Department of Electronics and Telecommunication Engineering

Session: 2020-21

B. Tech. Third Semester

Electronics Devices and Circuits-I

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
ESC	ETT301	Electronic Devices and Circuits-I	2	1	0	20	20	60	100	3

Prerequisites: Basic knowledge of Semiconductor Physics (FYT106 and FYT110)

Course Objectives:

1. To understand properties, characteristics and behaviour of basic solid state devices such as PN junction diode/BJT/JFET
2. To know and analyze different amplifier configurations.
3. To introduce concepts of feedback in electronic circuits
4. To design Electronic circuits using diodes and transistors

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Explain the working principle, operation and characteristics of basic solid state devices such as PN junction diode, BJT and JFET.
2. Apply the concept of biasing techniques and feedback to improve stability of circuits.
3. Categorize amplifiers and oscillators based on feedback topology.
4. Analyze different amplifier configurations and DC bias circuitry of BJT.
5. Interpret BJT circuits for small signal at low and high frequencies.
6. Design Electronic circuits using diodes and transistors.

Course Contents:

Module-1: Semiconductor Theory and PN Junction Devices **5 Hrs**

Energy bands in silicon, intrinsic and extrinsic silicon , Carrier transport in silicon diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. P-N junction diode theory, Zener diode, Zener as a Voltage regulator, Tunnel diode, LED, Schottky diode, Varactor Diode operation, characteristics and applications such as Rectifiers, Filters

Module-2: Bipolar Junction Transistors **5 Hrs**

BJT Structure, Operation, Input and Output Characteristics in CE, CB and CC configuration, Comparison of transistor configurations , Ebers-Moll model, BJT biasing techniques, Load line concept, Thermal Runaway, Stability factor, Stabilization Techniques, Ratings and specifications of BJT from data sheet.

Module-3: Single Stage Amplifiers **5 Hrs**

BJT small signal model – Analysis of CE, CB, CC amplifiers, Concept of frequency response, Miller's theorem, Effect of coupling, bypass, junction and stray capacitance on frequency response of BJT amplifiers

Module-4: Power Amplifiers **5 Hrs**

Classes of Power amplifiers – Class A, Class B, Class AB, Class C and Class D amplifiers, Analysis of Class A, Class B, Class AB amplifiers, Distortions in amplifiers, concept of Total Harmonic Distortion, Comparison of power amplifiers

Module-5: Feedback Amplifiers And Oscillators **5 Hrs**

Feedback Concept, Classification of amplifiers based on feedback topology, (Voltage, Current, Transconductance and Transresistance amplifiers), Effect of negative feedback on various performance parameters of an amplifier, Analysis of one circuit for each feedback topology. Oscillators: - Condition for oscillations, Phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators

Module-6: Junction Field Effect Transistors **5 Hrs**

JFET:-Structure, Symbol, Basic Operation, Drain and Transfer Characteristics, Biasing arrangements for JFET, Biasing against device variation, biasing for zero current drift. Universal JFET bias curve, Ratings and specifications of JFET from data sheet.

Text Books:

1. Millman&Halkies, "Electronic Devices and Circuits", Second Edition, Tata McGraw Hill.

2. Boylestead&Nashelsky, "Electronic devices and Circuits Theory" Eighth edition, PHI

3. S. Salivahanan,N.Suresh Kumar,"Electronic devices and Circuits",Fourth Edition , McGraw Hill Education (India) Private Ltd
4. Donald Neaman, "Electronic Circuit Analysis and Design", Third Edition, Tata McGraw Hill

Reference Books.

1. MillmanHalkies, "Integrated Electronics", Seventh edition,Tata McGraw Hill.
2. David A. Bell,"Electronic Device and Circuits", Fourth Edition, PHI.
3. Gupta.J.B, "Electron Devices and Circuits", Second Edition ,S.K.Kataria& Sons,
4. Floyd,"Electronic Devices", Seventh Edition, Pearson.
5. Sedra and Smith, "Microelectronic Circuits ", Oxford University Press, 2004.
6. Ben G. Streetman "Solid State Electronic Devices ", Sixth Edition ,Pearson

E-Resources:

