PROPOSED CURRICULA AND SYLLABI
FOR

S.Y. B. Tech.

(Electronics & Telecommunication Engineering)

with effect from
Academic Year 2016-2017
onwards

Department of Electronics and Telecommunication Engineering
Shri Guru Gobind Singhji Institute of Engineering & Technology
Vishnupuri, Nanded (M.S.) PIN 431606 INDIA

Programme Syllabus Scheme for
S.Y. B.Tech. (Electronics & Telecommunication)
Academic Year 2015-16 onwards

Semester I

Course Code	*Course Title*	*Lectures (L)*	*Tutorials (T)*	*Practical (P)*	*Credits*
MA201	Mathematics-III	4	0	0	4
EC251	Basic Electronic Devices and Circuits	3	1	2	5
EC252	Data Structures	3	0	2	4
EC253	Digital Circuits and Design	3	0	2	4
EC254	Electronic Instrumentation	3	0	2	4
HS222	Human Values and Professional Ethics	2	0	0	2
	Total	18	1	8	23

Semester II

Course Code	*Course Title*	*Lectures (L)*	*Tutorials (T)*	*Practical (P)*	*Credits*
MA202E	Mathematics-IV (Transforms)	4	0	0	4
EC255	Analog and Digital Electronic Circuits	3	1	2	5
EC256	Circuit Theory	3	1	2	5
EC257	Communication Engineering Principles	3	0	2	4
EC258	Microcontroller and Applications	3	0	2	4
HS221	Professional Communication	2	0	2	3
	Total	18	2	10	25

N.B.: Lectures/Tutorials/Practical are mentioned in Hours/Week

Programme Examination Structure for S.Y. B.Tech. (Electronics & Telecommunication) Academic Year 2015-16 onwards

Semester I

Course Code	*Course Title*	*Theory*		*Practical*		*Credits*
		Mid Term	*End Term*	*Mid Term/ Continuous Evaluation*	*End Term/ Continuous Evaluation*	
MA201	Mathematics-III	30	70	-	-	4
EC251	Basic Electronic Devices and Circuits	30	70	50	50	4
EC252	Data Structures	30	70	50	50	4
EC253	Digital Circuits and Design	30	70	50	50	4
EC254	Electronic Instrumentation	30	70	50	50	4
HS222	Human Values and Professional Ethics	30	70	50	50	2

Semester II

Course Code	*Course Title*	*Theory*		*Practical*		*Credits*
		Mid Term	*End Term*	*Mid Term/ Continuous Evaluation*	*End Term/ Continuous Evaluation*	
MA202E	Mathematics-IV (Transforms)	30	70	-	-	4
EC255	Analog and Digital Electronic Circuits	30	70	50	50	5
EC256	Circuit Theory	30	70	50	50	5
EC257	Communication Engineering Principles	30	70	50	50	4
EC258	Microcontroller and Applications	30	70	50	50	4
HS221	Professional Communication	30	70	50	50	3

SEMESTER I

MA201 MATHEMATICS III (L-4, T-0, P-0, Credits-4)

Teaching Scheme	*Examination scheme*
Lectures: 4 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks

Course objectives:

- To acquaint student with:
  - The basic concepts of an ordinary differential equations
  - Partial differential equations
  - Mathematical Modelling in physical problems
  - Initial and boundary value problems
- Motivate students to use critical thinking skill to solve practical problems.

Course Syllabus:

Unit-1: Basic Concepts & Ideas, Geometric Meaning of $y' = f(x, y)$, direction field , exact equations, Integrating factors, Linear differential equation, Bernoulli's equations, orthogonal trajectories, applications to electrical circuits.

Unit-2: Second Order Differential equations, Homogeneous linear differential equation for real & complex roots, Euler Cauchy equation, existence & uniqueness theorem (Without proof) & Wronskian.

Unit-3: Non homogeneous equation, solutions by undetermined coefficients & Variation of parameter methods, modelling, forced oscillation, resonance & electrical circuits, system of differential equations.

Unit-4: Fourier series, Periodic function, Fourier theorem Euler's formulae for the Fourier coefficients, convergence of Fourier series, change of interval, even & odd function, half range Fourier series.

Unit-5: Partial differential equations, Separation of Variables, Vibrations of string, one dimensional equation.

Text/Reference Books:

1. Advanced Engineering Mathematics – R.K Jain & S.R.K Iyenger
2. Advanced Engineering Mathematics- Erwin Kreyszig
3. Elementary Differential Equation(eighth edition) W.E Boyce & R. Diprima (John Wiley 2005)
4. Fourier series & boundary Valued Problems., R.V Churchill & JW Brown(Seventh edition) Mc Graw Hill(2006)

Course Outcomes: At the end of the course the student is expected to understand:

- Importance of differential equations i.e. ODE and PDE in physical problems.
- Able to solve IVP in electrical and mechanical problems.
- Analyzing physical phenomena in engineering and technology by using this theory.

