# VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)

**Ibrahimbagh, Hyderabad-31**
Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

**Sponsored by**
**VASAVI ACADEMY OF EDUCATION**
**Hyderabad**

**SYLLABI UNDER AUTONOMY FOR**
**B.E SECOND YEAR B.E (ECE)**
**WITH EFFECT FROM 2017-18**
**( For the students admitted in 2016-17)**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
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**Website:**

*With effect from the academic year 2017 - 2018*

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)**
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**SCHEME OF INSTRUCTION AND EXAMINATION**
**B.E. (ECE) III SEMESTER**

| S. No. | Course Code | Course | Scheme of Instruction | | | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Hours / week | | | | Duration in Hrs | Maximum Marks | | |
| | | | L | T | D | P | | SEE | CIE | |
| **THEORY** | | | | | | | | | | |
| 1 | BS 310MA | Engineering Mathematics – III | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 2 | ES 310EC | Networks Analysis | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 3 | PC 310EC | Electronic Materials & Devices | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 4 | PC 320EC | Electromagnetic Theory | 3 | 2 | - | - | 3 | 70 | 30 | 4 |
| 5 | MC 320CE | Environmental Studies | 2 | - | - | - | 3 | 70 | 30 | 2 |
| 6 | MC 310ME | Introduction to Entrepreneurship | 1 | - | - | - | 2 | 35 | 15 | 1 |
| 7 | HS 310EH | FS - I: Communication Skills in English-I | 2 | 2 | - | - | 3 | 70 | 30 | 2 |
| 8 | OE 3XXXX | Open Elective – 1 | 2 | - | - | - | 3 | 70 | 30 | 2 |
| **PRACTICALS** | | | | | | | | | | |
| 9 | ES 321EC | Basic Circuits Lab & Electronic Workshop | - | - | - | 3 | 3 | 50 | 25 | 2 |
| 10 | PC 311EC | Electronic Devices Lab | - | - | - | 3 | 3 | 50 | 25 | 2 |
| | | **Total** | **19** | **7** | **-** | **6** | **-** | **625** | **275** | **24** |
| | | **Grand total** | **32** | | | | | **900** | | |

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**B.E. (ECE) III SEMESTER**

**INTERDISCIPLINARY COURSES OFFERED BY ECE TO CSE & EEE**

| S. No. | Code | Subject | Scheme of Instruction | | | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods / week | | | | Duration in Hrs | Maximum Marks | | |
| | | | L | T | D | P | | SEE | CIE | |
| **THEORY** | | | | | | | | | | |
| 1 | ES 310EC | Basic Electronics | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 2 | PC 330EC | Electronic Engineering - I | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| **PRACTICALS** | | | | | | | | | | |
| 1 | ES 321EC | | - | - | - | 2 | 3 | 50 | 25 | 1 |
| 2 | PC 321EC | Electronic Engineering - I Lab | - | - | - | 2 | 3 | 50 | 25 | 1 |

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**ENGINEERING MATHEMATICS – III**
(Common to all Branches except IT)

| | | |
|---|---|---|
| Subject Code : BS 310MA | Instruction : 3+1 Periods/week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| **Students should be able to**<br>• ***Study*** the Fourier series, conditions for expansion of function and half range series<br>• ***Formulate*** and solve linear and nonlinear partial differential equations and apply partial differential equations to engineering problems viz., wave, heat and Laplace's equations.<br>• ***Study*** the methods to solve equations, apply numerical methods to interpolate, differentiate and integrate functions and to solve differential equations using numerical methods and solve systems of equations.<br>• ***Understand*** Random variables Probability Distributions, Statistics and their applications.<br>• ***Understand*** how to fit a curve to a given data, how correlation between variables can be measured. | **Students will be able to**<br>• ***Expand*** any function which is continuous, discontinuous, even or odd in terms of its Fourier series.<br>• ***Find*** the partial differential equations by eliminating arbitrary constants and functions and solve linear, nonlinear Partial differential equations and also will be able solve wave, heat and Laplace's equations in engineering problems.<br>• ***Solve*** algebraic and transcendental equations using Bisection method Regula-Falsi, Newton-Raphson, apply numerical methods to interpolate, differentiate functions, solve systems of equations and solve differential equations using numerical methods.<br>• ***Apply*** various probability distributions to solve practical problems, to estimate unknown parameters of populations and apply the tests of hypotheses.<br>• ***Solve*** problems on how fitting of a curve to given data using curve fitting, and also to find co-efficient of correlation and to determine regression lines and their applications. |

**UNIT- I**

**Fourier Series:** Introduction to Fourier series – Conditions for a Fourier expansion – Functions having points of discontinuity – Change of Interval - Fourier series expansions of even and odd functions - Fourier Expansion of Half- range Sine and Cosine series.

**UNIT – II**

**Partial Differential Equations and its Applications:** Formation of first and second order Partial Differential Equations - Solution of First Order Equations – Linear Equation - Lagrange's Equation, Non-linear first order equations - Charpit's method **Applications of Partial Differential Equations:** Classification of second order Partial Differential Equations- Method of Separation of Variables - Solution of One **D**imensional Heat Equation - One Dimensional Wave Equation – Two Dimensional Heart Equation - Laplace's Equation.

**UNIT - III**

**Numerical Methods:** Solution of Algebraic and Transcendental equations**-**Bisection method - Regula Falsi method- Newton-Raphson Method - Interpolation- Newton's Forward and Backward Interpolation Formulae - Lagrange's Interpolation Formula - Newton's Divided Difference Formula - Numerical Differentiation -Interpolation approach- Numerical Solutions of Ordinary Differential Equations - Taylor's Series Method - Euler's Method - Runge-Kutta Method of $4^{th}$ order(without proofs).

**UNIT - IV**

**Probability and Statistics**: Random variables – Probability Distribution function for Discrete and Continuous Random variables - Expectation – Variance – Moments -Moment Generating Function- Poisson and Normal Distributions – Testing of Hypothesis - Tests of Significance - t-test - F- test - $\chi^2$ - test for small samples.

**UNIT - V**

**Curve Fitting:** Curve fitting by the Method of Least Squares **-** Fitting of Straight line – Regression - Lines of Regression – Correlation – Karl Pearson's Co-efficient of Correlation.

**Suggested Readings:**

1. R.K. Jain & S.R.K. lyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
2. Dr. B.S Grewal Higher Engineering Mathematics, $40^{th}$ Edition, Khanna Publishers.
3. Dr. B.S Grewal Numerical Methods, Khanna Publishers.
4. Gupta & Kapoor, Fundamentals of Mathematical Statistics, Sultan chand & sons, New Delhi.
5. Kreyszig E Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons Ltd, 2006.
6. N.P.Bali & Manish Goyal A text book of Engineering Mathematics by, Laxmi Publication.
7. S.S.Sastry Numerical Analysis–PHI Learning Ltd.,

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**NETWORKS ANALYSIS**

| | | |
|---|---|---|
| Subject Code : ES 310EC | Instruction : 3+1 Periods/ week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To make the students capable of analyzing any given electrical networks.<br>• To make the students learn how to synthesize network from given immittance function. | **At the end of the course students will be able to:**<br>• Calculate circuit parameters for given circuit.<br>• Analyze given circuit in time domain and frequency domain<br>• To perform transient and steady state analysis for RLC circuits.<br>• Determine two port network parameters from given network<br>• Synthesize from driving point function in Foster and Cauer forms using R,L,C. |

**Unit-I**

**Network reduction techniques:** Review of Kirchoff's laws. Nodal and super nodal analysis, mesh and super mesh analysis, source transformation, star and delta transformations, graph theory.

**Unit-II**

**Network Theorems to AC and DC circuits:** Super position theorem, Thevenin's and Norton's theorem, maximum power transfer theorem, Reciprocity theorem, Millman's theorem, Tellegen's theorem.

**Unit-III**

**Transient and Steady state response of circuits:** Zero input response(ZIR), Zero state response (ZSR), complete response. Transient and steady state analysis of RL,RC,RLC circuits for unit step , sinusoidal and exponential inputs.

**UNIT-IV**

**Two port networks:** Z,Y,h,g, ABCD parameters. Equivalence of two port networks .T,pi transformations, Inter connection of two ports.