1. https://nptel.ac.in/courses/122/106/122106025/
2. https://onionesquereality.wordpress.com/.../more-video-lectures-iit-open
3. http://www.nesoacademy.org/electronics-engineering/analog-electronics/analog
4. http://www.electronics-tutorials.ws/transistor/tran_1.html
5. http://www.allaboutcircuits.com/textbook/semiconductors/chpt-1/active-versus-passive-devices/

Integrated Circuit and Applications

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETT302	Integrated Circuit and Application	2	1	0	20	20	60	100	3

Prerequisites:

1. Concepts of Basic Electrical Engineering.
2. Fundamentals of Engineering Mathematics

Course Objectives:

1. To understand characteristics of various Analog Circuits.
2. To study and interpret the datasheet
3. To study various op-amp parameters and their significance for Op-Amp.
4. To analyze and identify linear and nonlinear applications of Op-Amp.
5. To understand functionalities of PLL.

Course Outcomes:

Students will be able to:

1. Acquire the basic knowledge of OPAMP.
2. Relate the data sheet of different manufacturers.
3. Demonstrate the working principle of various analog circuits.
4. Evaluate various performance parameters and their significance for Analog circuits.
5. Compare multivibrator circuits, Data converters.
6. Design and analyze filters, Oscillators, linear and non-linear applications of Op-Amp.

Course Contents:

Module-1: Introduction to Operational Amplifier **5 Hrs**

Op-Amp Fundamentals: Block diagram of operational amplifier, Op-Amp parameters, virtual ground concept, Differential amplifiers, Interpreting datasheet. Inverting & non inverting configurations

Circuits with resistive feedback: Concept of feedback & their types.

Module-2: OP-Amp Linear Applications **5 Hrs**

Voltage follower, Summing amplifier, scaling and averaging amplifier, Instrumentation amplifier and applications, Integrator and differentiators (Practical considerations and design), current to voltage converters, voltage to current converters, Peak detector, using Op-Amp & Transistor and analog multipliers.

Module-3: OP-Amp Non Linear Applications **5 Hrs**

Comparators, Log and antilog amplifiers, Schmitt trigger, Clipper and Clamper, Precision Rectifier. Multivibrators: Bistable, Monostable, Astable multivibrator circuits using Op-Amp, Sample/Hold circuits.

Module-4: Signal Generator **5 Hrs**

Principle of Oscillators, Barkhausen's criterion, Oscillator types: RC, LC oscillators, Triangular wave generator, Saw tooth wave generators. Monolithic timer IC 555, applications of IC 555, V to F and F to V converters.

Module-5: Design of Converters and filters **5 Hrs**

D-A conversion techniques, A-D Conversion techniques, First and second order Low Pass filter, High Pass filter, Band Pass filter, Band Select and All pass active filters.

Module-6: Phase Locked Loops & multipliers **5 Hrs**

Block diagram of PLL free running frequency, lock range, capture range and Sample circuits for each block. Applications of PLL - Frequency synthesizer FM demodulator, AM demodulator, FSK demodulator, Analog multiplier, Multiplier IC.

Text Books:

1. David A. Bell, 'Op-amp & Linear ICs', Oxford, 2013.
2. D. Roy Choudhary, Sheil B.Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.
3. Ramakant A. Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000.
4. N. C. Goyal and Khetan 'A Monograph on Electronics Design Principals', Khanna Publications
5. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", Mc Graw Hill.

Reference Books:

1. Fiore, "Opamps & Linear Integrated Circuits Concepts & Applications", Cengage, 2010.
2. Floyd , Buchla, "Fundamentals of Analog Circuits", Pearson, 2013.
3. Jacob Millman, Christos C. Halkias, "Integrated Electronics – Analog and Digital circuits system", Tata McGraw Hill, 2003.
4. Robert F. Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', PHI Learning, 6th edition, 2012.
5. Tobey, Graham, Huelsman "Operational Amplifier Design and Applications" McGraw Hill.

Network Synthesis and Analog Filter

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETT303	Network Synthesis and Analog Filter	2	1	0	20	20	60	100	3

Prerequisites:

Basic knowledge of network analysis, Ohms law, Kirchoff's Current and Voltage law.