EC251BASIC ELECTRONIC DEVICES AND CIRCUITS (L-3, T-1, P-2, Credits-5)

Teaching Scheme	*Examination scheme*
Lectures: 3 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks
Tutorial: 1 hrs/week	
Practical: 2 hrs/week	Mid-term 50 marks, End-term 50 marks

Course objectives:

- To acquaint student with:
  - Semiconductor material properties
  - Basic semiconductor device and its application
  - MOSFET and BJT amplifier design process
  - Amplifier frequency response at low and high frequency.
- Motivate students to use critical thinking skill to design MOSFET amplifier.

course Syllabus:

Review of semiconductor materials: Concept of semiconductors, Electrical characteristics of Si, Ge, and GaAS, etc.; Intrinsic and extrinsic material; drift and diffusion current concept in semiconductor material.

Diodes and diode circuits: P-N Junction diode: Formation, working and characteristics; Diode models; Static and dynamic diode resistance using concept of load line; Diode circuits such as HWR, FWR, clippers, doubler/trippler, and clampers; Zener diode; Applications of zener diode such as regulated power supply. (Self-study syllabus: Types of different diodes such as LED, Schottky, tunnel, PIN, solar cell, etc., and their applications; Datasheets of commonly used diodes)

The concept of amplifier: The concept of amplifier; Their types such as voltage, current, transresistance and transconductance; Ideal amplifier characteristics; Loading effect on practical amplifiers.

MOSFETs and Amplifiers: Study of n-channel and p-channel enhancement type MOSFETs:, MOSFET characteristics and operating modes; Current biasing of MOSFETs and concept of current mirror; load line and graphical analysis using the same; MOSFET Small Signal model; Basic transistor amplifier configurations: CS, CD, and CG; Small signal analysis of CS, CD and CG amplifiers; MOSFET second order effect; Effect of channel-length modulation on small signal model; voltage divider biasing; CS, CD, and CG circuits including voltage divider biasing and channel-length modulation effect; Small-signal analysis of degenerated CS amplifier circuit. (Self-study syllabus: MOSFET as a load and biasing, MOSFET-only amplifiers without passive resistances, Datasheets of commonly used MOSFETs)

BJTs and Amplifers: Transistor structure, input and output characteristics of CE configuration, Mode of operations; Early effect; Biasing of BJT; Small-signal-low-frequency *gm-rπ* and h-parameter models of transistor for different configurations; CE (with and without bypassed emitter), CC, and CB amplifier circuits with infinite coupling and bypass capacitors; Bootstrapping for high input-impedance (Self study syllabus: Input and characteristics of CC and CB configuration; Datasheets of commonly used transistors)

Frequency response: Single-stage RC LP and HP time constants, Frequency response of single-stage RC circuits; Amplifier frequency response, System transfer function, Bode plot, Frequency analysis of

transistor amplifiers with coupling and bypass capacitors on lower frequency spectrum; High-frequency models of BJT and MOSFET; Miller effect; Unity gain-bandwidth product; Load-capacitor concept; Frequency analysis of transistor amplifiers with on lower frequency spectrum.

Reference Books:

1. Donald A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw-Hill.
2. Sedra/Smith, Microelectronic Circuits, Oxford University Press.
3. J. Millman and C. C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, Tata McGraw-Hill Publishing Company.
4. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, PHI publishers.

Course Outcomes: At the end of the course the student is expected to understand:

- The Course gives an overview of various semiconductor devices.
- Verify working of diodes, transistors (BJT & MOSFET) and their applications.
- Set up bias point in transistor as per given specifications
- Build common emitter/base/collector and common source/drain/gate amplifier circuits and measure their gain and input output impedances.
- Develop the capability to analyze and design simple circuits containing nonlinear elements such as transistors using the concept of load lines, operating point and incremental analysis.

EC252 DATA STRUCTURES (L-3, T-0, P-2, Credits-4)

Teaching Scheme	*Examination scheme*
Lectures: 4 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks
Practical: 2 hrs/week	Mid-term 50 marks, End-term 50 marks

Course objectives:

- To acquaint student with:
  - Algorithm analysis and its complexity.
  - Data structure design methodologies and its implementation.
- Motivate students to use critical thinking skill to implement algorithms and data structures.

Course Syllabus:

Overview of C++

Overview of C++, C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and de-allocation (new and delete), exception handling.

