GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY: NELLORE
(AUTONOMOUS)

NELLORE–524317 (A.P) INDIA

B.TECH IN ELECTRONICS & COMMUNICATION ENGINEERING
(ACCREDITATED BY NBA)

COURSE STRUCTURE AND SYLLABI
UNDER RG 22 REGULATIONS

DEPARTMENT VISION

To become a reputed learning centre producing competent professionals.

DEPARTMENT MISSION

DM_1: Provide Quality education through interactive teaching-learning practices.

DM_2: Establish Technology-enabled environment for core competencies including robotics.

DM_3: Arrange Industry-Collaboration to hone professional skills.

DM_4: Organize activities to foster social skills and ethical values.

Program Educational Objectives (PEOs)

PEO1: Professional Skills: Apply Engineering concepts to solve Electronics and Communication Engineering problems of social relevance.

PEO3: Industry Needs: Design and develop Electronic devices and Systems for Industry or pursue research.

PEO2: Lifelong Learning: Demonstrate competencies through continuous learning and adapt to multi-disciplinary environment**.**

PEO4: Engineering citizenship: Practice professional ethics and contribute to the societal needs**.**

Program Outcomes

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1 **Professional Skills**: Apply principles of Analog and Digital Electronics, Communication Systems, Image processing, VLSI and Embedded Systems to solve diverse problems.

PSO2 **Software Knowledge**: Develop solutions for complex engineering problems of social relevance by employing Xilinx, CC Studio, Micro Wind, Keil, NG Spice, Scilab tools.

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B.TECH Electronics & Communication Engineering

Course Structure (RG22)

Semester 0

Induction Program: 3weeks
(Common for All Branches of Engineering)

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

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B.TECH Electronics & Communication Engineering

Course Structure (RG22)

Semester - 1 (Theory-5, Lab-3)							
Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	22A0001T	Linear Algebra and Calculus	3	0	0	3
2	BSC	22A0003T	Applied Physics	3	0	0	3
3	HSC	22A0013T	Communicative English	3	0	0	3
4	ESC	22A0518T	C Programming & Data Structures	3	0	0	3
5	ESC	22A0302T	Engineering Drawing	1	0	4	3
6	HSC (Lab)	22A0014P	Communicative English Lab	0	0	3	1.5
7	BSC (Lab)	22A0008P	Applied Physics Lab	0	0	3	1.5
8	ESC (Lab)	22A0519P	C Programming & Data Structures Lab	0	0	3	1.5
			Total credits				**19.5**

Category	Credits
Basic Science Course (BSC)	7.5
Engineering Science Course (ESC)	7.5
Humanities and Social Science Course (HSC)	4.5
Total	19.5

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B.TECH Electronics & Communication Engineering

Course Structure (RG22)

Semester - 2 (Theory-4, Lab-5)							
Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	22A0002T	Differential Equations and Vector Calculus	3	0	0	3
2	BSC	22A0006T	Chemistry	3	0	0	3
3	ESC	22A0201T	Fundamentals of Electrical Circuits	3	0	0	3
4	ESC	22A0401T	Electronic Devices & Circuits	3	0	0	3
5	BSC (Lab)	22A0011P	Chemistry Lab	0	0	3	1.5
6	ESC (Lab)	22A0202P	Fundamentals of Electrical Circuits Lab	0	0	3	1.5
7	ESC (Lab)	22A0402P	Electronic Devices & Circuits Lab	0	0	3	1.5
8	ESC (Lab)	22A0403P	Electronics Workshop	0	0	3	1.5
9	ESC (Lab)	22A0502P	IT Workshop	0	0	3	1.5
			Total credits				**19.5**

Category	Credits
Basic Science Course (BSC)	7.5
Engineering Science Course (ESC)	12
Total	19.5

LINEAR ALGEBRA & CALCULUS					
Course Code	**L:T:P:C**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0001T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**BS**

Course Objectives:

This course will illuminate the students in the concepts of calculus and linear algebra. 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.

Syllabus		**Total Hours: 45**
Module - I	**Matrices**	**9 Hrs**

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Applications: Finding the current in electrical circuits Eigen values and Eigenvectors and their properties, Cayley- Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of amatrix.

Module - II	**Mean Value Theorems**	**9 Hrs**

Rolle's Theorem (Without Proof), Lagrange's mean value theorem (Without Proof), Cauchy's mean value theorem (Without Proof), related problems, Taylor's and Maclaurin theorems with remainders (without proof) - related problems, Taylor's and Maclaurin series (without proof) Expansions of functions by Taylors and Maclaurin's series.

Module - III	**Multivariable Calculus**	**9 Hrs**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Module - IV	**Multiple Integrals**	**9 Hrs**

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

Module - V	**Beta and Gamma functions**	**9 Hrs**

Beta and Gamma functions and their properties, relation between beta and gamma functions,evaluation of definite integrals using beta and gamma functions.

Course Outcomes (CO):

On completion of this course, student will be able to

- Solving the system of linear equations, find the eigen values and eigenvectors and use thisinformation to facilitate the calculation of matrix characteristics.
- Translate the given function as series of Taylor's and Maclaurin's with remainders, analyzethe behavior of functions by using mean value theorems.
- Acquire the Knowledge maxima and minima functions of several variables. Utilize Jacobian ofa coordinate transformation to deal with the problems in change of variables.
- Apply multiple integration techniques in evaluating areas and volumes bounded by the region.
- Understand beta and gamma functions and its relations, conclude the use of special function in evaluating definite integrals.

Textbooks:

1. Higher Engineering Mathematics, B. S. Grewal , 44/e, Khanna Publishers, 2017.
2. Linear Algebra & Calculus by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
3. Engineering Mathematics III by N.P. Bali, Dr. K.L. Sai Prasad, University Science Press.

Reference Books:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, Wiley India
2. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
3. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N.Prasad, S. Chand Publications.

Applied Physics

(Common to ECE, EEE)

Course Code	L:T:P:C	Credits	Exam Marks	Exam Duration	Course Type
22A0003T	3:0:0:0	3	CIE:30 SEE:70	3H	BS

Prerequisite: Student should know about fundamental and basic principles in physics.