Course Objectives:

1. To review basic components of electric network.
2. To appreciate the consequences of linearity using various network theorems.
3. To analyze Analog circuits that include energy storage elements using Laplace transforms for circuit analysis.
4. To analyze and synthesize waveforms for different electrical parameters.
5. To analyze four terminal networks using two-port parameters
6. To learn about the basics of analog Filters

Course outcomes:

Students will be able to:

1. Define various terminologies and network theorems.
2. Understand the basics of Network synthesis and analog filters.
3. Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
4. Analyze steady state and transient response of electrical circuits
5. Characterize the transfer function for two – port networks.
6. Design various electrical circuits using network theorems.

Course Contents:

Module-1: Basics of electric circuits **5 Hrs**

Basics of electric circuits, circuit elements and their voltage – current relationship, classification of circuit elements, sources – their types and characteristics, concept of equivalent sources, source transformation, nodal analysis of circuits containing resistors,

inductors, capacitors, transformers, and both independent and dependent sources to determine current, voltage, power, and energy. Series Circuit, Parallel Circuit, Source shifting, Principe of duality, concept of V-shift and I-shift.

Module-2: Basics of Network Analysis **5 Hrs**

Mutual inductance, coefficient of coupling, dot convention, dot marking in coupled coils, mesh analysis of circuits containing resistors, inductors, capacitors, transformers, and both independent and dependent sources to determine current, voltage, power, and energy.

Module-3: Network Theorems **5 Hrs**

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

Module-4: Laplace Transform **5 Hrs**

Review of Laplace Transform, concept of complex frequency, transform impedance and admittance, s – domain impedance and admittance models for resistor, inductor and capacitor, series and parallel combinations of elements. Transformed network on loop and mesh basis, mesh and node equations for transformed networks, time response of electrical network with and without initial conditions by Laplace transform, Transient analysis.

Module-5: Introduction to Active Filters **6 Hrs**

Aspects of filter design problem, approximation problem in network theory, maximally flat low pass filter approximation (Butterworth), Chebyshev approximations.

Module-6: Synthesis of Active filters **5 Hrs**

Synthesis of Active filters: Low Pass, Band Pass, RC-CR Transformation, Sensitivity, Biquad Circuits.

Text Books:

1. Franklin Kuo, "Network Analysis & Synthesis", Wiley International.
2. Govind Daryanani, "Analysis and Synthesis of Filters".

Reference Books:

1. Kendall Su, " Analog Filters", Kluwer Academic Publisher, 2nd Edition, 2002.
2. John O' Malley, "Basic Circuit Analysis", Schaum's series.
3. Van Valkenberg, "Network Analysis", Pearson Education.

Analog Communication System

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETT304	Analog Communication System	2	1	0	20	20	60	100	3

Course Objectives:

1. To introduce the concepts of analog communication systems and to make the students understand the functions of major building blocks of communication system and noise performance.
2. To develop a clear insight into techniques involved in different types of modulation and demodulation of AM & FM signals.
3. To introduce the fundamental concepts of sampling theorem.
4. To describe the effect of noise in analog and pulse modulation systems

Course Outcomes:

At the end of this course, the students should be able to,

1. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
2. Distinguish between different types of analog modulation techniques based on bandwidth Occupied and power transmitted.
3. Analyze the performance of analog communications in the presence of noise by evaluating the figure of merit for different schemes of modulation
4. Evaluate different components of analog communication systems such as modulator, demodulator, mixer, receiver etc in time and frequency domain.
5. Design the modulators, demodulators for amplitude and frequency modulated systems.
6. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.

Course Contents:

Module-1: AM Transmission **5 Hrs**

Introduction Overview: Signals and their classifications, Fourier Analysis of Signals and Systems. Elements of a Communication System, Need for modulation, Channel, Noise, Band

pass transmission: Complex low pass representation of narrowband signals and systems, Equivalent low pass transmission model.

Module-2: AM Reception **6 Hrs**

Amplitude modulation DSB-FC, DSB-SC, SSB, VSB and ISB transmissions: mathematical Analysis-time and frequency domain analysis, modulation index, generation and detection methods, power requirement of these systems, Comparison of AM modulation schemes, Quadrature Carrier Multiplexing(QAM), frequency division multiplexing.

Module-3: FM Transmission **6 Hrs**

Angle Modulation Frequency Modulation (FM),: Single Tone Frequency Modulation, Spectrum Analysis, Narrowband FM, Wideband FM, Transmission Bandwidth of FM Waves, Generation of FM waves: Direct and Indirect Methods, Demodulation of FM, Phase Locked Loops, Limiting of FM waves, comparison between AM & FM, Phase Modulation, Relation between FM and PM.