**UNIT-V**

**Frequency domain Analysis:** Concept of poles, zeros, impedance and admittance functions. Analysis of series and parallel resonance, Q factor, selectivity, bandwidth

**Network Synthesis:** Hurwitz polynomials, positive real functions, LC immitance functions, RC impedance functions, RL admittance functions, RL imedance functions, RC admittance functions. Cauer and Foster's forms of RL impedance and RC admittance

**Suggested Reading:**

1. William H. Hayt, Jr., Jack E. Kemmerly and Steven M. Durbin, *Engineering Circuit Analysis*, 5th edition, McGraw Hill, 2010.
2. Van Valkenberg M.E., Network Analysis, PHI, New Delhi, 3rd edition 2002.
3. Chakrabarti, *Ciruit Theory* Dhanapati Rai & Co(Pvt.)Ltd., Educational & Technical Publishers,
4. Charles A. Desoer and Ernest S Kuh, *Basic Circuit Theory*, McGraw Hill, 2009.
5. Raymond A. DeCarlo and Penmin Lin, Linear Circuit Analysis, 2nd edition, Oxford Univ. Press, 2003.
6. Lawrence P. Huelsman, *Basic Circuit Theory*, 3rd edition, 2009.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**ELECTRONIC MATERIALS & DEVICES**

| | | |
|---|---|---|
| Subject Code : PC 310EC | Instruction : 3+1 Periods/ week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| To familiarize the students with various two terminal and three terminal electronic devices working and implementation and use in the design of real time electronic products. | **At the end of the course students will be able to:**<br>• Analyze the operation of PN-Junction as a diode under different biasing and temperature conditions.<br>• Employ PN- Junction diode as a rectifier in power supplies.<br>• Study the principles of Special devices (includes LED, Photodiode, tunnel diode, SCR etc.)<br>• Design simple regulated power supplies using zener diode as a reference.<br>• Perform the small signal analysis (including h-parameters) for BJT's and FET's.<br>• Apply different biasing techniques (including self bias) for BJT's and FET's |

**UNIT - I**

**Materials:** Types of materials – gasses, Liquids & solids, Different types of solids – conductors, insulators & semiconductors (intrinsic, N-type & P-type), Interface between metal-metal, metal-semiconductor and semiconductor-semiconductor (PN & shotkey contact).

**Junction Diode :** Different types of PN Junction formation techniques, PN Junction Characteristics, biasing- band diagrams and current flow, Diode current equations under forward bias and reverse bias conditions, Junction breakdown in diodes and breakdown voltages, effect of temperature on diode characteristics, Diode as a circuit element, small signal diode models, Junction capacitance under forward bias and reverse bias, Diode switching characteristics, Zener Diodes, Zener voltage regulator and its limitation.

**UNIT - II**

**PN Diode Applications:** Half wave, Full wave and Bridge rectifiers - their operation, performance characteristics, and analysis; Filters (L, C, LC and CLC filters) used in power supplies and their ripple factor calculations, design of Rectifiers with and without Filters.**Specials Diodes**: Elementary treatment on the functioning of Tunnel, Varactor, Photo, Light Emitting diodes. **Display devices**: Study of block diagram of typical display device.

**UNIT - III**

**Bipolar Junction Transistor :** Transistor Junction formation (collector-base, base-emitter Junctions) Transistor biasing-band diagram for NPN and PNP transistors, current components and current flow in BJT, Early effect, BJT input and output characteristics in CB, CE CC configuration, BJT as an amplifier, BJT biasing techniques, Thermal runway, heat sinks and thermal stabilization, operating point stabilization against temperature and device variations, stability factors, Bias stabilization .

**UNIT - IV**

**Small Signal Transistors equivalent circuits :** Small signal low frequency h-parameter model of BJT, Determination of h parameters, analysis of BJT amplifiers using h-parameter, comparison of CB, CE and CC amplifier configurations, Analysis of BJT amplifier with approximate model. **Special Devices:** working of UJT, SCR, DIAC, TRIAC

**UNIT - V**

**Junction Field Effect Transistors (JFET):** JFET formation, operation & current flow, pinch-off voltage, V-I characteristics of JFET. JFET biasing-zero drift biasing. Low frequency small signal model of FETs. Analysis of CS, CD and CG amplifiers and their comparison. FET as an amplifier and as a switch. MOSFETs: MOSFETs, Enhancement & Depletion mode MOSFETs, V-I characteristics. MOSFET as resistor, MOSFET as a switch. Introduction to CMOS.

**Suggested Reading**:

1. Millman and Halkias," Electronic devices and circuits", 2nd Edition, McGraw Hill Publication, 2007
2. Adel S.Sedra and Kenneth C.Smith "Micro Electronic Circuits theory and applications" sixth edition Oxford publications.
3. M Satyam, K Ramkumar, " Foundations of Electronic Devices", Wiley Eastern Limited, 1990.
4. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory", 10th Edition, PHI, 2009
5. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008.
6. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6thEdition, Pearson Education, 2005.
7. Jacob Millman, Christos C. Halkias, "Integrated electronics: analog and digital circuits and systems", 2nd Ed, Mc Graw-Hill, 2010

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**ELECTROMAGNETIC THEORY**

| | | |
|---|---|---|
| Subject Code : PC 320EC | Instruction : 3+2 Periods/ week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 04 |

| Course Objective: | Course Outcomes |
|---|---|
| • To understand and analyze electromagnetic field theory, with an emphasis's on electromagnetic waves. | **At the end of the course students will be able to:**<br>• Apply the knowledge of vector calculus to solve for electric fields from point charge and charge distributions.<br>• Interpret the meaning of Maxwell's equations for static and dynamic fields and the boundary conditions for different media boundaries.<br>• Analyse the behavior of electric and magnetic fields in the presence of dielectric and magnetic materials.<br>• Formulate and solve electromagnetic wave equations and make calculations of propagation characteristics of EM waves.<br>• Analyze electromagnetic wave propagation, attenuation, reflection, and refraction in various media. |

**UNIT - I**

Cartesian, Cylindrical and spherical coordinate systems - review of vector analysis - Coulomb's Law. Electric Field Intensity. Electric field due to different charge distributions. Line of charge, sheet of charge and volume charge distributions. Electric flux, flux density, Gauss's Law and application. Divergence theorem.

**UNIT - II**

Energy and potential, Potential field of system of charges, potential gradient. Energy density, Boundary conditions in static electric field, Capacitance of two-wire line, Continuity equation, current density, Poisson's equation, Laplace equation, Uniqueness theorem, Applications of simple practical cases.

**UNIT - III**

Steady magnetic field, Biot-Savart's law, Ampere's law, Stroke's theorem, Magnetic scalar and vector potentials. Magnetic boundary conditions, Magnetomotive force, Permeability, self and mutual inductances, Evaluation of inductance of solenoid, toroid, coaxial cable, two-wire transmission line.

**UNIT - IV**

Time varying fields, Maxwells equations, Boundary conditions in Em field. Em wave equations in free space and conductors. Sinusoidal variations. Uniform plane wave, wave motion in free space. Wave motion in perfect dielectrics, lossy dielectrics and conductors. Polrization - linear, elliptical and circular polarizations.

**UNIT - V**

Energy theorem and Poynting vector, Instantaneous, average and complex Poynting vector. Reflection of plane waves by a perfect conductor, normal and oblique incidence. Reflection of plane waves by a perfect dielectric, normal and oblique incidence. Reflection coefficient. Transmission coefficient, power and energy calculations.

**Suggested Reading:**

1. Jordan, E.C., Balmain, K.G. electromagnetic Waves and Radiating Systems, 2nd Edition, Prentice Hall of India, 2001.
2. Hayt. W.H. Engineering Electromagnetics, Tata McGraw Hill, 5th Edition, 1994
3. J.D.Krauss and Fleish, Electromagnetics with applications, 5th Edition, McGraw Hill, 1999.
4. Nannapaneni Narayana Rao, Elements of Engineering Electromagnetics, 6th edition, 2009.
5. Matthew N.O.Sadiku, Principles of Electromagnetics, 4th edition, Oxford Univ. Press, 2009.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**ENVIRONMENTAL SCIENCE**

| | | |
|---|---|---|
| Subject Code : MC 320CE | Instruction : 2 Periods/week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 02 |

| Course Objective: | Course Outcomes |
|---|---|
| *In this subject the students will*<br>• Describe various types of natural resources available on the earth surface.<br>• Explain the concepts of an ecosystem and the biotic and abiotic components of various aquatic ecosystems.<br>• Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity.<br>• Explain the causes, effects and control measures of various types of environmental pollutions.<br>• Describe the methods for water conservation, the causes, effects of global warming, climate change, acid rain, ozone layer depletion, various types of disasters and their mitigation measures. | *Upon the completion of this course students will be able to*<br>1. Describe the various types of natural resources.<br>2. Differentiate between various biotic and abiotic components of ecosystem.<br>3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India.<br>4. Illustrate causes, effects, control measures of various types of environmental pollutions.<br>5. Explain the methods of water conservation, causes, effects of climate change, global warming, acid rain and ozone layer depletion, various types of disasters and their mitigation measures. |

**UNIT-I**

**Environmental Studies:** Definition, importance of environmental studies. Natural resources: Water resources; floods, drought, conflicts over water, dams-benefits and problems. Food resources; Effects of modern agriculture, fertilizer-pesticide problems, water logging salinity. Energy resources: Renewable and non-renewable energy resources. Land Resources, soil erosion and desertification.