Introduction to Data Structure

Algorithms, performance analysis- time complexity and space complexity. Basic terminology, Elementary Data Organization, Definition of Data structure and Abstract data type, Classification of Data structures.

Arrays

Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C++, Character string operation, Array as Parameters, Ordered List, Sparse Matrices and Vectors.

Stacks
Array Representation and Implementation of stack, Operations on Stacks: Push, Pop, Traverse. Linked Representation of Stack, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack, Applications in recursion

Queues
Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues.

Linked List
Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

Trees
Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

Searching and Hashing
Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

Sorting
Selection sort, Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.

Binary Search Trees
Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

Graphs
Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

File Structures
Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

Reference Books:

1. Langsam Y,.Augenstein M.J and Tanenbaum A. M, "Data Structures Using C and C++", Second Edition, Pearson Education, 2007.
2. Kruse R, Tonodo C.L. and Leung B, "Data Structures and Program Design in C", Pearson Education, 2007.
3. Horowitz E, Sahni S and Mehta D, "Fundamentals of Data Structures in C++," Galgotia Publiction, 2009.
4. Weiss M A, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2007.

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:

- Identify, understand and determine the usage of various data structures, operations and associated algorithms.
- Understand, analyze and Develop programs to implement different data structures such as: arrays, linked lists, stacks, queues, trees, hash tables, and graphs and related algorithms
- Compare different implementations of data structures and to recognize the advantages and disadvantages of the different implementations.
- Data structure implementation
- Algorithm analysis, complexity and its implementation

EC253DIGITAL CIRCUITS AND DESIGN (L-3, T-0, P-2, Credits-4)

Teaching Scheme	*Examination scheme*
Lectures: 3 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks
Practical: 2 hrs/week	Mid-term 50 marks, End-term 50 marks

Course objectives:

- To acquaint student with:
  - Basic number system and codes used in digital design.
  - Real time problem implementation using Boolean functions.
  - Combinational and sequential logic design and basic digital design building block.
- Motivate students to real time applications using digital circuits.

Course Syllabus:

Number Systems and Codes: Binary, Octal, Decimal and hexadecimal number systems, their conversion, Binary arithmetic, BCD, Octal, and Hexadecimal codes, Excess-3, Biquinary, and other BCD codes, Parity in codes, Code detection and Correction, Gray code, Encoding and Decoding for security.

Boolean Algebra and Logic Gates: Theorems and properties of Boolean algebra, Boolean functions, Canonicals and standard forms, Other logic operations, Digital logic gates, Digital IC logic families, Logic design examples.

Simplification of Boolean Functions: The K-map method: 2, 3, and 4 variable maps, five and six variable maps, Quine McCluskey method of simplification and NAND-NOR realization.

Combinational Logic Design: Adders, Subtractors, Code converters, Binary parallel adders, Decimal adders, Magnitude comparators, Decoders, Multiplexers, Demultiplexers, Signed magnitude numbers and their arithmetic implementation.

Sequential Logic Design: Flip-flops, Analysis of clocked sequential circuits, J-K, D, T, SR flip-flops, Excitation tables of flip-flops and their applications.

Counters and Shift Registers: Asynchronous counters, Synchronous counters, mod-3, Counters, mod-5 counters, presettable counters, shift-counters, Up-down counters, Ripple counters, Shift registers, Serial in serial out, Serial in parallel out, Parallel in serial out, and Parallel in parallel out shift registers, Introduction to VHDL/Verilog.

Semiconductor Memories: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memories, Read only memories, R/W memories, content addressable memories, PLA and CCD memories.

Text/Reference Books

1. M. Morris Mano, Digital Logic and Computer Design, PHI Publication, New Delhi.
2. William I. Fletcher, An Engineering approach to Digital Design, PHI Publication, New Delhi.
3. Malvino and D. Leach, Digital Principles and Application, Mc Graw Hill Book Company.
4. R. P. Jain, Modern Digital Electronics, McGraw Hill Book Company.
5. Louis Nashelsky, Introduction to Digital Technology, John Wiley & Sons.
6. Williams H. Gothman, Digital Electronics, PHI Publication, New Delhi.

Course Outcomes: At the end of the course the student is expected to understand:

- Acquire knowledge of basics of digital electronics.
- Able to solve problems related to number systems, codes and Boolean algebra.
- Design combinational circuits such as adders, subtractors and muliplexers etc.
- Design of sequential circuits such as flip flops, counters and registers etc.
- Acquire knowledge of Digital ICs characteristics and logic families.