Module-4: FM Reception **5 Hrs**

Radio Receivers and performance in the noise Basic receiver (TRF), Super heterodyne receiver for AM and FM, performance parameters for receiver such as sensitivity, selectivity, fidelity, image frequency rejection etc., AGC technique, Sources of noise, Signal to Noise Ratios, Figure of Merit Calculations, Noise in AM, Pre emphasis and De emphasis in FM, Comparison of Noise Performance of different modulation schemes.

Module-5: Applications of AM and FM **4 Hrs**

Applications of AM and FM AM Radio, Television: Video Bandwidth, Choice of Modulation, Colour Television, HDTV, FM Radio, FM Stereo Multiplexing.

Module-6: Acoustics **5 Hrs**

Acoustics: Introduction to acoustic transducers, microphone and loud speakers, construction, types, characteristics and applications, Block schematic of Public address system, High quality audio such as stereophonic, Dolby, surround, 3-D etc.

Text Books:

1. J. G. Proakis and M. Salehi, "Communication system engineering", 2/e, Pearson Education Asia, 2002.
2. R. E. Ziemer, W. H. Tranter, "Principles of Communications: Systems, Modulation, and Noise", 5/e, John Wiley & Sons, 2001.

3. Simon Haykins and Michael Moher,"Communication Systems", 5th Edition, John Wiley and sons, 201
4. Communication Systems - Analog and digital, Singh and Sapre, 2nd edition, 2007, TMH.

Reference Books:

1. Wayne Tomasi, "Electronic Communications Systems – Fundamentals Through advanced", 5th Edition Pearson Education, , 2012
2. H. Taub and D. L. Schilling, Principles of Communication Systems, 3rdReprint , McGraw Hill, 2006.
3. George Kennedy and Bernard Davis," Electronic Communication systems", 4th Edition, TMH, 2008
4. Modern digital and analog Communication systems, B. P. Lathi, 3rd edition, 2015, Oxford University Press.
5. Roddy and Coolen, "Electronic Communication Systems", Pearson Education.
6. Frank R. Dungan, "Electronic Communication Systems", Delmar Publishers.

Digital Circuits and Microprocessor

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETT305	Digital Circuits and Microprocessor	2	1	0	20	20	60	100	3

Course Objectives:

1. Develop a strong foundation of digital electronics.
2. Understand concepts of combinational and sequential circuits.
3. Develop and design synchronous circuits and sequential machines.
4. Understand the concepts of processors

Course Outcomes:

Students will be able to:

1. Define Logic Families and Programmable Devices and Understand the architecture of logic families and combinational digital circuits and describe the basic concept and interrupts in microprocessors.
2. Classify SOP and POS forms, combinational and sequential circuits, synchronous and asynchronous circuits.
3. Apply the principles of Boolean algebra to manipulate, minimize design logic circuits using logic gates and K-map and Use HDL & appropriate EDA tool for digital logic design and simulation.
4. Analyze combinational logic circuits and sequential circuits.
5. Recommend various combinational logic circuits like code converters, multiplexers, adders in the design of complex hierarchical combinational blocks like multipliers, fast adders etc and Validate sequential logic circuits elements like latches, flip-flops for counters, registers, simple finite state machine and similar circuits.
6. Design modular combinational circuits, synchronous sequential logic circuits and interface various devices with microprocessor.

Course Contents:

Module-1: Logic Simplification **6 Hrs**

Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Logic Gates, combinational Logic Optimization Techniques, Canonical forms of Boolean expression. Implementations of

Boolean expressions using logic gate, Introduction to logic families & their characteristics such as Fan-In, Fan-out, Propagation delay, Power dissipation, Noise Margin

Module-2: Combinational logic Design **5 Hrs**

Comparators, Multiplexers, Demultiplexer, Encoder, Decoder, K-Map, half and full adders, Subtractors, serial parallel adders, Barrel Shifter, ALU.

Module-3: Sequential circuits **5 Hrs**

Latches and flip-flops: SR-FF, D-FF, JK-FF, Master-Slave JK-FF & T-FF's, Excitation & Truth Table, Flip-flop conversions, Shift registers. Introduction to Synchronous Counters: Ring counter, Johnson counter.