Course Objectives:

This course will enable students to:

- To make a bridge between the physics in school and engineering courses.
- To impart the knowledge in basic concepts of the optical phenomenon like interference, diffraction andpolarization.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibers along with engineering applications.
- To open new avenues of knowledge and understanding the basic concepts of dielectric and magneticmaterials and its application in the emerging micro devices.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of chargecarriers in semiconductors.
- To identify the importance of semiconductors in the functioning of electronic devices.
- To enlighten the concepts related to superconductivity which leads to their fascinating applications.
- To impart knowledge in basic concepts of electromagnetic waves

Syllabus	Total Hours: 48
Module - I Wave Optics	**10**

Interference- Principle of superposition – Interference of light – Types of Interference – Path difference – Phase difference – Conditions for sustained interference- Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index of liquid.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to singleslit, double slit and N-slits (qualitative) – Grating spectrum**.**

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

Module –II Lasers and Fiber optics	**10**

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Ruby laser – He-Ne laser – Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (qualitative) – Applications

Module –III Dielectric and Magnetic Materials	**10**

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation.

Magnetic Materials- Introduction –Basic definitions – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro – Hysteresis – Soft and Hard magnetic materials

Module –IV Semiconductors and Superconductors	**10**

Semiconductors- Introduction – Classification of crystalline solids – Intrinsic semiconductors – Intrinsic Density of charge carriers- Intrinsic conductivity-Intrinsic Fermi level- Extrinsic semiconductors– p-type and ntype- Drift and diffusion currents – Einstein's equation – Formation of p-n junction diode – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and TypeII superconductors – BCS theory – Josephson effects (AC and DC) – High T_C superconductors – Applications of superconductors**.**

Module –V Electrostatics and Electromagnetic Waves	**8**

Electrostatics -Introduction- Electric charge-Coulomb's law-Electric filed-- Electric field due to linear charge-Gauss' law- statement and its proof- Derivation of Coulomb's law from Gauss law.

Electromagnetic Waves- Introduction-Divergence and Curl of Electric and Magnetic Fields- Stokes' theorem for curl- Maxwell's Equations (Quantitative)- Electromagnetic wave propagation (Non-conducting medium (dielectric medium)) -Poynting's Theorem.

Course Outcomes:

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

- Describe the importance of Interference, Diffraction and Polarization and the engineering applications as well (L2)
- Demonstrate the properties of lasers and fibre optics to various applications in science and technology (L2)
- Explain the fundamental concepts and theory related to dielectric and magnetic materials (L1)
- Illustrate the functioning of semiconductors in electronic devices (L2)
- Discuss the principles and theory related to superconductors and explore their technological applications(L2)
- Explain the electromagnetic wave propagation and its power in non-conducting medium (L2)

Text Books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, Cengage Learning.
3. Applied Physics for Engineers- K.Venkataramanan, R. Raja, M. Sundararajan(Scitech) [3,5] 2014

Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
3. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
4. David J.Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014
5. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill

E-resources:

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

COMMUNICATIVE ENGLISH

(Common to all Branches of Engineering)

Course Code	L:T: P: S	Credits	Exam marks	Exam Duration	Course Type
22A0013T	3: 0: 0: 0	3	CIE:30 SEE:70	3 Hours	HS

Course Objectives:

- Facilitate effective **listening skills** for better comprehension of academic lectures and English spoken by native speakers
- Help improve **speaking skills** motivating the learners to participate in activities such as role plays, discussions and structured talks/oral presentations
- Focus on appropriate **reading skills** for comprehension of various academic texts and authentic materials
- Impart effective strategies for good **writing skills** in summarizing, writing well organized essays, drafting formal letters and designing well structured reports
- Broaden the knowledge base of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Syllabus — **Total Hours:48**

Module - I	On the Conduct of Life: William Hazlitt	9 Hrs

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading: Skimming to get the main idea of a text Scanning to look for specific pieces of information.
Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.
Grammar and Vocabulary: Parts of Speech,
Content words and function words;
Word order in sentences;
Basic sentence structures;
Types of questions - Wh- questions.

Module - II	The Brook: Alfred Tennyson	9Hrs

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.
Grammar and Vocabulary: Use of Articles and zero Article
Prepositions
Punctuation, capital letters
Cohesive devices - linkers

Module - III	The Death Trap: Saki	11 Hrs

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: Paragraph Writing , Summarizing
Grammar and Vocabulary: Verbs - Tenses
Subject-Verb agreement
Direct & Indirect speech

Module - IV	Ponnuthayi – Bama	10 Hrs

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Read and Interpret graphic Information to reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters/Report Writing
Grammar and Vocabulary: Adjectives and Adverbs; Comparing and Contrasting
Voice - Active & Passive Voice.

Module - V	My Beloved Charioteer- Shasi Deshpande	9 Hrs

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- without the use of PPT slides
Reading: Reading for Comprehension
Writing: Writing structured essays on specific topics using suitable claims and evidences.
Grammar and Vocabulary: Identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Course Outcomes (CO):

On completion of this course, student will be able to

- Retrieve the knowledge of basic grammatical concepts.
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English.
- Apply grammatical structures to formulate sentences and correct word forms.
- Analyze discourse markers to speak clearly on a specific topic in informal discussions.
- Evaluate listening /reading texts and to write summaries based on global comprehension of these texts.
- Create and develop coherent paragraph interpreting graphical description.

Textbooks:

1) Language and Life: English Skills for Engineering Students - Orient Black Swan

Reference Books:

1. 1. Bailey, Stephen. Academic Writing: A Handbook for International Students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)

Web links:

www.englishclub.com
www.easyworldofenglish.com
www.languageguide.org/english/
www.bbc.co.uk/learningenglish
www.eslpod.com/index.html

C-PROGRAMMING & DATA STRUCTURES

Common to(ECE,EEE,ME,CE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0502T	3: 1:0:0	3	CIE: 30SEE:70	3Hours	ESC

Course Objectives:

This course will enable students to:

- Illustrate the basic concepts of C programming language.
- Choose a suitable C-construct to develop C code for a given problem.
- Illustrate the fundamental concept of data structures and Arrays.
- Emphasize the importance of data structures in developing and implementing efficient. algorithms.
- Illustrate a variety of data structures such as linked structures, stacks, queues, trees, and graphs.

