the sum of series.

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

a) Write a C program to swap two numbers using call by reference.

b) Demonstrate Dangling pointer problem using a C program.

c) Write a C program to copy one string into another using pointer.

d) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

a) Write a C program to write and read text into a file.

b) Write a C program to write and read text into a binary file using fread() and fwrite()

c) Copy the contents of one file to another file.

d) Write a C program to merge two files into the third file using command-line arguments.

e) Find no. of lines, words and characters in a file

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

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

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

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

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ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Common to all branches of engineering)

Course Objectives:

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

Course Outcomes:

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 principle 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 measurements of resistance, power and power factor.

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

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

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop

   Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, Screw Driver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc

   - Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of measuring instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function, Generator, Frequency, counter.

   - Provide some exercises so that measuring instruments are learned to be used by the students.

3. Components:

   - Familiarization/ Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
   - Testing of components like Resistor, Capacitor, Diodes, transistors, IC's etc- Compare values of components like resistors, inductors, capacitor 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. Demonstration and study of commonly used electrical workshop Tools.
   (Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, Screw Driver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc)
4. Determination of current in series and Parallel Circuits.
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, 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

Note: Minimum six experiments to be performed. All the experiments shall be implemented using both hardware and software.

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PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

Objectives of this course are

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

Course Outcomes:

The student will be able to:

CO4: Identify & testing of various electronic components.
CO5: Plot and discuss the characteristics of various electronic devices.
CO6: Explain the operation of a digital circuit.

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 gates using ICs.

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II SEMRSTER

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches of Engineering)

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

CO1: Solve the differential equations related to various engineering fields.

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

CO3: Identify solution methods for partial differential equations that model physical processes.

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

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

UNIT I: Differential equations of first order and first degree

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

UNIT II: Linear differential equations of higher order (constant coefficients)

Definitions, homogeneous and non-homogeneous, 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 applies to scalar point functions-Gradient, Directional derivative, Del applied to vector point functions-Divergence and Curl, 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.

Textbooks:

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. Advanced Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

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CHEMISTRY

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

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

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

CO1: Explain basic concepts of quantum mechanics and molecular and bonding.

CO2: Apply the principle of band diagrams in the application of conductors and semiconductors.

CO3: Compare the materials of construction for battery and electrochemical sensors.

CO4: Explain preparation, properties, and applications of thermoplastics & thermosetting & elastomers, conducting polymers.

CO5: Explain the principles of spectrometry, hplc in separation of solid and liquid mixtures.

UNIT I: Structure and Bonding Models:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II: Modern Engineering materials

Semiconductors – Introduction, basic concept, application

Super conductors-Introduction basic concept, applications.

Supercapacitors: Introduction, Basic Concept-Classification – Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles.

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-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT IV: Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

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.

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

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

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ENGINEERING GRAPHICS

(Common to All branches of Engineering)

Course Objectives:

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

Course outcomes

Upon successful completion of the course, the student will be able to

CO1: Constructions of various engineering curves.

CO2: Apply the principle of orthographic projection to points and lines.

CO3: Understand and draw the projection of planes and solids inclined to both planes in first quadrant.

CO4: Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications

CO5: Develop isometric drawings of simple objects reading the orthographic projection of those objects.

SYLLABUS (First angle projection only)

UNIT-1

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

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

UNIT-II

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

Projections of Straight Lines: Projection 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.

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.

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

UNIT-IV

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 cube, prism, cylinder, pyramid and cone in simple position only.

UNIT-V

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)

Learning Resources

Text books:

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

Reference books

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

Tata McGraw Hill,2017.

4. AutoCAD 2018 Training Guide (English, Paperback, Sagar Linkan)

Websites

1. https:// www.autodesk.com.au/campaigns/autocad-tutorials
2. https:/nptel.ac.in/courses/112104172

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BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to All Branches of Engineering)

PART A

Course Objectives:

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

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of water storage and conveyance structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT I

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

UNIT II

Introduction to 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

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

Introduction to Water Resources and Environmental Engineering: 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 Engineering, M.S.Palanisamy, Tata McGraw Hill Publications (India) Pvt.Ltd. Fourth Edition.
2. Engineering Materials by Rangwala S C, (36th Edition), AnandCharotar Publishing House.
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 – SPECIFICATIONS IS 10500-2012.

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PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:

1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2. Explain different engineering materials and different manufacturing processes.
3. Provide an overview of different thermal and mechanical transmission system and introduce basics of robotics and its application.

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand the different manufacturing process.

CO2: Demonstrate the working of different mechanical power transmission systems.

CO3: Describe the basics of robotics and its applications.

CO4: Explain the basics of thermal engineering and its applications.

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: Classification of Engineering Materials & their applications: Metals – Ferrous and Non-ferrous, Ceramics, Composites, Smart materials, Definition of Strength, Hardness, Ductility and Toughness.

UNIT-II

Manufacturing Process: 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

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

Thermal Engineering – Working principle of Boilers (Cochran boiler, Babcock and Wilcox boiler, La Mont boiler), Refrigeration cycle (Ideal Vapour Compression refrigeration cycle) and air- conditioning system (Summer air-conditioning system), IC Engines, Otto Cycle, Diesel cycle, 2-Stroke and 4-Stroke Engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

(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)

Textbooks:

1. Internal Combustion Engines by V. Ganesan, By Tata McGraw Hill Publications (India) Pvt.Ltd.
2. A Tear 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, Cengagelearing India Pvt. Ltd.