EC254 ELECTRONIC INSTRUMENTATION (L-3, T-0, P-2, Credits-4)

Teaching Scheme	*Examination scheme*
Lectures: 3 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks
Practical: 2 hrs/week	Mid-term 50 marks, End-term 50 marks

Course objectives:

- To acquaint student with:
  - Electronic measurement and its parameters.
  - Types of sensors and transducers.
  - Electrical parameter measurement using bridges.
- Motivate students to verification of electronic systems using electronic measurement and instrumentation.

Course Syllabus:

Measurement and error: Generalized Measurement System, Accuracy and Precision, Significant Figures, Types of Errors, Statistical Analysis, Probability of Errors, Limiting Errors, etc.

Primary sensing elements and transducers: Definition and Classification of Transducers, Characteristics and Choice of Transducers, Potentiometer, Strain Gauges, RTD, Thermister, Thermocouple, LVDT, RVDT, Capacitive Transducer, Piezo-Electric Transducer, Hall Effect Transducers, Photo Emissive Cell, Photoconductive Cell, Photovoltaic Cell, Photo Diode, Photo Transistor, Microphone, Loud Speaker and their Applications.

Electronic Instruments for Measurement of Basic Parameters: DC Meter, AC Voltmeter Using Rectifiers, True Rms Responding Volt-Meter, Electronic Multi-Meter, DVM, etc.

Bridge Measurement: Wheatstone Bridge, Kelvin Bridge, Maxwell Bridge, Hay Bridge, Schering Bridge, Wien Bridge, etc.

Oscilloscopes: Block Diagram of General Purpose Oscilloscope, Vertical Deflection System, Horizontal Deflection System, Probes, Dual Beam Oscilloscope, Dual Trace Oscilloscope, Lissajous Patterns, Storage Oscilloscope, etc.

Reference Books :

1. Alan S. Morris, "Principles of Measurements & Instrumentation", PHI.
2. A.D. Helfrick & W.D. Cooper, "Modern Electronic Instrumentation & Measurement Techniques", PHI.
3. Oliver Cage," Electronic Measurement", McGraw Hills.
4. Clyde F. Coombs, " Electronic Instruments Handbook", McGraw Hills.
5. Hewlett Packard, Tektronics, Advantest, Aplab, " Application Notes on Measurement".
6. A.K. Sawhney, "A course in Electrical and Electronic measurements and Instrumentation",Dhanpat Rai and Company.

Course Outcomes: At the end of the course the student is expected to understand:

- Analyze and Identify the instrument suitable for specific measurements.
- Understand and estimate errors in different measurement system and calculate accurately the values of R, L and C using suitable bridges.
- Understand and identify the basic principles of transducers for displacement, velocity, temperature and pressure.
- Apply special measuring techniques in instruments such as CRO, Wave Analyzer and Digital spectrum analyzer.
- Identify data acquisition system for a specific application.

HS222HUMAN VALUES AND PROFESSIONAL ETHICS (L-2, T-0, P-0, Credits-2)

Teaching Scheme	*Examination scheme*
Lectures: 2 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks

Examination scheme: 30* + 70 marks

*30 marks- The marks can be awarded on the basis of formal Mid-term Examination or sessional or assignments as prescribed by the concerned subject teacher(s) and the course co-ordinator for the specific semester/ academic year.

Objective of the Course:

- Making the student aware and sensitive to value system in real life situations.
- To help the students to discriminate between ephemeral and eternal values
- To discriminate between essence and form

Course Syllabus:

Unit 1:Course introduction: Need basic Guidance, Content and Process for Value Education

- Understanding the need, basic guidelines, content and process for Value Education
- A look at basic aspirations: Self Exploration, Happiness and Prosperity
- Fulfilment of human aspirations and harmony

Unit 2:Understanding the Harmony

- Thoughtful human being harmony, sentient, attitude and its importance in relationship
- Significance of restrain and health (yama and Niyama)
- Human goal settings and life management techniques, existence and co-existence, trust, respect in universal order

Unit 3:Understanding professional Ethics

- Harmony at various levels and understanding professional ethics
- Creating environmentally aware engineers
- Humanistic universal education, natural acceptance of human values, ethical human conduct

Unit 4:Competence of professional ethics

- Management models for present technologies, strategies for integrating humans in family and at all levels of existence
- Relevance of the above strategies in becoming responsible engineers, technologists and managers

Unit 5:Motivation

Text/Reference Books :

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
5. A.N. Tripathy, 2003, Human Values, New Age International Publishers
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
8. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
9. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
10. Subroto Bagchi, The Professional
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008. Scheme and Syllabus Bachelor of Computer

Course Outcome:

- The students will be able to recognise importance of human values, harmony and ethical behaviour in real life situations.