Syllabus		Total Hours:45
Unit - I	**Introduction to C Language**	**9Hrs**

Structure of C program, C Tokens, Data types, Operators, Precedence and Associativity of operators, Expressions and its evaluation, control structures – sequence, selection and Iteration statements, unconditional control structures – break, goto, continue. Arrays: Introduction to arrays, types of arrays, applications of arrays, Programming examples

Unit - II	Strings, Functions and Pointers	9Hrs

String: Declaring and Initializing string, Printing and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples

Functions: Defining function, user defined functions, standard functions, passing array as argument to function, recursion

Pointers: declaring and initializing pointers, pointers and arrays, pointer to pointer, pointer arithmetic, dynamic memory allocation,

Structures and Unions

Unit - III	Data Structures	9Hrs

Introduction to Data Structures: Definitions, Concept of Data Structures, Overview of Data Structures, Implementation of Data Structures

Linked Lists: Definition, Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Applications of Linked List

Unit - IV	Stacks & Queues	9Hrs

Stacks: Introduction, Definition, Representation of Stack, Operations on Stacks, Applications of Stacks

Queues: Introduction, Definition, Representation of Queues, Operations on Queues, Various Queue Structures, Applications of Queues.

Unit - V	Trees ,Graphs ,Searching and Sorting	9Hrs

Trees: Basic Terminologies, Definition and Concepts, Binary Tree, Representation of Binary Tree, operations on Binary Tree, Binary Search Tree, Heap Tree

Graphs: Introduction, Graph Terminologies, Representation of graphs, Operations on Graphs, Graph, Graph Traversal Techniques: BFS and DFS

Searching and Sorting – sequential search, binary search, exchange (bubble) sort, selection sort,

insertion sort.

Course Outcomes(CO):

On completion of this course, student will be able to

- Illustrate and explain the basic computer concepts and programming principles of C language(L2)
- Select the best selection and loop construct for solving given problem(L2)
- Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings.(L2)
- Implement basic operations on stack and queue using array representation(L2)
- Use linked structures, trees, and Graphs in writing programs(L2)
- Demonstrate different methods for traversing Graphs and Trees (L2)

Text Books:

1. C Programming & Data Structures – Behrouz A. Fourazan, Richard F. Gilberg.
2. Programming with C – Byron Gottfried, Third edition, Scham's Outlines
3. C Programming : A Problem Solving Approach- Behrouz A. Fourazan , E.V.Prasad, Richard F. Gilberg
4. Classic Data Structures , Second Edition, Debasissamanta, PHI
5. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S.Sahni and Susan Anderson Freed, Universities Press

Reference Books:

1. Let us C,YashwantKanetkar, 6th Edition , BPB
2. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
3. C Programming, E.Balagurusamy, 3rd edition, TMHPublishers
4. Programming in C, Ashok N. Kamthane, AmitKamthane, Pearson
5. Data Structures: A Pseudo code Approach with C, 2nd Edition, R.F.Gilberg and B. A. Forouzan, Cengage Learning.
6. "Data Structures and Algorithm Analysis in C" by Weiss
7. "Data Structure Through C" by Yashavant P Kanetkar

E-resources:

https://www.geeksforgeeks.org/c-programming-language/

http://en.cppreference.com/w/c

https://onlinecourses.nptel.ac.in/noc19_cs42/

https://www.linuxtopia.org/online_books/programming_books/gnu_c_programming_tutorial/index.html

https://codeforwin.org/

Engineering Drawing

Course Code	L:T:P/D:C	Course Type
22A0302T	1: 0: 0/4 :3	ESC

Course Objectives:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.

Syllabus		Total Hours:50
Unit - I	**Introduction to Engineering Drawing**	**10 Hrs**

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance- Conventions in drawing-lettering - BIS conventions.

a) Draw the Conic sections including Ellipse, Parabola, Hyperbola, and the Rectangular hyperbola using general methods,

b) Draw the Cycloid, Epicycloids, and Hypocycloid

c) Draw the Involutes of circle, square, pentagon, and hexagon

Unit - II	Projections of points, lines and planes	10 Hrs

Projections of points, lines, and planes: Projection of points in any quadrant, lines inclined to one and both planes, finding true lengths, finding true inclinations, angle made by line. Projections of regular plane surfaces using rotating plane method.

Unit - III	Projections of Solids	10 Hrs

Projections of solids: Projections of regular solids inclined to one and both the principle planes using auxiliary views method.

Unit - IV	Sections of solids	10 Hrs

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Unit - V	Development of surfaces	10 Hrs

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Course Outcomes (CO):

On completion of this course, student will be able to

- Draw various curves applied in engineering. (l2)
- Show projections of solids and sections graphically. (l2)
- Draw the development of surfaces of solids. (l3)

Textbooks:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

COMMUNICATIVE ENGLISH LAB

(Common to all Branches of Engineering)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0014P	**0:0:3:0**	**1.5**	**CIE:30 SEE:70**	**3H**	**HS**

Course Objectives

This course will enable students to:

- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will learn better pronunciation through sounds, stress, intonation and rhythm
- Students will be trained to use language effectively to face interviews, group discussions, public speaking
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.

List of Experiments | Total Hours: 48

1. Phonetics
2. Describing objects/places/persons
3. Role Play or Conversational Practice
4. JAM
5. Etiquettes of Telephonic Communication
6. Group Discussions
7. Debates
8. Oral Presentations
9. Interviews Skills
10. Reading comprehension
11. E-mail Writing
12. 12.Resume Writing

Course Outcomes:

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

- Listening and repeating the sounds of English Language
- Understand the different aspects of the English language proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, syllable division, stress, rhythm, intonation for better Listening and Speaking Comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to Improve fluency in spoken English.