**UNIT-II**

**Ecosystems:** Structure and function of an ecosystem, producers, consumers and decomposers, food chains, food webs, ecological pyramids, aquatic ecosystem (ponds, oceans, estuaries).

**UNIT-III**

**Biodiversity:** Genetic species and ecosystem diversity. Values of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

**UNIT-IV**

**Environmental Pollution:** Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste & e-waste management.

**UNIT-V**

**Social Aspects and the Environment:** Water conservation, Climate change, global warming, acid rain, ozone layer depletion. Environmental Impact Assessment, population explosion.

**Suggested Books:**

1. Deswal S. and Deswal A., A Basic Course on Environmental studies, Dhanpat Rai & Co Pvt. Ltd. 2013.
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2006.
3. Suresh K. Dhameja, Environmental Studies, S.K. Kataria & Sons, 2010.

**References Books:**

1. De A.K., Environmental Chemistry, New Age International, 2003.
2. Odum E.P., Fundamentals of Ecology, W.B. Sunders Co., USA, 2004.
3. Sharma V.K., Disaster Management, National Centre for Disaster Management, IIPE, Delhi, 2013.
4. Rajagopalan R., Environmental Studies, Second Edition, Oxford University Press, 2013.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**INTRODUCTION OF ENTREPRENEURSHIP**

| | | |
|---|---|---|
| Subject Code : MC 310ME | Instruction : 1 Period/ week | CIE – Marks : 15 |
| SEE – Marks : 35 | SEE - Duration : 2 Hours | Credits: 01 |

| Course objectives | Course Outcomes |
|---|---|
| The objectives of this course are to :<br>• inspire students and help them imbibe an entrepreneurial mind-set.<br>• introduce key traits and the DNA of an entrepreneur<br>• provide the information about the facilities , schemes available to start enterprise in INDIA<br>• educate the government policies and support structure for the entrepreneur<br>• improve the entrepreneur skills | On completion of the course, the student will be able to:<br>• Develop awareness about entrepreneurship and successful entrepreneurs.<br>• Generate and analyse the business ideas<br>• Understand the supporting organizations available to establish the business in the country<br>• Understand the different government policies which support the entrepreneur<br>• Understand how to Prepare a business plan report |

**UNIT - I**

Entrepreneurship: Entrepreneur characteristics – Classification of Entrepreneurships – Incorporation of Business – Forms of Business organizations –Role of Entrepreneurship in economic development –Start-ups.

**UNIT - II**

Idea Generation and Opportunity Assessment: Ideas in Entrepreneurships – Sources of New Ideas – Techniques for generating ideas – Opportunity Recognition – Steps in tapping opportunities.

**UNIT - III**

Institutions Supporting Small Business Enterprises: Central level Institutions: NABARD, SIDBI, NIC, KVIC, NIESBUD,SIDO, DST,EDI,FICCI,CII,ASSOCHAM etc. – state level Institutions –DICs- SFC- SIDC- Other financial assistance.

**UNIT - IV**

Government Policy and Taxation Benefits: Government Policy for SSIs- tax Incentives and Concessions –Non-tax Concessions –Rehabilitation and Investment Allowances.

**UNIT - V**

Entrepreneurial skills-design thinking, selling and communication. Project Formulation and Appraisal: Preparation of Project Report –Content; Guidelines for Report preparation, project report and pitching

**Learning Resources:**

1. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship: successfully launching new ventures", 3rd edition, Pearson Prentice Hall, 2009.
2. P. Denning and R. Dunham, "The Innovator's Way", MIT Press: Cambridge, Massachusetts, 2010.
3. Arya Kumar, "Entrepreneurship", Pearson Education, Delhi, 2012.
4. Michael H. Morris, D.F.Kuratko, J G Covin, "Corporate Entrepreneurship and Innovation", Cengage learning, New Delhi,2010
5. Peter F. Drucker, "Innovation and Entrepreneurship", Routledge Classics, 2015 .
6. https://www.wfglobal.org/initiatives/national-entrepreneurship-network/

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**FS – I : COMMUNICATION SKILLS IN ENGLISH-I**

| | | |
|---|---|---|
| Subject Code : HS 310EH | Instruction : 2+2 Periods/ week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 02 |

| Course Objective: | Course Outcomes |
|---|---|
| • The four major skills of language learning listening, speaking reading and writing provide the right key to success.<br>• The main objective of this finishing school curriculum is to involve content for all the above mentioned four skills in teaching English and to get students proficient in both receptive and productive skills | • Respond to questions and Engage in an informal conversation.<br>• Narrate a message/story/incident, both verbally and in writing.<br>• Describe an event / a session / a move / an article.<br>• Respond to others while being in a casual dialogue.<br>• Comprehend facts given and respond in an appropriate manner.<br>• Construct sentences in a coherent form<br>• Provide explanations<br>• Recognize and list the key points in a topic/message/article.<br>• Participate in group and form discussions by providing factual information, possible solutions, and examples.<br>• Debate on a topic by picking up the key points from the arguments placed.<br>• Provide logical conclusions to the topics under discussion.<br>• Prepare, present, and analyze reports. |

**UNIT I – FUNDAMENTALS OF COMMUNICATION**

**Competencies:**

- Basic conversational ability.
- Write e-mails introducing themselves & their purpose

**Topics covered**

Greeting and Introductions

Small Talk
Recalling

**Topic Level Details**
**Greeting & Introductions**
**Competencies:**

- Greeting appropriately
- Introducing themselves, a friend
- Responding to simple statements and questions both verbally and in writing
- Seeking introduction from others about themselves or about any topic.
- Writing an email with appropriate salutation, subject lines, self introduction, and purpose of mail.

**Small Talk**
**Competencies:**

- Identifying the topic of conversation.
- Speaking a few sentences on a random list of topics
- Reading simple information like weather reports, advertisements
- Seeking clarifications.

**Recalling**
**Competencies:**

- State takeaways from a session or conversations

**UNIT II: NARRATIONS AND DIALOGUES**
**Competencies:**

- Framing proper phrases and sentences to describe in context
- Speaking fluently with clarity and discrimination
- Responding to others in the dialogue.

**Topics covered**
Paraphrasing
Describing

**Topic Level Details**
**Paraphrasing**
**Competencies:**

- Listen for main ideas and reformulating information in his/her own words
- Draw appropriate conclusions post reading a passage.
- Writing an email confirming his/her understanding about a topic

**Describing**
**Competencies:**

- Speaking, Reading, and Writing descriptive sentences and paragraphs.

**UNIT-III: RATIONAL RECAP**
**Competencies:**

- Organizing and structuring the communication
- Detailing a topic
- Summarizing a topic.

**Topics Covered:**
Organizing
Sequencing
Explaining
Summarizing

**Topic Level Details**
**Organizing**
**Competencies:**
- Organizing the communication based on the context and audience

**Sequencing**
**Competencies:**
- Structuring the content based on the type of information.

**Explaining**
**Competencies:**
- Explaining a technical/general topic in detail.
- Write an email giving detailed explanation/process

**Summarizing**
**Competencies:**
- Recapitulating

**UNIT - IV: PROFESSIONAL DISCUSSIONS AND DEBATES**
**Competencies:**
- Analytical and Probing Skills
- Interpersonal Skills

**Topics Covered:**
Discussing
Debating
**Topic Level Details**
**Discussing**
**Learning Outcome:**
The students should be able to explore and support issues by adding explanations and examples.
**Competencies:**
- Thinking
- Assimilating

**Debating**
**Competencies:**
- Comprehending key points of the debate and note decisive points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

**UNIT - V: DRAWING CONCLUSIONS AND REPORTING**
**Competencies:**
- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.

**Topics Covered:**
Concluding
Reporting
**Topic Level Details**
**Concluding**
**Competencies:**

- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

**Reporting**
**Competencies:**

- Reporting an incident
- Writing/Presenting a project report

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**BASIC CIRCUITS LAB AND ELECTRONICS WORKSHOP**

| | | |
|---|---|---|
| Subject Code : ES 321EC | Instruction : 3 Periods/ week | CIE – Marks : 25 |
| SEE – Marks : 50 | SEE - Duration : 3 Hours | Credits: 02 |

| Course Objective: | Course Outcomes |
|---|---|
| To apply the concepts of circuit theory for a given complex circuit and verify its response using discrete components and CAD tools. | At the end of the course students will be able to:<br>• Identify the appropriate network theorem to analyze for a given network.<br>• To determine different two port network parameters for a given network and also characterize the network from the two port parameters.<br>• To simulate and find the response of a given circuit using CAD tools. |

**List of Experiments:**

**Part –A**

1. Soldering and desoldering of components
2. Design of PCB

**Part -B**

1. Verification of superposition theorem and Thevenin's theorems
2. Verification of maximum power transfer theorem
3. Verification of Tellegan's theorem
4. Measurement of two-port network parameters
5. Design & verification of Series Resonance
6. Design & verification of Parallel Resonance

**Part –C (using SPICE)**

1. Determination of two port network parameters in the presence of at least one dependent source.
2. Transient response of RL and RC circuits.
3. Verification of network theorems in the presence of dependent source.
4. Transient response of RLC series and parallel circuits.
5. Measurement of power factor and power relationships.

