Credit Framework for Multidisciplinary UG Programme in Electronics & Telecommunication Engineering (Level 5.0) - Semester - III

Sr.	Course Type	Course Code	Course Name	L	T	P	Hr	Cr	Examination Weightage in %			Ownership
									TA	MST	ESE	
1	PCC		Mathematics for Electronics Engineers	3	0	0	3	3	20	20	60	Mathematics
2	PCC		Electronic Devices and Circuits	3	0	0	3	3	20	20	60	EXTC
3	PCC		Electrical Network Theory	3	0	0	3	3	20	20	60	EXTC
4	PCC		Digital Logic Design	3	0	0	3	3	20	20	60	EXTC
5	MDM		Multi-disciplinary Minor-I	2	0	0	2	2	20	20	60	Respective Department
6	OE		Open Elective – I	3	0	0	3	3	20	20	60	Respective Department
7	**VSEC**		Python Programming	1	0	2	3	2	ISCE:60		40	EXTC
7	VSEC		Electronic Devices and Circuits Lab	0	0	2	2	1	ISCE:60		40	EXTC
8	PCC		Digital Logic Design Lab	0	0	2	2	1	ISCE:60		40	EXTC
9	**VEC**		Universal Human Values	2	0	0	2	2	20	20	60	
			Total	20	0	6	26	**23**				

Semester - IV

Sr.	Course Type	Course Code	Course Name	L	T	P	Hr	Cr	Examination Weightage in %			Ownership
									TA	MST	ESE	
1	PCC		Signals & Systems	3	0	0	3	3	20	20	60	EXTC
2	PCC		Microprocessor & Microcontroller	3	0	0	3	3	20	20	60	EXTC
3	PCC		Analog Communication Systems	3	0	0	3	3	20	20	60	EXTC
4	MDM		Multi-disciplinary Minor-II	2	0	0	2	2	20	20	60	Respective Department
5	OE		Open Elective – II	3	0	0	3	3	20	20	60	Respective Department
7	**VEC**		Environmental Science	2	0	0	2	2	20	20	60	
8	PCC		Microprocessor & Microcontroller Lab	0	0	2	2	1	ISCE:60		40	EXTC
9	PCC		Analog Communication Systems Lab	0	0	2	2	1	ISCE:60		40	EXTC
10	**AEC**		Modern Indian language	2	0	0	2	2	ISCE:60		40	Humanities
11	CEP/FP		Comm. Engg. Project / Field Project	0	0	4	4	2	ISCE:60		40	EXTC
			Total	18	0	8	26	**22**				

S. Y. B. Tech. Electronics and Telecommunication Engineering

Course code		**Semester**	III	**Credits**	3	Scheme	3L:0T:0P
Course	MATHEMATICS FOR ELECTRONICS ENGINEERS						

Course Outcomes:

After the completion of course, the student should be able to

1. Compute the Laplace transform of various functions
2. Evaluate the Fourier components of various functions.
3. Solve problems on vectors using different theorems.
4. Understand Bessel function and solve problems on Legendre polynomials.
5. Apply properties of Z transform and its inverse to solve engineering problems.

Module	**Content**	**Hrs**
1	**Laplace Transform** 1. Functions of bounded variation 2. Linear property of Laplace transforms. 3. Laplace transforms of standard functions such as 4. Change of scale property ,First shifting theorem, Second shifting theorem 5. Inverse Laplace transform using linear property, theorems, partial fractions and convolution theorem. 6. Unit step functions, Heaviside, Dirac delta functions, Periodic functions and their Laplace transforms. 7. Application to solve ordinary differential equations with one dependent variable.	9
2	**Fourier Series** 1. Orthogonal, Orthonormal sets, Expressions of a Function in Series of Orthogonal Functions. 2. Dirchlet's conditions. 3. Fourier series of periodic functions with period 2π, $2l$. 4. Dirchlet's theorem, even and odd functions. 5. Half range expansions, Parseval's relations. 6. Complex form of Fourier series. 7. Fourier integral and Fourier transform.	8
3	**Bessel Functions** 1. Bessel's Equation, Solutions of Bessel's function, Bessel's Function Of Jn(x). 2. Recurrence formula Jn(x), Equation Reducible to Bessel's equation 3. Orthogonality of Bessel's functions, A Generating function for Jn(x), 4. Trigonometric Expansion involving Bessel's functions, 5. Bessel's Integral, Legendre's Equation, Legendre's Polynomial, 6. General solution of Legendre's Equation, Rodrigue's Formula, 7. Generating function of Legendre polynomial, 8. Orthogonality of Legendre polynomial.	8