Suggested Software: Walden InfoTech / Young India Films

Reference Books:

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T. Balasubramanyam

Online Learning Resources/Virtual Labs:

www.esl-lab.com

www.englishmedialab.com

www.englishinteractive.net

Applied Physics Lab

(Common to ECE, EEE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0008P	0:0:3:0	1.5	CIE:30 SEE:70	3H	BS

Course Objectives:

This course will enable students to:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and materials applications.
- Apply the principles of semiconductors in various electronic devices

Syllabus	Total Hours: 48

Note: In the following list, out of 12 experiments, any 2 experiments must be performed in a virtual mode

List of Experiments

1. Determine the thickness of the wire using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber and hence to find itsacceptance angle
8. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
10. To determine the resistivity of semiconductor by Four probe method
11. To determine the energy gap of a semiconductor
12. Determination of Hall voltage and Hall coefficient of a given semiconductor using HallEffect.

Course Outcomes:

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

- Determine the radius of a curvature and / or thickness of thin wire using microscope with the help of interference concept (L2)
- Evaluate the wavelength of various colors of grating and also dispersive power of prism by spectrometer using the principle of diffraction (L2)
- Evaluate wavelength of light source and particle size with He-Ne laser using the principle of diffraction Estimate the numerical aperture of a given optical fiber and hence to find its acceptance angle (L2)
- Estimate the dielectric constant of a given material (L2)
- Examine the hysteresis loss of the magnetic material by B- H curve and Estimate the magnetic field of a circular coil carrying current along the axis (L2)
- Measure the type of conductivity ,hall voltage and hall coefficient of a given semiconductor using hall effect and also measure the energy band gap of a given semiconductor material (L2)

Text Books:

1. Engineering Practical Physics B Mallick S Panigrahi, 1st, Edition, Cengage Learning Publishers

2. A Text book of Engineering Physics Practical, Dr. Ruby Das, Dr. Rajesh Kumar, C. S. Robinson,Prashant Kumar Sah, UNIVERSITY SCIENCE PRESS (An Imprint of Laxmi Publications Pvt. Ltd.)

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S ChandPublishers, 2017

E-resources:

http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University
https://www.scribd.com/doc/81569075/Physics-Lab-Manual
http://www.mlritm.ac.in/assets/img/Lab%20manual%20Physics.pdf
https://bmsit.ac.in/public/assets/pdf/physics/studymaterial/Physics%20lab%20manual_cbcs%20%20-%20kavichintu.pdf

C-PROGRAMMING & DATA STRUCTURES LAB (Common to ECE, EEE)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0502P	**0:0:3:0**	**1.5**	**CIE:30 SEE:70**	**3Hours**	**ESC**

Course Objectives:

This course will enable students to:

- Work with an IDE to create, edit, compile, run and debug programs
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Design & develop of C programs using arrays, strings, pointers & functions.
- Exploring basic data structures such as stacks and queues.
- Introduces variety of data structures such as hash linked list, trees and graphs.
- Introduces searching and sorting algorithms.

Syllabus	**Total Hours: 48**

List of Experiments

1. a) Write an algorithm to calculate and display the volume of a CUBE having its height (h=10cm), width (w=12cm) and depth (8cm).

b) Write an algorithm to calculate area and Circumference of a circle.

c) Write an algorithm to calculate simple interest for a given P, T, and R (SI = P*T*R/100)

2.a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices ii) Multiplication of Two Matrices

3 a) Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to a given main string from a given position.

ii) To delete n characters from a given position in a given string.

4 a) Write a C program to find sum and average of three numbers.

b) Write C program to evaluate each of the following equations

5a) Write a program in C to print individual characters of string in reverse order.

b) Write a program in C to compare two strings without using string library functions.

c) Write a C program to determine if the given string is a palindrome or not

6 . a) Write C program to find GCD of two integers by using recursive function.

b) Write C program to find GCD of two integers using non-recursive function

7 .Write C programs that implement stack (its operations) using

i) Arrays ii) Pointers

8. Write C programs that implement Queue (its operations) using

i) Arrays ii) Pointers

9. Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression

ii) Evaluating the postfix expression

10. Write a C program that uses functions to perform the following operations on singly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

11. Write a C program that uses functions to perform the following operations on Doubly linkedlist.

i) Creation ii) Insertion iii) Deletion iv) Traversal

12. Write a C program that uses functions to perform the following operations on circular linkedlist.

i) Creation ii) Insertion iii) Deletion iv) Traversal

13 .Write a C program that uses functions to perform the following:

i) Creating a Binary Tree of integers

ii) Traversing the above binary tree in preorder, inorder and postorder.

14. Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

i) Linear search ii) Binary search

15 .Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort

Course Outcomes:

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

- Use conditional and iterative statements for writing the C programs(L2)
- Make use of different data-structures like arrays, strings, structures for solving problems.(L2)
- Use basic data structures such as arrays, Stacks and Queues
- Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals
- Use various searching and sorting algorithms.
- Use linked structures, trees, and Graphs in writing programs

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Classic Data Structures , Second Edition, Debasissamanta, PHI

Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S.Sahni and Susan Anderson Freed, Universities Press

Reference Books:

1. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
2. C Programming, E.Balagurusamy, 3rd edition, TMHPublishers
3. .Programming in C, Ashok N. Kamthane, AmitKamthane, Pearson
4. Data Structures: A Pseudo code Approach with C, 2nd Edition, R.F.Gilberg and B. A. Forouzan, Cengage Learning.
5. "Data Structures and Algorithm Analysis in C" by Weiss
6. "Data Structure Through C" by Yashavant P Kanetkar

"Problem Solving in Data Structures and Algorithms Using C: The Ultimate Guide to Programming Interviews" by Hemant Jain

GEETHANJALI INSTITUTE OF SCIENCE AND TECHNOLOGY
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NELLORE – 524137 (A.P) INDIA

B.TECH Electronics & Communication Engineering

Course Structure (RG22)

Semester - 2 (Theory-4, Lab-5)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	BSC	22A0002T	Differential Equations and Vector Calculus	3	0	0	3
2	BSC	22A0006T	Chemistry	3	0	0	3
3	ESC	22A0201T	Fundamentals of Electrical Circuits	3	0	0	3
4	ESC	22A0401T	Electronic Devices & Circuits	3	0	0	3
5	BSC (Lab)	22A0011P	Chemistry Lab	0	0	3	1.5
6	ESC (Lab)	22A0202P	Fundamentals of Electrical Circuits Lab	0	0	3	1.5
7	ESC (Lab)	22A0402P	Electronic Devices & Circuits Lab	0	0	3	1.5
8	ESC (Lab)	22A0403P	Electronics Workshop	0	0	3	1.5
9	ESC (Lab)	22A0502P	IT Workshop	0	0	3	1.5
			Total credits				**19.5**

Category	Credits
Basic Science Course (BSC)	7.5
Engineering Science Course (ESC)	12
Total	19.5

Differential Equations & Vector Calculus					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0002T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**BS**

Course Objectives:

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

Syllabus		**Total Hours:45**
Module - I	**Linear Differential Equations of Higher Order(Constant Coefficients)**	**9 Hrs**

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskean, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.