**Suggested Reading:**

1. Muhammad H. Rashid, "Spice for Circuits and Electronics Using PSPICE" 2/e, 2001, PHI.
2. John O. Attia, "PSPICE and MATLAB for Electronics: An Integrated Approach" 2/e, CRC Press, 2002.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**ELECTRONIC DEVICES LAB**

| Subject Code : PC 311EC | Instruction : 3 Periods/week | CIE Marks : 25 |
|---|---|---|
| SEE – Marks : 50 | SEE - Duration : 3 Hours | Credits: 02 |

| Course Objective: | Course Outcomes |
|---|---|
| To develop an understanding of the underlying concepts of Electronic devices and circuits with Qualitative approach | **At the end of the course students will be able to:**<br>• Verify the working of PN Junction diodes, transistors and their characteristic behavior.<br>• Design of different rectifiers with various filter combinations.<br>• Design of transistor biasing circuits for the given operating point.<br>• Carryout analysis of single stage RC coupled amplifiers. |

**List of Experiments:**

**CYCLE - I**

1. Zener Diode Characteristics and Zener as Voltage Regulator
2. Design of Half wave and Full wave Rectifiers with and without Filters
3. Characteristics of PHOTO DIODE
4. Common Base characteristics of BJT and measurement of h – parameters
5. Common Emitter characteristics of BJT and measurement of h-parameters,
6. JFET Characteristics and measurement of its small signal parameters.
7. Characteristics of UJT and Seven Segment LED Display

**CYCLE - II**

8. BJT Biasing
9. FET Biasing
10. Analysis and bandwidth calculation of Single stage RC coupled CE Amplifier.
11. Analysis and bandwidth calculation of Single stage RC coupled CC Amplifier.
12. Single stage FET Common Source RC coupled Amplifier
13. Characteristics of SCR and study of TRIAC characteristics
14. Analysis & Design of circuits using PSPICE(Minimum of five experiments).

**Suggested Reading:**

1. Robert Diffenderfer, "Electronic Devices Systems and Applications", Cengage Learning India Private Limited, 2010
2. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**INTRODUCTION TO ELECTRONICS ENGINEERING (For CSE)**

| | | |
|---|---|---|
| Subject Code : ES 320EC | Instruction : 3+1 Period/ week | CIE Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| **Course Objective:** | **Course Outcomes** |
|---|---|
| • To understand the characteristics and operation of different electronic devices.<br>• To study the working of transistorized amplifiers and oscillators.<br>• To gain the basic knowledge of digital logic circuits.<br>• To study the working principle of different types of transducers. | **At the end of the course students will be able to:**<br>• Employ different electronic devices to build electronic circuits such as rectifiers, voltage regulators.<br>• Describe the functioning of electronic circuits such as amplifiers and oscillators.<br>• Implement digital circuits such as adders and subtractors using logic gates.<br>• Have the knowledge of certain electronic devices such as SCR, DIAC, TRIAC, UJT.<br>• Convert real time electrical signals into corresponding signals using different types of transducers. |

**UNIT - I**

**Semiconductor Theory:** Classification of semiconductors, Energy Levels, Conductivity, Mobility, Diffusion and Drift currents, Hall Effect, Characteristics of P-N Junction diode, Parameters and Applications. **Rectifiers:** Half wave and Full wave Rectifiers (Bridge, center tapped), ripple factor and efficiency, comparison of rectifiers, Filters, types of filters, Rectifiers with and without filters

**UNIT - II**

**Transistors:** Bipolar Junction Transistor, Construction, Types, Working principle, Configurations, Transistor parameters, Transistor as an amplifier, Problems, h-parameter equivalent circuits. Field effect transistor, Construction and working of JFET, Parameters and applications of JFET, Types of MOSFET (depletion and enhancement), Comparison of BJTs with JFETs; **Regulators:** Characteristics of Zener Diode, Voltage Regulation, Zener diode as voltage regulator, IC voltage regulators.

**UNIT - III**

**Feedback Concepts** – Basic concept of feedback, Types of feedback, Feedback topologies, General characteristics of Negative feedback amplifiers; **Oscillators** – Classification of Oscillators, Types, LC Type and RC Type Oscillators and Crystal Oscillators (Qualitative treatment only)

**UNIT - IV**

**Operational Amplifiers –** Introduction, Characteristics of ideal Operational amplifier, Operational amplifier stages, Parameters, Open loop and closed loop configurations, Applications (Adder, Subtractor, Voltage follower, Integrator, Differentiator, Instrumentation Amplifier); **Digital circuits:** Boolean Algebra, Logic Gates, Combinational circuits such as half and full adders, half and full subtractors.

**UNIT - V**

**Data Acquisition systems:** Introduction, Classification of transducers, Capacitive transducer, Inductive transducer, LVDT, Electrical strain gauges, Temperature transducers (Thermocouple), Piezoelectric transducer, Photoelectric transducer; **Photo Electric Devices:** Photo diode, Photo Transistor, LED, LCD; **Industrial Devices:** SCR, TRIAC, DIAC, UJT - Construction, Working principle and Characteristics only; **Display Systems:** Constructional details of C.R.O and Applications.

**Suggested Reading:**

1. S.Shalivahan, N. Suresh Kumar, A Vallavea Raj Electronic Devices and Circuits Tata McGraw Hill, 2003.
2. Jacob Milman & C., Halkias, Electronic devices Eighth Edition, Reprinted, Mc Graw Hill,1985.
3. Ramakanth A. Gayakwad, Op-AMPS and Linear Integrated Circuits, 3rd edition, Prentice Hall of India,1985.
4. Mooris Mano, Digital design, 3rd edition, Prentice Hall of India,2002.
5. Cooper, Electronic Measurement and Instrumentations.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**ELECTRONIC ENGINEERING – I (For EEE)**

| | | |
|---|---|---|
| Subject Code : PC 330EC | Instruction : 3+1 Periods/week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To give understanding on semiconductor materials and characteristics of the p-n junction diode.<br>• To understand the operation of BJT,FET,MOSFET and characteristics of special purpose electronic devices.<br>• To familiarize students with biasing circuits of BJT, FET. | **At the end of the course students will be able to:**<br>• Define and describe the principle of operation of electronic devices like PN junction diode, Zener diode, BJT and FET etc.<br>• Analyze and design various rectifier circuits with and without filters for a regulated DC power supply.<br>• Illustrate the use of diode in practical applications and gain knowledge on special diodes.<br>• Design biasing circuits to operate transistor in active region.<br>• Analyze and compare the small signal low frequency Bipolar junction Transistor and Field effect transistor amplifiers in different configurations with the help of their equivalent circuits. |

**UNIT - I**

**Semiconductor Diodes and Rectifiers:** P-n junction as a rectifier, V-I characteristics, temperature dependence of V-I characteristics, Breakdown of junctions – Zener and Avalanche, halfwave, fullwave, bridge rectifiers, L,C, $\pi$ –section filters, Regulation and Ripple characteristics.

**UNIT - II**

**Transistors and their biasing:** BJT current components, modes of transistor operation, Early effect, BJT input and output characteristics in CB, CE and CC configuration.BJT as an amplifier. BJT biasing techniques thermal runaway, operating point, bias stabilization circuits.

**UNIT - III**

**Small Signal Transistor Equivalent Circuits:** Small signal low frequency h-parameters model of BJT, h-parameters, analysis of BJT amplifier with approximate model, comparison of CB, CE and CC amplifier configurations, Miller's theorem, frequency response of RC coupled amplifier.

**UNIT - IV**

**Filed effect transistors:** V-I characteristics of JFET, JFET biasing, low frequency small signal model of FETs, FET as a CS amplifier, MOSFETs: Enhancement and depletion mode MOSFETs, V-I characteristics.

**UNIT - V**

**CRO:** Study of CRO block diagram.

**Special devices:** Elementary treatment on the functioning of tunnel diode, varactor diode, photo diode, light emitting diode, LCD, UJT, SCR, photo transistor.