SEMESTER II

MA202EMATHEMATICS IV (TRANSFORMS)(L-4, T-0, P-0, Credits-4)

Teaching Scheme	*Examination scheme*
Lectures: 4 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks

Course objectives:

- To acquaint student with:
  - Laplace Transforms
  - Fourier Transforms
  - Linear Difference Equation and Z-transforms
- Motivate students to use critical thinking skill to solve practical problems.

Course Syllabus:

Laplace Transformation: Introduction, Basic properties of Laplace Transform, Laplace Transform of derivatives, Laplace Transform solution of Initial value problems, Laplace Transform of integrals, Differentiation of Laplace Transform, Integration of Laplace Transform, Convolution theorem. Unit step function, Second shifting theorem, Laplace Transform of Dirac-delta function and Laplace Transform of periodic functions.

Fourier Integral, Fourier Transforms and Integral Transforms: Fourier integral Theorem, Fourier Transform, Convolution, Finite Fourier Sine and Cosine Transform, Parseval's identity for Fourier Transform, Solution for partial differential equations using Fourier Transform.

Linear Difference Equation and Z – Transform: Introduction, Z- Transforms, Standard Z-Transforms, Properties of Z- Transform, Inverse Z- Transform, Convolution Theorem, Solution of difference equations.

Text/Reference Books:

1. R.K. Jain, S.R.K. Iyengar, "Advanced Engineering Mathematics"
2. Erwin Kreyszig, "Advanced Engineering Mathematics"
3. W.E. Boyace, R. Diprima, "Elementary Differential Equation"
4. B.V. Ramana, "Higher Engineering Mathematics"
5. Koneru S. Rao, "Engineering Mathematics"

Course Outcomes: At the end of Course the students are expected to understand and to solve,

- Initial value problem by Laplace transform method.
- Partial differential equation by Fourier transform method.
- Difference equation by Z-transform method

EC255 ANALOG AND DIGITAL ELECTRONIC CIRCUITS(L-3, T-1, P-2, Credits-5)

Teaching Scheme	*Examination scheme*
Lectures: 3 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks
Tutorial: 1 hrs/week	

Practical: 2 hrs/week	Mid-term 50 marks, End-term 50 marks

Course objectives:

- To acquaint student with:
  - Biasing Stability considerations
  - Multistage and feedback concepts
  - Oscillators and multivibrators
  - Power amplifiers
  - Introduction to MOSFET digital circuits o Preliminary OPAMP knowledge
- Motivate students to use critical thinking skill to the advanced analog design

Course Syllabus:

Biasing Stability considerations

Temperature dependency on biasing; Device-parameter dependency; Stability factor; Thermal runaway. (Self-study syllabus: Derivations of Stability Factor for various biasing schemes, Bias compensation circuits using Diodes and Thermistors)

Multi-stage Amplifiers

Multi-stage amplifiers using BJT and MOSFET; Small-signal analysis of multi-stage amplifiers; Darlington circuit, Cascode circuit; Design of amplifiers based on given specifications. (Self-study syllabus: Concept of noise in amplifiers, Types of noise, Noise Figure)

Negative feedback Amplifiers

Feedback concept; General characteristics of negative feedback amplifiers; Gain, input and output resistance with feedback; Method of analysis of feedback amplifier; Voltage series, current series, voltage shunt, and current shunt amplifiers using BJT and MOSFET; Design of feedback amplifiers. (Self-study syllabus: Stability of amplifiers, gain and phase margins, compensation)

Sinusoidal oscillators

Criterion for oscillation; Barkhausen criteria; LC, RC, Wien bridge, and Crystal oscillators. (Self-study syllabus: Derivations of Frequency and gain criteria)

Power Amplifiers and output stages

Power transistors; Power amplifiers; Classes of amplifiers: class-A power amplifiers, class-B power amplifiers, Class-AB push-pull complementary output stages, class-C and class-D; Other power considerations.

Multivibrators

Bistable, monostable, and astable multivibrators using BJT; Triggering methods; Commutating capacitors; Schmitt trigger; Temperature effect on timings; Recovery at collector; Gated astable multivibrator.

MOSFET Digital Circuits

NMOS/PMOS Inverters; NMOS/PMOS Logic circuits (NAND/NOR); CMOS Inverter; CMOS Logic circuits (NAND/NOR); Transmission gates. (Self-study: RAM Cell, ROM)

Introduction to OP-AMPs

Differential amplifier using BJTs and MOSFETs; Ideal Op-Amp; Basic three-stage op-amp circuit using BJT and MOSFET

Reference Books:

1. Donald A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw-Hill.
2. Adel S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford University Press.