Module - II	**Partial Differential Equations**	**9 Hrs**

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method. Non linearequations of first order – Type I, II, III, IV.

Module - III	**Applications of Partial Differential Equations**	**9 Hrs**

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation (Without Derivation), Solutions one Dimensional Wave equation by the method of separation of variables and related Problems.

Module - IV	**Vector Differentiation**	**9 Hrs**

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

Module - V	**Vector Integration**	**9 Hrs**

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 applications of these theorems.

Course Outcomes (CO):

On completion of this course, student will be able to

- Solve the linear differential equations with constant coefficients by appropriate method.
- Apply a range of techniques to find solutions of standard partial differential equations.
- Calcify the PDE, learn the applications of PDEs
- Apply del to Scalar and vector point functions, illustrate the physical interpretation of Gradient, Divergence and Curl.
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

Textbooks:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Differential Equations & Vector Calculus by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganathamand M.V.S.S.N.Prasad S. Chand publication.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
3. Engineering Mathmatic I & II, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.

CHEMISTRY(Common to CSE,AI&ML,CS,ECE,EEE,DS)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0006T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**BS**

Course Objectives: Student will be able to

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

	Syllabus	**Total Hours: 48 Hrs**
Module- I	**Structure and Bonding**	**9Hrs**

Planck's quantumtheory,dualnatureofmatter,Schrodingerwaveequation,significanceofΨ and Ψ^2, 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.

Module-II	**Modern Engineering materials**	**10Hrs**

Coordination compounds: Crystal field theory – salient features – splitting of d-orbitals in octahedral and tetrahedralgeometry.

Basic concept, band diagrams for conductors, semiconductors and insulators, Effect of doping on bandstructures.

Supercapacitors: Introduction, Basic concept-Classification – Applications.

Nano chemistry: Introduction, classification of nanomaterials, properties and applications ofFullerenes, andcarbon nanotubes.

Module-III	**Electrochemistry and Applications**	**10Hrs**

Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode);Electrochemicalcell,Nernstequation,cellpotentialcalculationsandnumericalproblems, potentiometry- potentiometric titrations (redox titrations), conductometric titrations (acid-base titrations).

Primary cells: Zinc-air battery, Secondary cells: lead acid and lithium-ion batteries-working of the batteries including cell reactions, Fuel cells: hydrogen-oxygen, methanol -oxygen fuel cells – working principle of the cells.

Module-IV	**Polymer Chemistry**	**10Hrs**

Introduction to polymers, functionality of monomers, Types of polymerization-addition, condensation and copolymerization with specific examples and mechanisms of polymerization.

Plastics - Thermoplastics and Thermosetting, Preparation, properties and applications of – PTFE, Bakelite, Calculation of molecular weight of polymer by weight average and number average method, Polydispersity Index.

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

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications.

Biodegradable polymers: polylactic acid, poly dioxanone, starch, cellulose.

Module-V	**Instrumental Methods and its applications**	**9Hrs**

EMR spectra, Beer-Lambert's law, Basic Principle, Instrumentation and applications of UV-visible spectrophotometer and FTIR, Chromatography-Introduction**,** Principle and instrumentation of Gas Chromatography (GC),retention time, TLC, R_f factor.

Course Outcomes (CO): After completion of the course, students will be able to

- Describe Planck's quantum theory, dual nature of matter, Schrodinger equation, molecular orbital Theory and molecular orbital energy level diagram of different molecules
- Explain Crystal field theory, splitting in octahedral and tetrahedral geometry and the magnetic behaviour, Oxidation state, coordination and colour of complexes.
- Explain the principle of Band diagrams of conductors, superconductor, semiconductors and insulator and nonmaterial
- Discuss the principles of electrochemistry in potentiometry, conductometry, battery and electrochemical sensors
- Explain polymerization and the preparation, properties, and applications of thermoplastics &thermosetting, elastomers, & conducting polymers
- Discuss the different applications of analytical instruments

Textbooks:

1. P. C. Jain & Monika Jain, Engineering Chemistry, Dhanpat Rai Publishing Company
   (P) Ltd, New Delhi, 16th edition, 2013.
2. K. N. Jayaveera, G. V. Subba Reddy and C. Ramachandriah, Engineering Chemistry, Mc.Graw Hill Publishers, New Delhi.
3. Energy scenario beyond2100,by S.Muthu Krishna Iyer.

ReferenceBooks:

1. J. D. Lee, Concise Inorganic Chemistry, Oxford University Press, 5th edition 2010.
2. Skoog and West, Principles of Instrumental Analysis, Thomson, 6th edition, 2007.
3. Peter Atkins, Julio de Paula and James Keelar, Atkins' Physical Chemistry, Oxford University Press, 10th edition, 2010.

FUNDAMENTALS OF ELECTRICAL CIRCUITS (common to EEE&ECE)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
	3: 0:0:0	**3**	**CIE: 30 SEE:70**	**3Hours**	**BS**

Course Objectives: Student will be able to

1. Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various combinations of these parameters.
2. Basics of Magnetic circuits
3. Network Topology and concepts like Tree, Cut-set , Tie-set, Loop, Co-Tree
4. The Single Phase AC circuits and concepts of real power, reactive power, complex power, phase angle and phase difference.
5. Network theorems and their applications

Unit - I	**Introduction to Electrical Circuits**	**10 Hrs**

Electrical Circuits: Circuit Concept – Types of elements - Source Transformation-Voltage – Current Relationship for Passive Elements. Kirchhoff's Laws – Network Reduction Techniques- Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation, Nodal Analysis, Mesh Analysis, Examples.