**Suggested Reading:**

1) Jacob Millman and Christos C. Halkias, Satyabratajit "Electronics Devices and Circuits", McGraw hill, 3rd edition, 2010.
2) Jacob Millman and Christos C. Halkias, "Integrated Electronics" Mc Graw Hill, 1991.
3) Robert L.Boylestad and Louis Nashelsky,"Electronic Devices and Circuit Theory",PHI,10th edition 2006.
4) David L Schilling and Charles Belove,Electronics Circuits Discrete & Integrated ,3rd ed.,McGraw Hill Education (India) Private Limited,1989.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

## INTRODUCTION TO ELECTRONICS ENGINEERING LAB(For CSE)

| | | |
|---|---|---|
| Subject Code : ES 321 EC | Instruction:2 Periods/ week | CIE – Marks : 25 |
| SEE – Marks : 50 | SEE - Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • Verify the characteristics of various electronic devices.<br>• Understand the functioning of voltage regulator and rectifiers.<br>• Perform different arithmetic operations using operational amplier.<br>• Understand the working of logic gates to implement adder and subtractor. | **At the end of the course students will be able to:**<br>• Verify input/output characteristics of active devices and to compute their parameters.<br>• Analyse the functioning of voltage regulators, rectifiers and oscillators.<br>• Perform operations such as addition, subtraction, comparison of voltage levels using operational amplifier.<br>• Implement digital adders and subtractors using logic gates. |

1. Characteristics of Semiconductor (Si and Ge) and Zener diodes
2. CRO Applications
3. Full wave rectifier with and without filter
4. Zener Voltage Regulator
5. Characteristics of BJT (CB and CE)
6. Characteristics of FET
7. Amplifier with and without feedback
8. RC Phase shift oscillator
9. Hartley oscillator and Calpitt's Oscillator
10. Applications of Operational Amplifier: Adder, Subtractor, Comparator.
11. Verifications of Logic gates
12. Realization of Half and Full adder

**Suggested Reading *:***

1. Paul B. Zbar, Albert P. Malvino , Michael A. Miller, Basic Electronics, A Text-Lab Manual, 7th Edition, TMH, 1994.
2. Paul B. Zbar, Industrial Electronics, A Text – Lab Manual, 3rd Edition, TMH, 1983.

**General Note :**

There should not be more than 2 students per batch while performing any of the lab experiments.

(a) Mini Project cum design exercise: The students must design, rig-up, and test the circuits wherever possible and should carry out the experiments individually.

(b) This exercise carries sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercises

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**ELECTRONIC ENGINEERING – I LAB (For EEE)**

| Subject Code : PC 321EC | Instruction : 2 Periods per week | CIE – Marks : 25 |
|---|---|---|
| SEE – Marks : 50 | SEE - Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| To develop an understanding of the characteristics of Electronic devices and circuits with Qualitative approach | At the end of the course students will be able to:<br>• Estimate the parameters from V-I characteristics of different diodes and evaluate the performance of rectifiers.<br>• Estimate the parameters from BJT and FET characteristics.<br>• Compute the bandwidth of RC coupled BJT and FET amplifiers from the frequency response. |

**List of Experiments:**

**CYCLE – I**

1. V-I Characteristics of Si, Ge and Zener diode
2. Zener as Voltage Regulator
3. Design of Half wave and Full wave Rectifiers with and without Filters
4. Common Base characteristics of BJT and measurement of h – parameters
5. Common Emitter characteristics of BJT and measurement of h-parameters,
6. JFET Characteristics and measurement of its small signal parameters.
7. Applications of Cathode ray oscilloscope.

**CYCLE – II**

8. BJT biasing.
9. Analysis and bandwidth calculation of Single stage RC coupled CE Amplifier.
10. Analysis and bandwidth calculation of Emitter follower.
11. Single stage FET Common Source RC coupled Amplifier
12. Analysis and bandwidth calculation of Source follower.
13. Analysis and bandwidth calculation of Multi stage RC coupled CE Amplifier.
14. Characteristics of UJT.

**Suggested Reading:**

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001
2. S.Poorna Chandra,B. Sasikala, Electronics Laboratory Primer,A design approach, Wheeler publishing,1998.

*With effect from the academic year 2017 - 2018*

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)**
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**SCHEME OF INSTRUCTION AND EXAMINATION**
**B.E. (ECE) – IV SEMESTER**

| S. No. | Course Code | Course | Scheme of Instruction | | | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Hours / Week | | | | Duration in Hrs | Maximum Marks | | |
| | | | L | T | D | P | | SEE | CIE | |
| **THEORY** | | | | | | | | | | |
| 1 | BS 410MA | Engineering Mathematics – IV | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 2 | ES 410ME | Basic Thermodynamics | 3 | - | - | - | 3 | 70 | 30 | 3 |
| 3 | PC 410EC | Analog Electronic Circuits | 3 | - | - | - | 3 | 70 | 30 | 3 |
| 4 | PC 420EC | Signal Analysis & Transform Techn. | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 5 | PC 430EC | Pulse, Digital and Switching Circuits | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 6 | MC 300EH | HVPE – I | 1 | - | - | - | 2 | 35 | 15 | 1 |
| 7 | HS 410EH | FS - II : Communication Skills in English-II | 2 | 2 | - | - | 3 | 70 | 30 | 2 |
| 8 | OE4XXXX | Open Elective – II | 1 | - | - | - | 2 | 35 | 15 | 1 |
| 9 | OE4XXXX | Open Elective – III | 2 | - | - | - | 3 | 70 | 30 | 2 |
| **PRACTICALS** | | | | | | | | | | |
| 10 | PC 441EC | Electronics Circuits Lab | - | - | - | 3 | 3 | 50 | 25 | 2 |
| 11 | PC 451EC | Simulation Lab for Signals & Systems | - | - | - | 3 | 3 | 50 | 25 | 2 |
| | | **Total** | **21** | **5** | **-** | **6** | | **660** | **290** | **25** |
| | | **Grand total** | **32** | | | | | **950** | | |

*With effect from the academic year 2017 - 2018*

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)**
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**SCHEME OF INSTRUCTION AND EXAMINATION**
**B.E. (ECE) – IV SEMESTER**

**INTERDISCIPLINARY COURSES OFFERED BY ECE TO EEE**

| S. No. | Code | Subject | Scheme of Instruction | | | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods / Week | | | | Duration in Hrs | Maximum Marks | | |
| | | | L | T | D | P | | SEE | CIE | |
| **THEORY** | | | | | | | | | | |
| 1 | PC 440EC | Electronic Engineering - II | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| **PRACTICALS** | | | | | | | | | | |
| 2 | PC 461EC | Electronic Engineering - II Lab | - | - | - | 2 | 3 | 50 | 25 | 1 |

***With effect from the academic year 2017 - 2018***

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**ENGINEERING MATHEMATICS – IV**

(CSE, ECE, ME)

| | | |
|---|---|---|
| Subject Code : BS 410MA | Instruction : 3+1 Periods/ week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| Students should be able to<br>• Understand the Definition of Laplace and inverse Laplace Transforms-Shifting Properties and various theorems and how to apply them in solving Differential Equations.<br>• Analyze the characteristics and properties of and Z – transforms and solve the Difference Equations.<br>• Study the concept of Fourier and inverse Fourier Transform of a function and various Properties.<br>• Understand the Analytic functions, to evaluate a line integral of a function of a complex variable using Cauchy's integral formula, to evaluate real integrals using complex integration and how to evaluate Laurent Series and residues. | • Students will be able to<br>• Evaluate Laplace transforms and inverse Laplace transforms of functions. Apply Laplace transforms to solve ordinary differential equations arising in engineering problems.<br>• Apply Z-transform in the analysis of continuous time and discrete time systems and also solve the Difference Equations using Z-transform.<br>• Determine Fourier transform, Fourier sine and cosine transform of a function.<br>• Know the condition(s) for a complex variable function to be analytic and/or harmonic and state and prove the Cauchy Riemann Equation and use it to show that a function is analytic and to define singularities of a function, know the different types of singularities, evaluate contour integrals using the Cauchy Integral Theorem and the Cauchy Integral Formula and will be able to determine transformation in complex space. |

**UNIT - I**

**Laplace Transforms**: Introduction to Laplace transforms - Inverse Laplace transform - Sufficient Condition for Existence of Laplace Transform –Properties of Laplace Transform- Laplace Transform of Derivatives - Laplace Transform of Integrals - Multiplication by $t^n$ - Division by t – Evaluation of Integrals by Laplace Transforms- Convolution Theorem - Application of Laplace transforms to Linear Differential Equations with Constant Coefficients.

**UNIT - II**

**Fourier Transforms:** Mathematical Transforms**,** Fourier Integral Theorem - Fourier Transforms – Inverse Fourier Transform - Properties of Fourier Transform –Fourier Cosine & Sine Transforms - Convolution Theorem.

**UNIT - III**

**Z-Transforms:** Introduction - Z-transforms of Standard sequences - Linearity Property – Damping Rule - Shifting Properties- Multiplication by n - Initial and Final value theorems – Inverse Z-Transforms- Convolution Theorem – Application of Z-Transforms to Difference Equations.