Module-4: Synchronous machines **5 Hrs**

Classification of synchronous machines, Design of synchronous sequential machines using Moore & Mealy circuits: Sequence detector, State diagram and implementation.

Module-5: Fundamentals of Microprocessor **5 Hrs**

Basic 8085 microprocessor architecture and its functional blocks, 8085 microprocessor IC pin outs and signals.

Module-6: Programming with 8085 **6 Hrs**

Assembly Language Programming Basics, Addressing Modes, Instruction set ofmicroprocessor, Instruction timing diagram. Writing, Assembling & Executing AssemblyLanguage Programs, Memory Interfacing.

Text Books:

1. An approach to digital Design: Morris Mano, Pearson Publications.
2. Microprocessor Architecture, Programming and Applications with the 8085: RameshGaonkar, Penram International Publications.
3. Engineering Approach to Digital Design: W. Fletcher, PHI Publications.

Reference Books:

1. Fundamentals of digital circuits: A. Anand Kumar, Prentice-Hall of India, 4Edition.t
2. Modern digital Electronics: R.P. Jain, Tata McGraw Hill, 4Edition.r
3. Digital Electronic Principles: Malvino, PHI, 3Edition.

Multivariate Calculus

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
BSC	ETT306	Multivariate Calculus	2	1	0	20	20	60	100	3

Course outcomes:

Students will be able to:

1. Describe properties of Laplace transform, Convolution Theorem, Fourier integral theorem, Parseval's identity, Cauchy's integral theorem, Cauchy's residue theorem .
2. Illustrate the examples using Laplace transform, Fourier Transform, Partial differential equation, Function of Complex Variables, Matrices.
3. Apply the knowledge of Laplace transform, Z-transform, function of complex variable, Advance partial differential equation.
4. Analyze the question on Laplace transform, Fourier Transform, Partial differential equation, Function of Complex Variables
5. Create a modal using Laplace transform, Fourier Transform, Theory of probability, Function of Complex Variables, Matrices.

Course Contents:

Module-1: Matrices **5 Hrs**

Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Sylvester's theorem [without proof.]

Module-2: Laplace Transform **5 Hrs**

Definition – conditions for existence; Properties of Laplace transforms; Transforms of some special functions- periodic function, Heaviside-unit step function.

Module-3: Inverse LaplaceTransform **5 Hrs**

Introductory remarks; Inverse transforms of some elementary functions; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms; Applications to find the solutions of differential equations.

Module-4: Z-Transform **5 Hrs**

Definition, Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method), Solutions of Difference Equations with Constant Coefficients by Z- transform.

Module-5:Theory of Probability **5 Hrs**

Axioms of Probability, Conditional Probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions, Independent Random Variables, Conditional Distributions.

Module-6: Functions of Complex Variables **5 Hrs**

Analytic functions; Conjugate functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form,Cauchy's integral theorem; Bilinear transform Cauchy's integral formula; Residues; Cauchy's residue theorem (All theorem without proofs)

Text Books:

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
2. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
3. A Course in Engineering Mathematics (Vol III) by Dr. B. B. Singh, Synergy Knowledge ware,Mumbai.
4. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., NewDelhi.

Reference Books:

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, NewDelhi.
2. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd.,Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., NewDelhi.
4. IntegralTransformsandTheirEngineeringApplicationsbyDr.B.B.Singh,Synergy.Knowledg eware,Mumbai.
5. Integral Transforms by I. N. Sneddon, Tata McGraw-Hill, NewYork.
6. Advanced Mathematics for Engineers by Chandrika Prasad

Innovation

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
MC	ETT307	Innovation	1	0	0	50	0	0	50	Audit

Course Outcomes:

At the end of the Course, Student will be able to:

1. Discover the creative / innovative side within her/him.
2. Hone entrepreneurial and leadership skills within his/her personality.
3. Develop new ways of thinking and Learn the entire innovation cycle from Ideation to GoToMarket.
4. Study frameworks, strategies, techniques and business models for conceived ideas.
5. Develop skills for evaluating, articulating, refining, and pitching a new product or service.