Learning Outcomes:

At the end of this unit, the student will be able

1. To know about Kirchhoff's Laws in solving series, parallel, non-series-parallel configurations in DC networks
2. To know about voltage source to current source and vice-versa transformation in their representation
3. To understand analysis of Nodal and Mesh analysis for different circuits.

Unit - II	**Introduction to Magnetic Circuits**	**8 Hrs**

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction-Concept of Self and Mutual Inductance-Dot Convention-Coefficient of Coupling-Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits.

Learning Outcomes:

At the end of this unit, the student will be able to

1.To understand Faraday's laws

2.To distinguish analogy between electric and magnetic circuits

3. To understand analysis of series and parallel magnetic circuits.

Unit - III	**Graph theory**	**9 Hrs**

Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks & Independent Voltage and Current Sources, Network equilibrium equations -Duality & Dual Networks.

Learning Outcomes:

At the end of this unit, the student will be able

1. To understand basic graph theory definitions which are required for solving electrical circuits
2.To understand about loop current method
3. To understand about nodal analysis methods
4. To understand about principle of duality and dual networks
5. To identify the solution methodology in solving electrical circuits based on the topology

Unit - IV	**Single Phase A.C Circuits**	**11 Hrs**

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations,Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) with Sinusoidal

Excitation - Phasor diagrams - Concept of Power Factor- Concept of Reactance, Impedance, Susceptance and Admittance-Apparent Power, Active and Reactive Power, Examples. Resonance.

Learning Outcomes:
At the end of this unit, the student will be able
1. To understand fundamental definitions of 1-ϕ AC circuits
2. To distinguish between scalar, vector and phasor quantities
3. To understand voltage, current and power relationships in 1-ϕ AC circuits with basic elements R, L, and C.
4. To understand the basic definitions of complex immittances and complex power
5. To solve 1-ϕ AC circuits with series and parallel combinations of electrical circuit elements R, L and C.

Unit - V	**Network Theorems**	**10 Hrs**

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millmann's, Tellegen's, and Compensation Theorems for D.C and Sinusoidal Excitations.
Learning Outcomes:
At the end of this unit, the student will be able
1. To know that electrical circuits are 'heart' of electrical engineering subjects and network theorems are main part of it.
2.To distinguish between various theorems and inter-relationship between various theorems
3. To know about applications of certain theorems to DC circuit analysis
4. To know about applications of certain theorems to AC network analysis
5. To know about applications of certain theorems to both DC and AC network analysis

Course Outcomes (CO): After completion of the course, students will be able to

- Explain types of networks and Network Reduction Techniques
- Analyze Magnetic Circuits and Coupled circuits.
- Analysis of electrical networks using graph theory and duality and dual networks
- Analyze RLC circuits with AC Excitation
- Analyze the power, voltage and current for different network configurations.
- Apply theorems for finding the solutions of network problems

Textbooks:

1. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill, 5th Edition, 2013.
2. Engineering circuit analysis William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 7th Edition, 2006.
3. Circuit Theory Analysis & Synthesis A. Chakrabarti, Dhanpat Rai & Sons, 7th Revised Edition, 2018.

Reference Books:

1. Network Analysis M.E Van Valkenberg, Prentice Hall (India), 3rd Edition, 1999.
2. Electrical Engineering Fundamentals V. Del Toro, Prentice Hall International, 2nd Edition, 2019.
3. Electric Circuits- Schaum's Series, Mc Graw Hill, 5th Edition, 2010.
4. Electrical Circuit Theory and Technology John Bird, Routledge, Taylor & Francis, 5th Edition, 2014.

Electronic Devices and Circuits					
Course Code	**L:T:P**	**Credits**	**Exam. Marks**	**Exam Duration**	**Course Type**
22A0401T	**3:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**PC**

Course Objectives:

- To understand the basic principles of all semiconductor devices.
- To be able to solve problems related to diode circuits, and amplifier circuits.
- To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.
- To be able to compare the performance of BJTs and MOSFETs.
- To design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

Syllabus

Unit –I

Diodes: Introduction, The Ideal Diode – current voltage characteristic, rectifier, diode logic gates, Terminal Characteristics of Junction Diodes– forward bias, reverse bias, and breakdown regions. **Applications:** Rectifiers – Half wave, Full wave rectifier and Bridge rectifier. Filters - Inductor, Capacitor, L-section and π-Filters, Zener Diodes– Zener diode Characteristics, Voltage shunt regulator, Diode as switch, Clipping and Clamping Circuits– limiter circuit, the clamped capacitor, voltage doubler, Special Diode Types– UJT, Schottky barrier diode, Varactor diode, photo diode, light emitting diode(LED), Problem Solving.

Unit –II

Bipolar Junction Transistors (BJTs): Physical Operation - simplified structure and modes of operation, Operation of the npn, and pnp transistors: cutoff, active, and saturation modes, V-I Characteristics- of different configurations - graphical representation of transistor characteristics, dependence of collector current on collector voltage, the Early Effect, Basic BJT Amplifier Configurations - Common-Emitter (CE) amplifier without and with emitter resistance, Common-Base (CB) amplifier, Common-Collector (CC) amplifier or Emitter Follower, Problem Solving.

Unit –III

MOS Field-Effect Transistors (MOSFETs): Introduction, Device Structure and Physical Operation – device structure, operation with zero gate voltage, creating a channel for current flow, operation for different drain to source voltages, the P-channel MOSFET,CMOS, V-I characteristics– i_D - v_{DS} characteristics, i_D – v_{GS} characteristics, finite output resistance in saturation, characteristics of the p-Channel MOSFET, MOSFET Circuits at DC, Applying the MOSFET in Amplifier Design – voltage transfer characteristics, biasing the MOSFET to obtain linear amplification, the small signal voltage gain, graphical analysis, the Q-point. Problem solving.

Unit –IV

Biasing of BJT's & MOSFET's: Biasing of BJT's – load line, operating point, fixed bias, self bias, voltage divider bias circuits, Bias compensation, Thermal runaway, condition for Thermal stability, Biasing of MOSFET's - Fixed bias, Self bias, Voltage divider bias circuits, Problem solving.