**UNIT - IV**

**Functions of Complex Variables**: Limits and Continuity of function - Differentiability and Analyticity - Necessary & Sufficient Condition for a Function to be Analytic - Milne-Thomson's method - Cauchy-Riemann Equations in Polar Form - Harmonic Functions - Complex Integration - Cauchy's Theorem - Extension of Cauchy's Theorem for multiply connected regions- Cauchy's Integral Formula.

**UNIT - V**

**Power series** - Taylor's Series - Laurent's Series (without proofs) - Zeros and Singularities –Residues – Cauchy's Residue Theorem -Evaluation of Real Integrals using Residue Theorem -Bilinear Transformation.

**Suggested Reading**:

1. R.K.Jain & S.R.K.Iyengar , Advanced Engineering Mathematics - 3rd Edition, Narosa Publications
2. Dr.B.S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publishers.
3. Goyal & Gupta, Laplace's and Fourier transforms, 23rd Edition, Pragati Prakashan, 2009
4. Kreyszig E, Advanced Engineering Mathematics, 8 th Edition, John Wiley & Sons Ltd, 2006.
5. N.P.Bali & Manish Goyal A text book of Engineering Mathematics, Laxmi Publication.
6. H.K. Dass, Er.Rajnish Verma, Higher Engineering Mathematics, 2011 Edition S.Chand & company Ltd.
7. R.V. Churchill, "Complex Variables & its Applications".Mc Graw-Hill Book Company, INC

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**BASIC THERMODYNAMICS**

| | | |
|---|---|---|
| Subject Code : ES410ME | Instruction : 3 Periods/Week | CIE Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| The objectives of this course are to<br>• study the basic laws of thermodynamics and principles of refrigeration and air-conditioning.<br>• apply the knowledge of thermodynamics to power cycles. | At the end of the course the student will be able to:<br>• **explain** the basic concepts of thermodynamics.<br>• apply the first law and the second law of thermodynamics to various engineering problems<br>• **evaluate** the thermodynamic properties of steam for various thermodynamic processes.<br>• **distinguish** between refrigeration and air-conditioning and **apply** principles of psychrometry to various air-conditioning systems.<br>• **analyze** the performance of power cycles. |

**UNIT - I**

**Introduction**: Basic Concepts-System, Types of Systems, Control Volume, Surrounding, Boundaries, Universe, Macroscopic and Microscopic viewpoints, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi–static process; Zeroth Law of Thermodynamics – Principles of Thermometry, Reference Points, Constant Volume ideal gas thermometer. Energy in state and in transition-Work and Heat.

**UNIT - II**

**First and Second Law of Thermodynamics**: PMM I – Joule's Experiment – First law of Thermodynamics, First law applied to - process, flow system, Steady Flow Energy Equation, Limitations of the First Law;

Second Law of Thermodynamics- Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM II, Carnot cycle and its specialties, Clausius inequality, introduction to entropy.

**UNIT - III**

**Pure Substances**: Concept of Phase change; p-v-T- surfaces, T-s and h-s diagrams, triple point, critical point, properties during change of phase, Dryness Fraction – Property tables and Mollier chart – Various thermodynamic processes and energy transfers for non-flow and flow processes.

**UNIT – IV**

**Principles of Refrigeration & Air-conditioning:** Introduction to Refrigeration, Types of Refrigeration- Air refrigeration system and vapour compression refrigeration system**,** Types of Refrigerants, Atmospheric air - Psychometric Properties – Dry Bulb Temperature, Wet Bulb Temperature, Dew point Temperature, thermodynamic Wet Bulb Temperature, specific humidity, relative humidity, saturated air, vapour pressure, degree of saturation – Adiabatic Saturation, Carrier's Equation – Psychrometric chart.

**UNIT - V**

**Power Cycles-Gas Cycles:** Otto, Diesel, Dual-combustion cycles and Joule-Brayton Cycle – description and representation on p–v and T-s diagrams, thermal efficiency, Mean Effective Pressures on air standard basis – comparison of cycles. **Steam Cycle**: Rankine cycle – Performance Evaluation – combined cycles,

**Learning Resources**:

1. P.K. Nag, "Engineering Thermodynamics", Tata Mc Graw Hill, 4th Edition, 2008.
2. Yunus Cengel & Boles, "Thermodynamics – An Engineering Approach", TMH New Delhi 2008.
3. P. Yadav, "Fundamentals of Engineering Thermodynamics", Central Publishing, Allahabad, 2009.
4. Sonntag, Borgnakke and Van Wylen "Fundamentals of Thermodynamics", John Wiley 2010.
5. D S Kumar, "Ëngineering Thermodynamics", S K Kataria & Sons, 1st Edition, 2013
6. ISI Steam Tables in SI Units, Indian Standards Institution, New Delhi, SP: 26-1983
7. Dr. S S Banwait & Dr. S C Laroiya, Properties of Refrigerants & Psychrometric Tables and Charts in SI Units, Birla's Publications, New Delhi-2008.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**ANALOG ELECTRONIC CIRCUITS**

| | | |
|---|---|---|
| Subject Code : PC 410EC | Instruction : 3 Periods/ week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| To familiarize the students with design and working of various amplifiers and analyze concepts of positive and negative feedback. | **At the end of the course students will be able to:**<br>• Analyze and design various small signal amplifier circuits.<br>• Analyze the effect of negative feedback in amplifier circuits.<br>• Design of oscillator circuits for the given specifications.<br>• Design of power amplifier circuits for audio frequency applications.<br>• Analyze the characteristics of differential amplifier and its use in building Op-amps. |

**UNIT - I**

Small signal amplifiers: Classification of amplifiers, BJT and FET high frequency equivalent circuits, Mid-band analysis if single and multistage amplifiers, low frequency and high frequency analysis of single and multistage RC coupled and Transformer coupled amplifiers with BJT and FET..

**UNIT - II**

Feedback amplifiers: The feedback concept, general characteristics of negative feedback, Effect of negative feedback on input output impedances, voltage series and shunt feedbacks. Stability considerations, local versus global feedback

**UNIT - III**

Oscillators: Positive Feedback and conditions for sinusoidal oscillations, RC oscillator, LC oscillator Crystal oscillator, Amplitude and frequency stability of oscillator.
Regulators: Transistorized series and shunt regulators

**UNIT - IV**

Large signal amplifiers: BJT as large signal audio amplifier, Classes of operation, Harmonic distortion, power dissipation, efficiency calculations. Design considerations of transformer coupled and transformer less push-pull audio power amplifiers under Class-A, Class-B, Class-D, Class –AB operations, Qualitative analysis on R.F. Tuned amplifiers.

**UNIT - V**

Differential Amplifiers: Classification, DC and AC analysis of single/dual input Balanced and unbalanced output Configurations using BJTs. Level Translator.
Operational Amplifier: Op-amp Block Diagram, ideal Op-amp Characteristics, op-amp and its features, Op-Amp parameters & Measurements, Input and Output Offset voltages and currents, Slew Rate, CMRR, PSRR. Frequency Response and Compensation techniques.

**Suggested Reading:**


1. Adel S.Sedra and Kenneth C.Smith "Micro Electronic Circuits theory and applications" sixth edition Oxford publications.
2. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition, McGraw Hill Publication, 2009
3. Donald Schilling, Charles Belove, TuviaApelewicz Raymond Saccardi, "Electronic Circuits: Discrete and Integrated", TMH, 3rd Edition
4. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008
5. Robert L. Boylestad, "Electronic Devices and Circuit Theory", 6th Edition, PHI, 1998
6. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6th Edition, Pearson Education, 2005
7. Roody and Coolen, "Electronic Communications", 4th Edition, Pearson Education, Reprint 2007.


**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**SIGNAL ANALYSIS AND TRANSFORM TECHNIQUES**

| | | |
|---|---|---|
| Subject Code : PC 420EC | Instruction : 3+1 Periods /week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To define and classify continuous and discrete time signals & systems<br>• To determine the frequency domain characteristics of continuous and discrete time signals using various transform techniques.<br>• To verify the causuality and stability of LTI system and find its response using convolution. | **At the end of the course students will be able to:**<br>• Analyse continuous time signals and systems and transform them to frequency domain using CTFT, LT.<br>• Convert continuous time signals to discrete time signals using sampling.<br>• Represent the continuous and discrete time signals as a linear combinational of mutually orthogonal signals.<br>• Analyse discrete time signals and systems and transform them to frequency domain using ZT.<br>• Determine the response of an LTI system using convolution. |

**UNIT - I**

Continuous Time Signals & Systems: Introduction, Elementary signals, Basic operations on signals and its classification. Introduction to systems and its classification. Analogy between vectors and signals - signal representation by a set of mutually orthogonal functions, Evaluation of mean square error, Orthogonality in complex functions.