3. J. Millman and C. C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, Tata McGraw-Hill Publishing Company.
4. J. Millman, H. Taub and S. R. Mothiki, Pulse Digital and Switching Waveforms, Tata McGraw-Hill.
5. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, PHI publishers.
6. Ramakant Gayakwad, Op-amps and Linear Integrated Circuits, PHI publishers

Course Outcomes: At the end of the course the student is expected to understand:

- Verify stability using relevant parameters, setup bias point in transistors for designing of amplifiers as per given specifications.
- Build single stage, multistage, feedback amplifiers and calculate their gain, input impedance and output impedance.
- Develop the capability to analyse and design different types of oscillators and multi-vibrators.
- Design simple CMOS logic circuits.
- Illustrate the use of operational amplifier for practical applications.

EC256 CIRCUIT THEORY (L-3, T-1, P-2, Credits-5)

Teaching Scheme	*Examination scheme*
Lectures: 3 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks
Tutorial: 1 hrs/week	
Practical: 2 hrs/week	Mid-term 50 marks, End-term 50 marks

Course objectives:

- To acquaint student with:
  - Identify linear systems and represent those systems in schematic form
  - Apply Kirchhoff's current and voltage laws and Ohm's law to circuit problems
  - Simplify circuits using series and parallel equivalents and using Thevenin and Norton equivalents
  - Perform node and loop analyses and set these up in standard matrix format
  - Identify and model first and second order electric systems involving capacitors and inductors
  - Predict the transient behavior of first and second order circuits.
- Motivate students to use critical thinking skill to the advanced circuit design

Course Syllabus:

Network Theorems: Review of KCL, KVL, nodal and mesh analysis.Wye-Delta transformation.Thevenin's, Norton's,Superposition, Maximum power transfer theorems, Reciprocity and Tellegen's theorems.

Time domain analysis of simple RLC circuits: Transient Network Analysis**:** Response of RL, RC and RLC networksusing linear differential Equations and Laplace Transforms for unit step, impulse and ramp inputs.

Network Functions: Driving point impedances; Transfer functions ofnetworks.

Two Port Networks and their Characterization: Open circuit, shortcircuit, hybrid and transmission parameters; Series, parallel and tandemconnections of two-port networks, analysis of interconnected (magnetically coupled) two port network.

Three-Phase A.C. Circuit Analysis: Analysis of balanced andunbalanced three-phase networks; Symmetrical components and theirapplication in analysis of unbalanced networks; Analysis of A.C. circuitswith non-sinusoidal inputs

Network Synthesis: Poles and zeros of network functions, positive realfunctions and their properties, tests for positive real functions, Hurwitzpolynomials; Driving-point synthesis of LC, RC and RL networks,Foster forms and Cauer forms.

Network Topology: Concept of network graphs, tree, link, cut set,network matrices, node incidence matrix, loop incidence matrix, cut setincidence matrix, network analysis using network incidence matrices.

Introduction to Computer Aided Network Analysis : Analysis oflinear and non-linear networks, concept of companion network model;Computer aided transient network analysis.

Reference Books:

1. Hayt, Kemmerley and Durbin, "Engineering Circuit Analysis", 8th 2012Ed., Tata McGraw-Hill
2. De Carlo, R.A. and Lin, P.M., "Linear Circuit Analysis: Time Domain, Phasor and Laplace Transform Approaches", Oxford University Press.2003
3. M.E. Van Valkenburg, "Network Analysis", 3rd ed., Pearson 2006
4. M.E. Van Valkenburg, "Network Synthesis," PHI 2007
5. Kuo, F.F., "Network Analysis and Synthesis", 2nd Ed., Wiley India. 2008.

Course Outcomes: At the end of the course the student is expected to:

- Compute responses of first order and second order networks using time domain analysis.
- Determine two port network parameters and their conversions
- Compute responses of first order and second order networks using frequency domain analysis.
- Analyze networks using Thevenin, Norton, Maximum power transfer, Superposition theorems,Delta wye conversions.
- Analyse magnetically coupled and poly phase circuits ,synthesize one port networks and determine tie-set and cutset matrices for networks.
- Apply their knowledge in solving complex circuits through laboratory exercises.

EC257 COMMUNICATION ENGINEERING PRINCIPLES (L-3, T-0, P-2, Credits-4)

Teaching Scheme	*Examination scheme*
Lectures: 3 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks
Practical: 2 hrs/week	Mid-term 50 marks, End-term 50 marks

Course objectives:

- To acquaint student with:
  - Basic communication systems.
  - Probability and theory of random signals with operations on random variables.
  - Basic modulation and demodulation techniques.
  - Radio transmission and reception mechanism.
  - Basics of modern communication.
- Motivate students to learn advanced communication technologies.