Unit –V

MOSFET Small Signal Operation Models– the dc bias, separating the DC analysis and the signal analysis, Small signal equivalent circuit models, the transconductance, the T equivalent circuit model, Basic MOSFET Amplifier Configurations– three basic configurations, characterizing amplifiers, common source(CS) amplifier without and with source resistance, common gate (CG) amplifier, source follower, the amplifier frequency response, Problem solving.

Text Books:

1. Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits – Theory and Applications", 6th Edition, Oxford Press, 2013.
2. Donald A Neamen, "Electronic Circuits – analysis and design", 3rd Edition, McGraw Hill (India), 2019.

References:

1. J. Milliman and C Halkias, "Integrated electronics", 2nd Edition, Tata McGraw Hill, 1991.
2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson, 2006.

Course Outcomes:

After the completion of the course students will able to

1. Understand principle of operation, characteristics and applications of Semiconductor diodes.
2. Design the diode applications such as rectifiers, clippers and clampers.
3. Understand principle of operation, characteristics and applications of Bipolar Junction Transistor and MOSFETs.
4. Design amplifiers using BJTs, and MOSFETs.
5. Solve the problems related to Semiconductor diodes, BJTs, and MOSFETs.
6. Analyze performance of diode applications, biasing circuits of BJTs, MOSFETs and their applications.

Chemistry Lab

(Common to CSE,AI&ML,CS,ECE,EEE,DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0011P	0:0:1.5:0	1.5	CIE:30 SEE:70	3H	BS

Course Objectives:

This course will enable students to:

- Theobjectiveofthelaboratorysessionsistoenablethelearnerstogethands-onexperienceontheprinciples discussed in theory sessions and to understand the applications of these concepts in engineering.

Syllabus	Total Hours: 48

List of Experiments

1. Conduct metric titration of strong acid vs. strong base,
2. Determination of cell constant and conductance of solutions
3. Potentiometry - determination of redox potentials and emfs
4. pH metric titration of strong acid vs. strong base
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer
7. Verification of Lambert-Beer's law
8. Preparation of Nanomaterials
9. Separation of organic mixtures by Thin Layer chromatography
10. Identification of simple organic compounds by IR.
11. Estimation of Ferrous Iron by Dichrometry.
12. Determination of Copper by EDTA method.

(**Any 10 experiments from the above list)**

Course Outcomes:

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

- Determine the cell constant and conductance of solutions and the strength of an acid by conductometry
- Synthesize of advanced polymer materials
- Measure the strength of an acid present in secondary battery and Ferrous ion using volumetric analysis
- Determine the potentials and EMFs of solutions byPotentiometry
- Identify some organic and inorganic compounds by instrumental methods
- Synthesize of nanomaterials by simple methods

Text Book(s):

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Jain & Jain. Engineering Chemistry: Dhanapathrai Publications., 2015.
3. S.S.Dara, Experiments and Calculations in Engineering Chemistry: S-Chand Publications, Revised edition, 2008.

Reference Book(s):

1. S.K. Bhasin and Sudha Rani, "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 2nd edition.
2. Sunitha Rattan, "Experiments in Applied Chemistry", S.K. Kataria& Sons, New Delhi, 2nd edition.

FUNDAMENTALS OF ELECTRICAL CIRCUITS LABORATORY
(Common to EEE & ECE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0011P	0:0:3:0	1.5	CIE:30 SEE:70	3H	ESC

Course Objectives:

This course will enable students to:

1. Remember, understand and apply various theorems and verify practically.
2. Understand and analyze active, reactive power measurements in three phase balanced & un balanced circuits

Syllabus	Total Hours: 48

List of Experiments

1. Verification of Kirchhoff's current law and voltage law using hard ware
2. Verification of mesh analysis using hard ware and digital simulation.
3. Verification of nodal analysis using hard ware
4. Determination of average value, rms value, form factor, peak factor of sinusoidal wave, square wave using hard ware
5. Analyse Series and Parallel RLC circuits.
6. Verification of Series and Parallel Resonance
7. Verification of Thevenin's and Norton's Theorems
8. Verification of Superposition Theorem
9. Maximum Power Transfer Theorem for DC and AC circuits
10. Verification of Compensation Theorem for DC circuits
11. Verification of Reciprocity, Millmann's Theorems for DC circuits
12. Determination of Self, Mutual Inductances and Coefficient of Coupling

(**Any 10 experiments from the above list)**

Course Outcomes:

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

1. Analyze network parameters and types of networks
2. Analyze RLC circuits and coupled circuits.
3. Analyze Resonance for different circuits.
4. Apply theorems for finding the solutions of network problems
5. Apply Maximum power transfer theorems for finding the solutions of DC & AC Networks
6. Analyze coupled circuits.

Text Book(s):

1. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill, 5th Edition, 2013.
2. Engineering circuit analysis William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 7th Edition, 2006.
3. Circuit Theory Analysis & Synthesis A. Chakrabarti, Dhanpat Rai & Sons, 7th Revised Edition, 2018

Reference Book(s):

1. Network Analysis M.E Van Valkenberg, Prentice Hall (India), 3rd Edition, 1999.
2. 2. Electrical Engineering Fundamentals V. Del Toro, Prentice Hall International, 2nd Edition, 2019.
3. 3. Electric Circuits- Schaum's Series, Mc Graw Hill, 5th Edition, 2010.
4. 4. Electrical Circuit Theory and Technology John Bird, Routledge, Taylor & Francis, 5th Edition, 2014.

ELECTRONIC DEVICES AND CIRCUITS LAB					
Course Code	**L:T:P**	**Credits**	**Exam. Marks**	**Exam Duration**	**Course Type**
22A0402P	**0:0:3**	**1.5**	**CIE:30 SEE:70**	**3 Hours**	**PC**

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyse the characteristics of Diodes, BJT, MOSFET.
- To design the amplifier circuits from the given specifications.
- To Model the electronic circuits using tools such as PSPICE/Multisim.

Syllabus

LIST OF EXPERIMENTS: (**Conduct all experiments**).

Note: All the experiments shall be implemented using both Hardware and Software.