Course Contents:

Introduction to Innovation, Personal thinking preferences, 'Innovation' mind set, Everydaycreativity and eliminating mental blocks, Introduction to Innovation, Creative thinkingtechniques, Innovation types, Idea management and approaches, Teaming techniques forcreativity, Idea Conception, Idea Scoping, Self Evaluation, Idea Brainstorming sessions, IdeaVerification, Market Evaluation, Concept Evaluation, Idea Verification, Prototype Evaluation,Protection/Patent review, Innovation Case Study, Idea Presentations, Idea Incubation,Productand Market Plan, Product and Market Development, Innovation Case Studies, IdeaIncubationand Product Launch, Marketing and selling, Post Launch Review

Reference Books:

1. Jeff Dyer, Hal Gregersen, Clayton M. Christensen, " The Innovator's DNA: Mastering the FiveSkills of Disruptive Innovators, Harvard Business Review Press, 2011.
2. Paddy Miller, Thomas Wedell-Wedellsborg, "Innovation as Usual: How to Help Your People BringGreat Ideas to Life , Harvard Business Review Press, Kindle Edition.

Ethics in Engineering

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
HSMC	ETT308	Ethics in Engineering	2	0	0	20	20	60	100	2

Course Objectives:

1. To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to value time.
2. To create awareness and providing basic knowledge about engineering Ethics, Professional Ideals and Virtues.
3. To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards.
4. To inculcate knowledge and exposure on Safety and Risk, Risk Benefit Analysis and have an idea about the Collective Bargaining, Confidentiality, Professional, Employee, Intellectual Property Rights.
5. To have an adequate knowledge about MNCs, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.

Course Outcomes:

The students will be able to

1. Recognize various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
2. Determine the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
3. Apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society
4. Analyze responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.
5. relate ethical principles to resolve situations that arise in their professional lives
6. Compose or Acquire knowledge about various roles of engineers in variety of global issues

Course Contents:

Module-I: Human Values **5 Hrs**

Morals, values and Ethics Integrity , Work ethic , Service learning , Civic virtue , Respect for others , Living peacefully , Caring , Sharing , Honesty , Courage , Valuing time , Cooperation , Commitment , Empathy , Self confidence , Character , Spirituality , Introduction to Yoga and meditation for professional excellence and stress management.

Module-II: Engineering Ethics **5 Hrs**

Senses of 'Engineering Ethics' , Variety of moral issues , Types of inquiry , Moral dilemmas , Moral Autonomy , Kohlberg's theory , Gilligan's theory , Consensus and Controversy , Models of professional roles , Theories about right action , Self-interest , Customs and Religion , Uses of Ethical Theories.

Module-III: Engineering As Social Experimentation **5 Hrs**

Engineering as Experimentation , Engineers as responsible Experimenters , Codes of Ethics , A Balanced Outlook on Law.

Module-IV: Safety, Responsibilities And Rights **5 Hrs**

Safety and Risk , Assessment of Safety and Risk , Risk Benefit Analysis and Reducing Risk - Respect for Authority , Collective Bargaining , Confidentiality , Conflicts of Interest , Occupational Crime , Professional Rights , Employee Rights.

Module-V: Intellectual Property Rights **6 Hrs**

Intellectual Property Rights (IPR) , Discrimination.

Module-VI: Global Issues **4 Hrs**

Multinational Corporations , Environmental Ethics , Computer Ethics , Weapons Development , Engineers as Managers , Consulting Engineers , Engineers as Expert Witnesses and Advisors , Moral Leadership ,Code of Conduct , Corporate Social Responsibility.

Text Books:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

Reference Books:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.

2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics , Concepts and Cases", Cengage Learning, 2009

3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003

4. Edmund G Seebauer and Robert L Barry, "Fundametals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001

5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi 2013.

6. World Community Service Centre, " Value Education", Vethathiri publications, Erode, 2011

E- resources:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

Electronics Devices and Circuits-I Lab

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
ESC	ETL301	Electronic Devices and Circuits-I Lab	0	0	2	40	0	60	100	1

Prerequisites: Basic knowledge of Semiconductor Physics and theoretical knowledge about the practical.

Course Objectives:

1. To identify Basic electronic components and devices
2. To observe the characteristics of diodes and Transistors
3. To analyze different amplifier configurations and their Frequency response
4. To design Electronic circuits using diodes and transistors

Course Outcomes:

At the end of the laboratory work, students will demonstrate the ability to:

1. Acquire the basic concepts of different semiconductor components and understand the use of semiconductor devices in different electronic circuits.
2. Identify basic devices such as diodes, BJT and JFET from their package information by referring to manufacturer's data sheets.
3. Plot and study the characteristics of semiconductor devices.
4. Simulate Electronic circuits using SPICE.
5. Calculate different performance parameters of transistor.
6. Design, buildand test the performance of variouscircuits.