Course Syllabus:

Introduction to Communications Systems: Elements of a communication system, The Channel, Frequency bands, Band width, Noise in communication system, Signal to noise ratio, Noise Figure, Fundamentals of transmission lines, Characteristic impedance, basics of antenna design.

Random signals: Probability, Random variable, Discrete, continuous and mixed random variables, Operations on one Random variable, Multiple Random Variables, Operations on multiple random variables, transformations on random variables and properties, Expectations, moments, Central limit theorem.

Distribution and Density Functions: conditional, marginal, joint, Gaussian distribution and density, Sampling and estimation of mean, variance and moments, weak law of large numbers and strong law of large numbers

Analog communication: Amplitude Modulation, types of amplitude modulation, modulation index, power relation in AM, Current relation in AM, AM transmitter, Angle modulation and its types, Relationship between FM and PM.

Radio Transmission: AM radio transmitter and receiver, Tuned radio frequency and super heterodyne radio receiver, AM detector. FM radio receiver and its detection techniques.

Basics of modern communication: Mobile, satellite communication, radar communication, optical communication, wireless communication, microwave communication, power line communication, Spectral wireless communication

Text/Reference Books

1. Kennedy and Davis, Electronic communication Systems, Fourth Edition, TMH Publications, 2004
2. Peton Z and Peebles Jr, Probability, Random Variables and Random Signal Principles, TMH Publications, 2002
3. Anokh Singh and A.K. Chhabra, Principles of Communication Engineering, S. Chand & Company Ltd Publications, 2004
4. A. Bruce Carlson, et al : Communication systems, 4/e, McGraw Hill, 2001
5. H. Taub, D. Schilling, Principles of Communication systems, TMH, 2nd Ed.
6. Simon Haykin, Communication systems, 4/e. John Wiley, 2001
7. D. Roddy and J. Coolen, Electronic Communication, PHI Publication.

Course Outcomes: At the end of the course the student is expected to understand

- Understand and apply basic concept of noise as a Random Process, Distribution, Density Functions and its effect on communication systems.
- Analyze the performance of radio receiver and its detection techniques.
- Evaluate the performance of modulation and demodulation signals in a communication system.
- Generate modulation signals for AM, FM, PM and perform their demodulation.
- Compare the performance of AM, FM and PM Schemes and understand basics of modern communications.

EC258 MICROCONTROLLER AND APPLICATIONS (L-3, T-0, P-2, Credits-4)

Teaching Scheme	*Examination scheme*
Lectures: 3 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks
Practical: 2 hrs/week	Mid-term 50 marks, End-term 50 marks

Course objectives:

- To acquaint student with:
  - fundamentals of microprocessor and Microcontrollers,
  - 8051 Architecture and Instruction set,
  - Assembly Language Programming,
  - Memory and I/O Interfacing,
  - Interrupts, Timers and counters,
  - Serial Communication and Interfacing techniques of 8051 Microcontroller.
- Motivate students to use modern microcontrollers for projects.

Course syllabus:

Introduction microprocessor and microcontroller: What is Microprocessor? Princeton and Harvard Architecture, Overview of 8085 Microprocessor Architecture, Survey of 4/8/16/32 bit Microprocessors, What is Microcontroller? Overview of the 8051 family, Microcontrollers survey: 4/8/16/32-bit Microcontrollers

The 8051 Architecture: Features, Architecture of 8051, Pin Configuration, Oscillator and clock, ALU, Program counter, data pointer registers, stack and stack pointer, special function registers, memory organization, program memory, data memory, Input/Output Ports, External memory, Counter and Timer, Serial data Input / output, Interrupts

8051 Assembly Language Programming: 8051 Assembly programming, Assembling and running an 8051 program, 8051 data types and directives, 8051 flag bits and the PSW register, 8051 register banks and stack. Addressing Modes, 8051 Instructions: Data Transfer Instructions, Arithmetic and Logic Instructions, Branch Instructions, Subroutine Call and RET Instructions, Bit manipulation Instructions, I/O Port Programming, Assembly programming examples, Software development Tools for 8051: Assembler, Simulator, Compiler & Debugger,etc.

Memory and I/O Device interfacing with 8051:
Structure and Operation, , Port Programming, Interfacing of Data memory and program memory, Port interfacing of switches and LEDs with ports and it's programming.