1. Design a half wave rectifier with and without filters for the given specifications, and verify the results experimentally for different load conditions, also Calculate ripple factor with relevant graphs.
2. Design a full wave rectifier with and without filters for the given specifications, and verify the results experimentally for different load conditions, also Calculate ripple factor with relevant graphs
3. Verify the operation of various clipping and clamper circuits using PN junction diode experimentally.
4. Design a voltage regulator using Zener diode and verify load regulation characteristics.
5. Analyze the input and output characteristics of BJT in Common Emitter configuration experimentally.
6. Analyze the input and output characteristics of BJT in Common Base configuration experimentally.
7. Design voltage- divider bias/self-bias circuit using BJT and verify experimentally.
8. Design a small signal amplifier using BJT (common emitter) for the given specifications also calculate Bandwidth.
9. Analyze the output and transfer characteristics of MOSFET in Common Source Configuration experimentally.
10. Design self-bias circuit using MOSFET and verify experimentally.
11. Verify the operation of a switch using CMOSFET/JFET/BJT experimentally.
12. Design a small signal amplifier using MOSFET (common source) for the given specifications also calculate Bandwidth.

Tools / Equipment Required: Software Tool like Multisim/ Pspice or Equivalent,
DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Course Outcomes:

After the completion of the course students will able to

1. Understand the operation and characteristics of basic electronic devices.
2. Design the Diode applications like Rectifiers, Clippers and Clampers for the given specifications**.**
3. Analyze the Characteristics of Diodes, BJTs, MOSFETs.
4. Design BJT based amplifiers for the given specifications.
5. Design MOSFET based amplifiers for the given specifications
6. Simulate Diode, BJT and MOSFET applications in PSPICE /Multisim.

ELECTRONICS WORKSHOP

Course Code	L:T:P	Credits	Exam. Marks	Exam Duration	Course Type
22A0403P	**0:0:3**	**1.5**	**CIE:30 SEE:70**	**3 Hours**	**PC**

Course Objectives:

- To introduce electronic components, measuring instruments and tools used in electronic workshop.
- To equip with the knowledge of understanding data sheets of electronic components.
- To give practical experience on soldering the electronic components on a PCB.
- To introduce EDA tools.
- To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide training on Productivity tools like word processors, spreadsheets, presentations.

Syllabus

List of Exercises / Experiments:

1. Familiarization of commonly used Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that electronics hardware tools and instruments are learned to be used by the students

2. Familiarization of Electronic Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that electronic measuring instruments are learned to be used by the students

3. Electronic Components: Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.

4. Testing of electronic components like Resistor, Capacitor, Diode, Transistor, ICs etc.
   - Compare values of components like resistors, inductors, capacitors etc with the measured values by using electronic instruments

5. Study of Cathode Ray Oscilloscope (CRO)
   - Find the Amplitude and Frequency of a signal
   - Measure the Unknown Frequency & Phase difference of signals using Lissajous figures

6. Interpret data sheets of discrete components and IC's.
   - Write important specifications/ratings of components & ICs and submit it in the form of a report

7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
Provide some exercise so that students are familiarized in using EDA tools

8. Assembling and Testing of simple electronic circuits on breadboards; identifying the components and its location on the PCB, soldering of the components, testing the assembled circuit for correct functionality.

Course Outcomes:

- Identify discrete components and ICs.
- Assemble simple electronic circuits over a PCB.
- Test various components.
- Interpret specifications (ratings) of the component.

IT WORKSHOP					
Course Code	**L:T:P**	**Credits**	**Exam. Marks**	**Exam Duration**	**Course Type**
22A0502P	**0:0:3**	**1.5**	**CIE:30 SEE:70**	**3 Hours**	**ESC**

Course Objectives:

- To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide Technical training to the students on Productivity tools like Word processors Spreadsheets, Presentations and LAteX
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Syllabus

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process. Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using

it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating email account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc. Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered, Image Manipulation tools.

Task 9: Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 10: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet

Task 11: LateX: Introduction to Latex and its installation and different IDEs. Creating first document using Latex, using content into sections using article and book class of LaTeX. Styling Pages: reviewing and customizing different paper sizes and formats. Formatting text (styles, size, alignment, colors and adding bullets and numbered items, inserting mathematical symbols, and images, etc.). Creating basic tables, adding simple and dashed borders, merging rows and columns. Referencing and Indexing: cross-referencing (refer to sections, table, images), bibliography (references).

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs, Bigelows, TMH
6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI.
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6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

Basic Electrical and Electronics Engineering

(Common for all branches excluding EEE & ECE)

Course Code	L:T:P	Credits	Exam. Marks	Exam Duration	Course Type
22A0240P	0:0:3	1.5	CIE:30 SEE:70	3 Hours	PC

Course Objectives:

To get practical knowledge about basic electrical circuits, electronic devices like Diodes, BJT, JFET and also analyze the performance of DC Motors, AC Motors and Transformers.

Syllabus

LIST OF EXPERIMENTS: (**Conduct all experiments**).

Note: All the experiments shall be implemented using both Hardware and Software.

Equipment Required:

1. Verification of Kirchhoff's Laws.
2. Verification of Superposition Theorem.
3. Magnetization characteristics of DC Shunt Generator.
4. Brake Test on DC-Shunt Motor. Determination of Performance curves.
5. OC & SC Tests on Single Phase Transformer.
6. V-I Characteristics of Solar Cell
7. V-I Characteristics of PN junction Diode
8. V-I Characteristics of Zener Diode
9. Half Wave Rectifier and Full Wave rectifier.
10. Input and Output characteristics of BJT with CE configuration
11. Input and Output characteristics of BJT with CB configuration
12. Input and Output Characteristics of JFET.

Additional Experiments:

13. Speed control of DC Shunt Motor
14. Brake Test on Three Phase Induction Motor.

Course Outcomes:

After the completion of the course students will able to,

1. Experimentally verify the basic circuit theorems, KCL and KVL
2. Draw the Open circuit characteristics of DC Shunt Generator circuits experimentally.
3. Acquire hands on experience of conducting various tests on dc shunt motor, single phase transformers obtaining their performance indices using standard analytical as well as graphical methods
4. Experimentally verify the V-I characteristics of Solar cell
5. Draw the characteristics of different semiconductor devices like PN junction Diode, Zener Diode, BJT and JFET by conducting suitable experiments.
6. Experimentally verify the working of half and full wave rectifier by using PN Junction diodes