List of Experiments:

1. To Plot the V- I characteristics of PN junction diode (Silicon), Zener diode, LED under forward and reverse bias conditions.
2. To find the i) Voltage regulation ii) Load Regulation of a Zener shunt regulator
3. To design Half wave rectifier (with and without Filter) and find ripple factor and efficiency of Half wave Rectifier
4. To plot input and output wave forms of the Full Wave Rectifier (with and without Filter) and find ripple factor and efficiency of Full wave Rectifier
5. To observe the action of a Transistor as an Electronic switch
6. To plot input and Output Characteristics of Common Base Transistor configuration
7. To plot input and Output Characteristics of Common Emitter Transistor configuration
8. To obtain Frequency Response of single stage CE Amplifier and Find performance parameters
9. To plot Drain and Transfer characteristics of Field Effect Transistor (JFET) and Find gm, rd and μ from characteristics
10. Design and simulate LC Oscillators (Compare practical and theoretical oscillation frequency)
11. Build and test RC oscillator
12. Design and simulate Power Amplifiers - Class A, Class B, Class AB
13. Design and simulate Voltage Shunt Feedback Amplifiers
14. Design and simulate Current Series Feedback Amplifiers
15. Applications of Diodes: To verify the truth table for Logic Gates (AND & OR) using Diodes

Integrated Circuit and Applications Lab

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETL302	Integrated Circuits and Applications Lab	0	0	2	40	0	60	100	1

Prerequisites:

1. Concepts of Basic Electrical Engineering.
2. Fundamentals of Engineering Mathematics

Course Objectives:

1. To learn about various types of analog systems.
2. To study the practical aspects of linear and non-linear applications of OP-AMP
3. To design the oscillators using OP-AMP and Transistors.
4. To study frequency response of different circuits based on operational amplifier

Course Outcomes:

Students will be able to:

1. Interpret the data sheet of different manufacturers.
2. Classify and comprehend the working principle of data converters
3. simulate filter circuits and oscillators using op-amp.
4. Illustrate the function of application specific ICs such as IC 555, PLL and its application in communication.
5. Analyze various linear and non linear applications of Op-Amp.
6. Design and construct waveform generation circuits.

List of Experiments:

1. Design Inverting and Non Inverting OP-AMP. Measure the gain and plot the input/output wave forms.
2. Implementation of Op-Amp as adder & subtractor.
3. To design OP-AMP as Integrator and Differentiator and plot its input/output wave forms.
4. To design OP-AMP as Schmitt trigger for generating a waveform of specific pulse width.
5. To design OP-AMP as peak detector.
6. To design OP-AMP as Precision rectifier and plot the waveforms.
7. To Verify Op-amp parameters (1) CMRR (2) Slew Rate.
8. Design and verify Multivibrator circuits using IC 555.
9. To study Phase Lock Loop using IC 565.
10. To study OP-AMP as Clippers & Clampers.
11. Design RC oscillator using OP-AMP and calculate its frequency.
12. Design LC oscillator and calculate its frequency.
13. Design first & second order low pass Butter worth filer.
14. Design first & second order high pass Butter worth filer.
15. Study of Multiplier IC.

Network Synthesis and Analog Filter Lab

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETL303	Network Synthesis and Analog Filter Lab	0	0	2	60	0	40	100	1

Course Outcomes:

At the end of the laboratory work, students will demonstrate the ability to:

1. Analyze the various electrical and electronic networks using the techniques they learn.
2. Construct a circuit to suit the need.
3. Design various types of Active and Passive filters given the specifications

List of Experiments:

1. Verification of Network theorems(Superposition, Thevenin's, Nortons, Reciprocity, MaximumPower Transfer)
2. Two-port network parameters: Determination of z, y, h, T parameters
3. Determination of transient response of current in RL and RC circuits with step voltage input.
4. Analysis of RL, RC and RLC circuit.
5. Attenuators: T –type, Ladder.
6. Attenuators:Lattice type attenuators.
7. Determination of frequency response of current in RLC circuits with sinusoidal ac input.
8. Passive filters I: Low-passfilter.
9. Passive filters I: High-pass filter.
10. Passive Filters-II: Band-pass filter.
11. Passive Filters-II: Band-stop filter.
12. Active filters I: Low-passfilter. (1st order and 2nd order)
13. Active filters I: High-pass filter. (1st order and 2nd order)
14. Active Filters-II: Band-pass filter. (1st order and 2nd order)
15. Active Filters-II: Band-stop filter. (1st order and 2nd order)