Reference Books:

1. AppuuKuttan 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 RathoreTata 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.

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DATA STRUCTURES

Course Objectives:

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

CO1: Explain the roll 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 stakes 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

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.

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

UNIT-V

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

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.

Text books:

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 Peter Sanders

2.C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman,and John E.Hopcroft

3.Problem Solving with Algorithms and Data Structures by Brad Miller and David Ranum

4.Introduction to Algorithms by Thomas H. Cormen, Charles E.Leiserson, Ronald L.Rivest, and Clifford Stein

5.Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.

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CHEMISTRY LAB

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

- Verify the fundamental concepts with experiments.

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer Bakelite materials.

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

CO4: Analyse the IR spectra of some organic compounds.

CO5: Calculate strength of acid in Pb-Acid battery.

List of Experiments:

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

Reference:

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

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IT WORKSHOP

(Common to All Branches Of Engineering)

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- To Demonstrate Configuring the Systems Dual boot both Windows and Other Operating Style msViz. Linux,BOSS.
- To Teach Basic Command line Interface Commands on Linux.
- To Teach the Usage of Internet for Productivity and Self-Paced Life-long Learning.
- To Introduce Compression, Multimedia and Antivirus tools and Office Tools Such as Word processors,Spread sheets and Presentation Tools

Course Outcomes:

CO1: Perform Hard Water Trouble Shooting.

CO2: Understand Hardware Components and Inter Dependencies.

CO3: Safe guard Computer Systems.

CO4: Document Presentation Preparation.

CO5: Perform Calculations Using Spread sheets.

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions.

Draw the Block Diagram of the CPU along with the Configuration of Each Peripheral and Submit to your Instructor.

Task 2: Every student should dissemble 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 a part of the course content.

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

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

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

Internet & World Wide Web:

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP settings. Finally students should demonstrate, to the instructor, how to access the Websites and E-mail. If there is no internet connectivity preparations need to be made by the Instructor to Simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search tool bars and Popup Blockers. Also,plug-ins like Macromedia Flash and JRE for applets should be configured.

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

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

LaTEx and WORD

Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft(MS) Office or equivalent(FOSS) tool Word: Importance of La TeX and MS Office or equivalent(FOSS)tool Word as Word Processors, Details of the four tasks and features that would be covered in each, using La TeX and Word- Accessing, overview of tool bars, saving files, using help and resourses, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered: Formatting Fonts in word, Drop Cap in Word, Applying Text Effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time Option in both La TeX and Word.

Task 3: Creating project abstract features to be covered: Formatting Styles, Inserting table, Bullet Sand Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: 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 be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

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

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

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

POWER POINT

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

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

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

AI TOOLS – ChatGPT

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

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

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

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

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

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

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 Hand Book, Kate J.Chase, PHI(Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme.-CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan-CISCO Press, Pearson Education, 3rd edition

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ENGINEERING WORKSHOP

(Common to ALL branches of Engineering)

Course Objectives:

1. To familiarize students with wood working, sheet metal operations, fitting and electrical house Wiring skills

Course Outcomes:

Upon successful completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities.

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

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

List of Experiments:

(Student has to complete Two experiments in each Trade)

1. Demonstration: Safety practices and precautions to be observed in the workshop

2. Wood Working: Familiarity with different types of woods and tools used in woodworking and make following joints. a) Half-Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. Sheet Metal Working: Familiarity with different types of tools used in sheet metal Working, Developments of following sheet metal job from GI sheets a) Taperedz tray b) Conical funnel c) Elbow pipe d) Brazing

4. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre.

5. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires.

6. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of green sand moulds for given Patterns.

7. Welding shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. Plumbing: Demonstration and practice of Plumbing tools, preparation of pipe joints with coupling for same diameter and with reducer for different diameters.

Textbooks:

1. Basic Workshop Technology: Manufacturing process, Fleix W.; Independently Publised, 2019. Workshop Processes, Practices and Materials; Bruce J.Black, Rutledge publishers, 5th Edn.2015.

2. A course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

References Books:

1. Elements of Workshop Technology, Vol I. by S. K. Hajra Choudary & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H.S. Bawa, Tata-McGraw Hill, 2004.
3. Writing Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A; Atul Prakshan.

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DATA STRUCTURES LAB

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: At the end of the course, Student will be 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: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

List of Experiments:

Exercise 1: Array Manipulation

(i) Write a program to reverse an array.

(ii) C Programs to implement the searching Techniques – Linear & Binary Search.

(iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort.

Exercise 2: Linked List Implementation

(i) Implement a singly linked list and perform insertion and deletion operations.

(ii) Develop a program to reverse a linked list iteratively and recursively.

(iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

(i) Create a program to detect and remove duplicates from a linked list.

(ii) Implement a linked list to represent polynomials and perform addition.

(iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

(i) Implement a doubly linked list and perform various operations to understand its properties and applications.

(ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

(i) Implement a stack using arrays and linked lists .

(ii) Write a program to evaluate a postfix expression using a stack.

(iii) Implement a program to check for balanced parenthesis 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 Search Tree

(i) Implementing a BST using Linked List.

(ii) Traversing of BST.

Exercise 9: Hashing

(i) Implement a hash table with collision resolution techniques.

(ii) Write a program to implement a simple cache using hashing.

Text Books:

1. Data Structures and algorithms 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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