Fourier Series: Review of Fourier series, Existence and Convergence, Trigonometric and exponential Fourier series representations and their relations, Symmetry conditions, Properties, Complex Fourier spectrum, Power Spectral Density (PSD).

**UNIT - II**

Signal Representation by Continuous Exponentials: Introduction to Fourier Transform, Existence, Fourier transform of singularity functions and signals, Properties, Fourier transform of a periodic function, Energy Spectral Density (ESD).
Signal Transmission Through Linear Systems: Introduction to Linear Time Invariant (LTI) system, Unit Impulse and step response, Transfer function of an LTI system, Filter characteristics of an LTI system, Distortion less transmission, Signal bandwidth, System bandwidth, Ideal filter characteristics, Causality and Paley-wiener criterion for physical realization.

**UNIT - III**

Sampling: Introduction to Sampling, Sampling Theorem, Aliasing, Sampling Techniques, Reconstruction.
Signal Representation by Generalized Exponentials: Introduction to Laplace transforms, Existence, Region of convergence (ROC) and it properties. Properties of Laplace transform. Inverse Laplace transform. Analysis and characterization of continuous LTI systems using Laplace Transform.

**UNIT - IV**

Discrete Time Signals & Systems: Introduction, Elementary signals, Basic operations on signals and its classification. Introduction to systems and its classification. Linear Shift invariant systems, Stability and Causality, Linear constant coefficient systems. Discrete Fourier Series (DFS), Discrete Time Fourier Transform (DTFT).
Z-Transforms: Introduction to Z-Transform, Existence, Region of Convergence (ROC) and its properties. S-plane and Z-plane correspondence, Properties of Z-Transform, Inverse Z-Transform, Analysis and characterization of discrete LTI systems using Z-Transform

**UNIT - V**

Convolution & Correlation: Continuous convolution - Graphical interpretation and Convolution properties. Discrete convolution- Graphical interpretation and Convolution properties. Continuous correlation-Cross correlation and Auto correlation, their graphical interpretation and properties. Discrete correlation- Cross correlation and Auto correlation, their graphical interpretation and properties.

**Suggested Reading:**

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 Ed., PHI.
3. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2 Ed.
4. Signals and Systems – A.Rama Krishna Rao – 2008, TMH.
5. M.J. Robert " Fundamentals of signals and systems", McGraw Hill, 2008

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**PULSE, DIGITAL AND SWITCHING CIRCUITS**

| | | |
|---|---|---|
| Subject Code : PC 430EC | Instruction : 3+1 Periods/week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To familiarize the students with the concepts of wave shaping using linear & nonlinear circuits, switching characteristics of diodes.<br>• To design & analyze various Multi vibrators.<br>• To understand the concepts of combinational and sequential circuits, analyze and Design the Combinational and sequential systems. | **At the end of the course students will be able to:**<br>• Analyze the responses of RLC circuits for standard test input signals.<br>• Synthesize Non-linear wave shaping circuits for given transfer characteristics.<br>• Analyze and design Multivibrator circuits using BJTs.<br>• Analyze and design various combinational and sequential circuits at gate level.<br>• Design finite state machines for real time applications. |

**UNIT - I**

Wave-Shaping: RC, RL and RLC circuits, response to Step, Pulse, Square, Exponential and Ramp inputs. Integrating and differentiating circuits, Compensated attenuators. Non-linear wave shaping using Diodes and Transistors. Clipping and Clamping circuits, Clamping circuit theorem.

**UNIT - II**

Multi vibrators: Analysis and design of Transistor Multi vibrators – Bistable, Mono-stable and Astable circuits. Operation of regenerative comparator (Schmitt Trigger). Time base generators: Speed, transmission and displacement errors.
Analysis and Design of sweep circuits using UJT and SCR.

**UNIT - III**

Boolean – Algebra: Introduction to Boolean Algebra, DeMorgan's theorem, Canonical forms and standard forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Simplification of switching functions using theorems,
Karnaugh map method, Quine McCluskey /Tabular method. Realization of Logic functions using AND-OR, OR-AND and NAND / NOR.

**UNIT - IV**

Combinational Logic Design: Binary Adders, Subtractors, Code converters, Decoders and Encoders, Priority Encoder, static and hazard free design.
Introduction to Sequential Logic: Types of Flip-Flops, Excitation Tables and Flip-Flop Conversions, Classification of sequential circuits.

**UNIT - V**

Sequential Logic Design: State Diagram and State Table, Design of synchronous and asynchronous counters, registers.

Finite State Machines: Moore Type and Mealy Type FSM, Design of Sequence Detector using Moore and Mealy FSM. One Hot Encoding.

**Suggested Reading:**

1. Jacob Millman and Herbert Taub, Pulse, Digital and Switching Waveforms, TMH, 3rd edition, 2011.
2. M. Morris Mano and Michael D. Ciletti, "Digital Design", 4th Edition., Prentice Hall, 2007
3. Zvi Kohavi, Switching And Finite Automata Theory, TMH, 2nd edition, 2001.
4. David A. Bell, Pulse, Switching and Digital Circuits, 5th edition, OXFORD Higher Education, 2015.
5. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design, TMH, 3rd edition, 2010.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**HUMAN VALUES & PROFESSIONAL ETHICS – I**

| | | |
|---|---|---|
| Subject Code : MC 300EH | Instruction : 1 Period/ week | CIE – Marks : 15 |
| SEE – Marks : 35 | SEE - Duration : 2 Hours | Credits: 01 |

| Course Objectives | Course Outcomes |
|---|---|
| **The course will enable the students to** :-<br>• Get a holistic perspective of value- based education.<br>• Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations.<br>• Understand professionalism in harmony with self and society.<br>• Develop ethical human conduct and professional competence.<br>• Enrich their interactions with the world around, both professional and personal. | **At the end of this course the student will be able to:**<br>• Gain a world view of the self, the society and the profession.<br>• Make informed decisions.<br>• Start exploring themselves in relation to others and their work –constantly evolving into better human beings and professionals<br>• Inculcate Human values into their profession.<br>• Validate their aspirations through right understanding of human relationship and see the co-relation between the human values and prevailing problems.<br>• Strike a balance between physical, mental, emotional and spiritual parts their being.<br>• Obtain a holistic vision about value-based education and professional ethics. |

**UNIT - I**

**The purpose of life**-Individual to society to the ideal –individual transformation as a stepping stone to idealism- the flow of transformation from individual to society – An awakened society as a basis to move towards the concept of idealism. How do

lifestyles and habits affect the basic behavior? What is the roadmap to a healthy lifestyle and how does it impact the individual, furthermore, how does it enhance the purpose of life.

**Philosophy of Life from different cultures–value of life–Objective of life-** The Physical, Mental and Emotional aspects of man-Building an integrated personality. Ways and means to accomplish it.

**UNIT - II**

**Time Management**-Why is it essential? Impediments-how best to manage time? Benefits of effective time-management. How to make the best of the present?

**UNIT - III**

**Positive thinking-**The need, nature and scope of positive thinking-Positive thinking as a foundation to success and building character – Introspection and Self-analysis-identifying the desirable traits-Building of right character. Meaning of values versus skills. Self worth and Professional worth. Professional Obligations and Competence. Work-life balance.

**UNIT - IV**

**Different lifestyles and habits**- **Excellence-Professional & Personal ethics in society**-Goals-Striking a balance between excellence and goals and how to aim for excellence and achieve it with ethics.

**UNIT - V**

**Potentials and harnessing potentials**-Self-Hidden potentials-Weeding out weaknesses-Channelizing the potential. Optimizing potential to achieve goals.

**Suggested Reading:**

1. B.L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. A.N Tripathy, 2003 Human values, New Age International Publishers.
3. EG Seebauer & Robert L. Berry,2000,Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.
4. Mike Martin and Ronald Schinzinger "Ethics in Engineering "McGraw Hill
5. Charles E Haris, Micheal J Rabins, " Engineering Ethics "Cengage Learning

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**FS - II: COMMUNICATION SKILLS IN ENGLISH-II**

| | | |
|---|---|---|
| Subject Code : HS 410EH | Instruction : 2+2 Periods/ week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 02 |

| COURSE OBJECTIVES | COURSE OUTCOMES |
|---|---|
| • identify the various features and functions of human language and communication.<br>• develop the habit of listening effectively so as to analyze the speaker's tone and tenor.<br>• choose appropriate words so as to speak and write accurately.<br>• read various types of texts and sift information correctly.<br>• study organizational structures and behavioral patterns and adapt appropriately. | • Participate in group and forum discussions by providing factual information, possible solutions, and examples.<br>• Debate on a topic by picking up the key points from the arguments placed.<br>• Provide logical conclusions to the topics under discussions.<br>• Prepare, present, and analyze reports.<br>• Choose appropriate words and tone to present accurate, specific, and factual reports.<br>• Compose a summary of beginning high level reading text that identifies the thesis and key supporting details.<br>• Summarize with 70% comprehension.<br>• Apply reading skills, including how to approach different types of literature. |

**UNIT I: PROFESSIONAL DISCUSSIONS AND DEBATES**

**Competencies:**

- Analytical and Probing Skills
- Interpersonal Skills

**Topics Covered:**

Discussing
Debating

**Topic Level Details**

**Discussing**

**Competencies:**

- Thinking
- Assimilating

**Debating**

**Competencies:**

- Comprehending key points of the debate and note decisive points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

**UNIT II: DRAWING CONCLUSIONS**

**Competencies:**

- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.