Analog Communication System Lab

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETL304	Analog Communication System Lab	0	0	2	60	0	40	100	1

Course outcomes:

Students will be able to:

1. Observe SSB detection techniques.
2. Realize various modulation technique..
3. Generate signals using Scilab.
4. Identify and design different analog modulation techniques.
5. Analyze multiplexing systems such as FDM,TDM and QAM.
6. Compare different communication systems by analyzing in time and frequency domain.

List of Experiments:

1. To generate amplitude modulated wave and determine the percentage modulation.
2. To generate frequency modulated signal and determine the modulation index and bandwidth for various values of amplitude and frequency of modulating signal.
3. To generate SSB using phase method and detection of SSB signal using Synchronous detector.
4. To generate DSB using phase method and detection of DSB signal using Synchronous detector
5. To generate the pulse amplitude modulated and demodulated signals
6. To Implement the pulse width modulated and demodulated signals
7. To Design & generate the pulse position modulated and demodulated signals
8. To Study Differential PULSE Code Modulation & Demodulation
9. Implement and Study the AM Superhetrodyne radio receiver

10. To construct the frequency division multiplexing and demultiplexing circuit and to verify its operation
11. To perform the AM DSB-SC signal Generation and Detection using Scilab Simulink.
12. To perform the FM signal Generation and Detection using Scilab Simulink.
13. Quadrature Amplitude Modulation and Demodulation.
14. Time Division Multiplexing and Demultiplexing.
15. Study of phase modulator.

Digital Circuits and Microprocessor Lab:

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETL305	Digital Circuits and Microprocessor Lab	0	0	2	60	0	40	100	1

Course Objectives:

1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

2. To prepare students to perform the analysis and design of various digital electronic circuits.

3. To study programming based on 8085 microprocessor

Course Outcomes:

Students will be able to:

1. Find and prevent various hazards and timing problems in a digital design.

2. Understand the fundamental of basic gates and their use in combinational and sequential circuits Outline the use of digital components as a switching elements.

3. Develop ability to handle arithmetic operations using assembly language programming.

4. Analyze basic arithmetic and logical circuits required in microcomputer systems.

5. Examine the structure of various number systems and its application in digital design.

6. Design various combinational and sequential circuits and develop skill to build, and troubleshoot cost effective digital circuits.

List of Experiments:

1. Verification and interpretation of truth table for AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates.
2. Construction of half / full adder using XOR and NAND gates and verification of its operation.
3. To Study & Verify Half and Full Subtractor.
4. Verify the truth table of RS, JK, T and D flip-flops using NAND & NOR gates.
5. Implementation and verification of decoder/de-multiplexer and encoder using logic gates.
6. Implementation of 4x1 multiplexer and 1x4 demultiplexer using logic gates.
7. Design and verify the 4- Bit Synchronous/ Asynchronous Counter using JK flip flop.
8. Verify Binary to Gray and Gray to Binary conversion using NAND gates only.
9. Verify the truth table of one bit and two bit comparator using logic gates.
10. Write a Program Using 8085 & Verify for :
    a. Addition of Two 8-Bit Numbers.
    b. Addition of Two 16-Bit Numbers. (With Carry)
11. Write a Program Using 8085 & Verify for :
    a. Subtraction of Two 8-Bit Numbers. (Display of Borrow)
    b. Subtraction of Two 16-Bit Numbers. (Display of Borrow)
12. Write a Program Using 8085 & Test for Typical Data:
    a. Multiplication of Two 8-Bit Numbers by Bit Rotation Method
    b. Division of Two 8-Bit Numbers by Repeated Subtraction Method
13. Write a Program to Move a Block of Data Using 8085 & Verify
14. Write a Program to Arrange Number in Ascending Order Using 8085 & Verify.
15. Write a Program to Check Number of 1's and 0's in Given Number Using 8085 & Verify.