8051 Interrupts: Basic of Interrupts, 8051 Interrupt structure, Interrupt Programming, Programing External hardware interrupts

8051 Timers and Counters: Timer/Counter organization, operation modes, programming in 8051 and Applications

8051 Serial Communication: Basics of Serial Communication, Synchronous and Asynchronous Communication, RS-232 protocol, MAX232, SFR and Modes of Serial Communication, Programming

Study of I/O Peripherals: Interfacing of Relays, Stepper Motor, LCD display, 8 bit ADC and DAC ICs and applications, Interfacing and Programming the PPI 8255 with 8051.

Applications of Microcontroller 8051

Reference Books :

1. Muhammad Ali Mazidi and Janice Gillispe, The 8051 Microcontroller and embedded systems, Pearson Education Asia, Indian reprint 2002.

   V Udayshankara, M S Mallikarjunaswamy, “801 Microcontroller”, Tata McGraw-Hill, 2009

2. Kenneth J. Ayala, The 8051 Micro-controller– Architecture, Programming & Applications, Third Edition, Cengage Learning, India, 2007.
3. Ajay V Deshmukh, Microcontrollers (Theory and Applications) The McGraw- Hill Companies, 2005.
4. The 8051 Microcontroller & Embedded Systems Using Assembly and C, 1st Edition, Cengage Learning, India, 2010.

Course Outcomes: At the end of the course the student is expected to :

- Understand architecture of 8051.
- Write simple assembly language programs for 8051.
- Interface IO devices, peripherals and memory with 8051.
- Develop simple 8051 based system.

HS221 PROFESSIONAL COMMUNICATION (L-2, T-0, P-0, Credits-2)

Teaching Scheme	*Examination scheme*
Lectures: 2 hrs/week	Theory: Mid-term 30 marks, End-term 70 marks

Objective of the Course:

- To enable students to speak and write English with a good level of proficiency.
- To build confidence in students to face interview, deliver speech, make presentation and participate in meeting and discussion.
- To lay a strong foundation on the subject by revising and correcting the basics.

Unit 1: Functional Grammar

Building of a sentence and its components, Tense- the time sense: Present, Past and Future tense with uses and applications, Verbs, Noun, Pronoun, Adjective, Adverb, Prepositions and Conjunctions: classification, identifications, uses and applications, Active & Passive voice, direct and indirect speech, clause, principles of effective communication.

Unit 2: Listening Skills

Requirements of listening skill, Phonetics and phonology, Articulation of consonants and vowels, Syllables, Weak form stress, Rhythm and intonation, Face to face conversation, Telephonic conversation.

Unit 3: Reading Skills

Requirements of reading skill, Reading poetry, Reading prose, Reading article from standard newspaper/ magazine

Unit 4: Writing Skill

Paragraph, Resumes, Letters- formal and informal, Circular, Notice, Agendas, Minutes, Reports, E-mail and Blog writing

Unit 5: Speaking Skills

Requirement of speaking skills, grammatical difficulties, Practice of public speaking, Conversation between /among students or groups on given situations

Unit 6: Integration of skills

Group discussion, Personal interview, Debate and Quiz competition, ppt Presentation

Practicals and Assignments:

- Practice of building of sentences and identification of components.
- Practice the uses and applications of tense.
- Identification of parts of speech and form changes- use in sentences.

- Identification of various clauses and their use in sentences.
- **Listening Skills:** Listen few BBC / Voice of America/ NDTV 24*7 or similar standard Television channel / Radio or any standard talk/discussion available in CD/DVD and answer the given questions/ write the summary.
- **Reading Skills:** Read few articles from standard newspaper The Hindu/ The Times of India / magazine /books and answer the given questions /write the summary.

1. Writing Skills (Assignments):

a. Write your own CV
b. Write an E-mail
c. Write a blog on current topic of discussion
d. Write a technical report
e. Write a letter
f. Comprehension Tests

2. Speaking and Integration of Skills:

g. Converse on few given situations
h. Group Discussions on a given topic
i. Debate competition on a given topic
j. Quiz competition among few groups of students
k. ppt presentation

Reference Books :

1. Essential English Grammar, Raymond Murphy, Cambridge University Press, 1 December, 2007.
2. Oxford English Grammar Course: Advanced, Michael Swan and Catherine Walter, Oxford, 24 February, 2012.
3. Advanced English Grammar, Martin Hewings, Cambridge University Press, 1 December, 2007.
4. Developing Communication Skills, Krishna Mohan and Meera Banerjee, Macmillan India Ltd, New Delhi, 2nd Edition,2009.
5. Oxford Advanced Learner's Dictionary, 8th Edition.

Course Outcome:

- The students will be able to lift themselves up by polishing their grammar, reading and writing skills, and group discussions.