**Topics Covered:**

How to draw conclusions
Importance of Logic

**Topic Level Details:**

**Drawing conclusions**

**Competencies:**

- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

**UNIT III: - REPORTING**

**Competencies:**

- Reporting an incident
- Writing/Presenting a project report

**UNIT IV: - READING FOR CONTEXT**

**Competencies**

Develop metacognitive strategies

**Topics covered**

**Develop critical reading skills:**

- Recognition of author's purpose
- Awareness of stylistic differences
- Discernment of fact and opinion
- Evaluation of fact and opinion
- Recognition of propaganda techniques
- Present vocabulary building methods
- Use comprehension and vocabulary strategies to raise reading rate.

**UNIT V: SOFT-SKILLS**

1. Professional integrity
2. Managing time
3. Coping with stress
4. Organizational skills

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**

**ELECTRONICS CIRCUITS LAB**

| | | |
|---|---|---|
| Subject Code : PC 441EC | Instruction : 3 Periods/week | CIE – Marks : 25 |
| SEE – Marks : 50 | SEE - Duration : 3 Hours | Credits: 02 |

| Course Objective: | Course Outcomes |
|---|---|
| To develop an understanding of the underlying concepts of analog electronic circuits, wave shaping circuits and low pass/high pass filters. | **At the end of the course students will be able to:**<br>• Design different types of clippers, clampers and multi vibrators for the given specifications<br>• Analyze the circuits (amplifiers and oscillators) behavior with and without feedback.<br>• Analyze and compare performance of power amplifiers.<br>• Analyze the working of symmetrical and asymmetrical networks.<br>• Design T and π section filters for given specifications. |

**List of Experiments:**

1. Frequency response of single stage and two stage RC-Coupled amplifier using BJT.
2. Frequency response of single stage and two stage RC-Coupled amplifier using FET.
3. Clipping and Clamping Circuits
4. Measurement of Image impedance and characteristic impedance
5. Frequency response of Voltage series feedback amplifier
6. Frequency response of Current Shunt feedback amplifier
7. Bistable Multi vibrator, Schmitt trigger
8. Astable Multi vibrator and Voltage to frequency Converter
9. Monostable Multi vibrator
10. Design and verification of constant K- LPF (Frequency response)
11. Design and verification of m-derived- HPF (Frequency response)
12. Design and verification of L type matching network
13. Design of Oscillators: RC Phase Shift , Hartley, Colpitts
14. Design of tuned Amplifier
15. Design of Power amplifiers : Class – A and Class – B

**Suggested Reading:**

1. Robert Diffenderfer, "Electronic Devices Systems and Applications", Cengage Learning India Private Limited, 2010.
2. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**SIMULATION LAB FOR SIGNALS AND SYSTEMS**

| | | |
|---|---|---|
| Subject Code : PC 451EC | Instruction : 3 Periods/week | CIE – Marks : 25 |
| SEE – Marks : 50 | SEE - Duration : 3 Hours | Credits: 02 |

| Course Objective: | Course Outcomes |
|---|---|
| • To impart the knowledge to write MATLAB codes for the generation of signals, to perform different operations and to verify various transforms for converting time domain signal to frequency domain signal. | **At the end of the course students will be able to:**<br>• Write MATLAB codes for the generation of signals.<br>• Apply various transforms on signals to find it's Spectrum using MATLAB.<br>• Correlate two signals and can remove noise using correlation.<br>• Find the response of the system using convolution function in MATLAB.<br>• Perform sampling of continuous time signal. |

**List of Experiments:**

1. Basic operations on Matrices
2. Signal Representation.
3. Continuous Systems
4. Convolution Representation
5. Fourier Series
6. The Fourier Transform
7. Mini project-1
8. Frequency domain analysis of Systems
9. Fourier analysis of Discrete time signals and Systems
10. The Laplace transform and the transfer function representation
11. System analysis using the transfer function
12. State space and linear systems
13. Verification of Sampling theorem
14. Correlation between signals and Systems
15. Mini project -2

**Suggested Reading:**

1. Taan S. ElAli and Mohammad A. Karim, "Continuous Signals and systems with MATLAB", 2/e, 2009, CRC Press.
2. Edward W.Kamen and Bonnie S. Heck, "Fundamentals of Signals and Systems Using MATLAB", PHI Inc.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**ELECTRONIC ENGINEERING – II (For EEE)**

| | | |
|---|---|---|
| Subject Code : PC 440EC | Instruction : 3+1 Periods/ week | CIE – Marks : 30 |
| SEE – Marks : 70 | SEE - Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To familiarize the student with the analysis & design of feedback amplifiers, oscillators, multistage amplifiers and power amplifiers.<br>• To understand the operation and design of linear and non-linear wave shaping circuits.<br>• To study and analyze the frequency response of amplifier circuits.<br>• To know the fundamental concepts of Operational amplifier. | **At the end of the course students will be able to:**<br>• Analyze and design various feedback, multistage and large signal amplifiers.<br>• Design a sinusoidal oscillator.<br>• Analyze drift compensation techniques and differential amplifiers.<br>• Design and analyze linear and non-linear wave shaping circuits. |

**UNIT - I**

**Multi stage amplifiers:** Cascading amplifier stages, classification of amplifiers, frequency responses of RC coupled amplifiers, Transformer coupled amplifiers, effect of cascading on band width.

**D.C. Amplifiers:** Problems of D.C amplifiers, Drift Compensation techniques, Differential amplifiers, importance of CMRR.

**UNIT - II**

**Feedback amplifiers:** Concept of Feedback, General characteristics of negative feedback amplifier, Effect of negative feedback on input and output impedances, voltage and current, series and shunt feedbacks.

**UNIT - III**

**Oscillators:** Barkhausen criterion, RC oscillators, Wien bridge, phase shift, LC Hartley and Colpitts oscillator, Crystal oscillators (BJT only), frequency stability of oscillator.

**UNIT - IV**

**Power amplifiers:** Classification of power amplifiers, Analysis of class A and B power amplifiers, Harmonic distortion, Power dissipation, efficiency calculations, Push pull amplifiers, Complementary symmetry Power amplifiers.

**UNIT - V**

**Wave-Shaping Circuits:** RC low pass and high pass circuit, response to step, pulse, Ramp and square wave inputs, Clipping circuits for single level and two levels, clamping circuits.

**Suggested reading:**

1) Jacob Millman and Christos C. Halkias, "Integrated Electronics" Mc Graw Hill, 1991.

2) Jacob Millman and Christos C. Halkias, Satyabratajit "Electronics Devices and Circuits", McGraw hill, 3rd edition, 2010.
3) Jacob millman and Taub: "Pulse, Digital and switching wave forms", Mc Graw hill, 2003.
4) Sedra and smith, "Microelectronic Circuits" oxford university press, 5th edition, 2009.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING**
**ELECTRONIC ENGINEERING – II Lab (For EEE)**

| | | |
|---|---|---|
| Subject Code : PC 461EC | Instruction : 2 Periods/week | CIE – Marks : 25 |
| SEE – Marks : 50 | SEE - Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| To develop an understanding of the underlying concepts of analog electronic circuits including feedback amplifiers, power amplifiers & oscillators, and design linear wave shaping and non-linear wave shaping circuits. | **At the end of the course students will be able to:**<br>• Analyze the small signal amplifiers behavior with and without feedback<br>• Design and verify the functioning of various sinusoidal oscillators<br>• Examine the characteristics of a difference amplifier<br>• Design different types of clippers and clampers |

**List of Experiments Proposed:**

1. Frequency response of Voltage series feedback amplifier
2. Frequency response of Voltage Shunt feedback amplifier
3. Frequency response of Current series feedback amplifier
4. Frequency response of Current Shunt feedback amplifier
5. Design of Hartley Oscillator
6. Design of Colpitt's Oscillator
7. Design of RC Phase Shift
8. Difference amplifier(Op-Amp)
9. Transformer coupled Class A power amplifier
10. Class B Power amplifier
11. Linear wave shaping-Integrator & Differentiator
12. Clipping circuits
13. Clamping Circuits

**Suggested Reading:**

1. 1.Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001.
2. Paul B. Zbar, Industrial Electronics, A Text-Lab Manual, 3rd Edition, TMH 1983.