GEETHANJALI INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
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
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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