4	**Z-Transform** 1. Z-Transform, Properties of z-transform, Theorem, change of Scale, Shifting property. 2. Inverse Z-Transform solution of Difference Equation, Multiplication by k, Division by k, Initial value, Final value, Partial sum, Inversion by residue method, Solution of Difference Equation 3. Convolution, Convolution property of Causal Sequence, Inverse of Z Transform by Division, By Binomial Expansion and partial fraction,	9
5	**Probability Theory** 1. Review of introduction to probability, concept of random variable, probability density function, cumulative distribution function 2. Moments, characteristic functions, Two random variables: Bi-variate distribution, functions of random variables 3. Joint moments, Joint Characteristic functions, Conditional distribution	8

Text Book:

- **Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd, 10th edition, 2015**
- **B S Grewal, Higher Engineering Mathematics, Khanna Publications, 39th Edition, 2005**

Reference:

- **B. V. Ramana, Higher Engineering Mathematics, McGraw Hill India, 1 st edition, 2006.**

Course code		Semester	III	Credits	3	Scheme	3L:0T:0P
Course	ELECTRONIC DEVICES AND CIRCUITS						Category: PCC

Course Outcomes:

After the completion of course, the student should be able to

1. Design various diode based circuits
2. Analyse BJT and FET transistor circuits for their DC and AC characteristics.
3. Analyse frequency response of BJT and FET amplifiers
4. Analyse AC & DC analysis of power amplifier
5. Understand the concept of feedback for amplifiers and oscillators.

Module	Content	Hrs
1	**Diode Application** 1. Application of rectifier with filter 2. Voltage doubler circuit 3. Clipper & clamper circuit 4. Multiple Diode circuit 5. Zener diode: Series and shunt voltage regulator	4
2	**Bipolar junction transistor** 1. Review of BJT amplifiers 2. Bipolar transistor Biasing , single base resistor biasing, voltage divider biasing and bias stability, 3. AC analysis using r-π model and h-parameter	5
3	**Field Effect Transistor** 1. Junction Field-effect Transistor. 2. MOS Field effect transistor, DC Circuit analysis . 3. Basic MOSFET Application: Switch, Digital Logic Gate and Amplifier. 4. MOSFET Amplifier , basic Transistor amplifier, common gate configuration. 5. Three basic amplifier configuration: single- stage MOSFET amplifiers, Basic JFET Amplifiers.	6
4	**Frequency Response of Amplifiers** 1. Frequency response analysis of BJT amplifier with Circuit Capacitors. 2. Frequency response analysis of FET amplifier with Circuit Capacitors. 3. High Frequency Response of BJT & FET Circuits.	5
5	**Multistage Amplifiers** 1. The Darlington Amplifier 2. Cascade amplifier 3. Cascode amplifier 4. RC coupled amplifier	4

6	**Power Amplifiers** 1. Power Amplifiers, Power Transistors - Power BJTs, Power MOSFETS, Heat Sinks 2. Classes Of Amplifiers - Class-A Operation, Class-B Operation, Class-AB Operation, Class-C Operation, Class-A Power Amplifiers, Class-AB Push Pull Complementary Output Stages.	5
7	**Feedback and Oscillators** 1. Introduction to Feedback, Basic Feedback Concepts, 2. Ideal Close-Loop Gain, Gain Sensitivity Bandwidth Extension,Reduction of Nonlinear Distortion, Noise Sensitivity 3. Ideal Feedback Topologies, Series- Shunt, Shunt-Series, Series-Series, Shunt-Shunt Configurations, Loop Gain, 4. Oscillator: Barkhausen's criteria, Wein bridge oscillator RC phase shift Oscillator, Hartley and colpitts Oscillator.	6

Text Book:

- **Donald A. Naeman, Electronic Circuit Analysis and Design, Second Edition, McGraw Hill International Edition 2001.**
- **Robert L. Boylestad, Electronic Devices and Circuit Theory, 11e. Taiwan, Pearson Education India.**

Reference:

- **Donald Schilling and Charles Belove, Electronic Circuits Discrete and Integrated, Third edition, McGraw Hill International Edition, 1989**
- **Adel Sedra and Kenneth Smith, Microelectronic Circuits, Fifth edition, Oxford University Press, 2004.**
- **Martin Roden, Gordon Carpenter, William Wieserman, Electronic Design, Fourth edition, Shroff Publishers,2002.**

Course code		Semester	III	Credits	1	Scheme	0L:0T:2P
Course	ELECTRONIC DEVICES AND CIRCUITS LAB						Category: VSEC

Course Outcomes:

After the completion of course, the student should be able to

1. Analyse and design wave shaping circuits.
2. Understand basic analog electronic circuit design techniques using BJT & FET.
3. Differentiate the response of BJT and FET at low frequency and High frequency.
4. Design and implement BJT based amplifier circuits utilizing various negative feedback topologies
5. Design and implement oscillators.

LIST OF TOPICS FOR ELECTRONIC DEVICES AND CIRCUITS LAB

Sr.No.	Topics	
1	Clipper circuits	
2	Clamper circuits	
3	Zener diode : Series and shunt regulator	
4	BJT bias circuits - Design, assemble and test.BJT common-emitter circuit - D.C and A.C performance:	
5	FET characteristics	
6	JFET bias circuits - Design, assemble and test.	
7	Frequency response of a BJT amplifier: low frequency, high frequency and mid frequency response.	
8	Frequency response of a FET amplifier: low frequency, high frequency and mid frequency response.	
9	Ac & DC analysis of Multistage amplifier	
10	Design of RC Phase Shift Oscillator	
	Design of Wien Bridge Oscillator	

Course code		Semester	III	Credits	3	Scheme	2L:1T:0P
Course	ELECTRICAL NETWORK THEORY						Category: PCC

Course Outcomes:

After the completion of course, the student should be able to

1. Analyze electrical networks using various Theorems.
2. Analyze electrical networks using time and frequency domain techniques.
3. Represent a network in terms of its two port network parameters.
4. Synthesize electrical networks using different approaches..

Module	Content	Hrs
1	**Circuit analysis of Dependent sources** 1. Mesh and Node Analysis of circuits with dependent sources. 2. Linearity, Superposition, Current AND Voltage Source Transformation 3. Thevenin's and Norton's Theorem 4. Maximum power transfer theorem	8
2	**Time and Frequency domain analysis** 1. First and second Order Differential equations, initial conditions. 2. Evaluation and analysis of Transient and Steady state responses using Classical Technique as well as by Laplace Transform for I & II order system. 3. Transfer function, Concept of poles and zeros. Frequency response of a system (concepts only).	10
3	**Two - port Networks** 1. Concept of two- port network. 2. Driving point and Transfer Functions. 3. Open Circuit impedance (Z) parameters, Short Circuit admittance (Y) parameters, Transmission (ABCD) parameters. 4. Inverse Transmission (A'B'C'D') parameters. Hybrid (h) parameters. 5. Inter Relationships of different parameters. 6. Interconnections of two - port networks. 7. T and Pi representation. 8. Terminated two - port networks	8
4	**Circuit analysis using Graph Theory** 1. Introduction to Graph Theory. Tree, link currents, branch voltages, cut set and tie set. 2. Mesh and Node Analysis. 3. Gauss Elimination Technique, Duality.	8
5	**Electrical Network synthesis** 1. The concept of complex frequency –driving point and transfer functions 2. Restriction of poles and zeros in the driving point and transfer function. 3. Time domain behavior from the pole—zero plot. 4. Foster I,II 5. Cauer I-II forms	8

Text Book:

- M. E. Van Valkenburg, Network Analysis, Prentice Hall of India, third edition. 2006.
- William H Hayt, Jack E Kemmerly and Steven M Durbin, Engineering Circuit Analysis, McGraw Hill International, sixth edition, 2002.

Reference:

- Artice M Davis, Linear Circuit Analysis, Thomson Asia Pvt. Ltd., Singapore, first edition, 2001
- Raymond A DeCarlo and Pen-Min Lin, Linear Circuit Analysis, Oxford University Press, second edition, 2001.

Course code		Semester	III	Credits	3	Scheme	3L:0T:0P
Course	DIGITAL LOGIC DESIGN						Category: PCC

Course Outcomes:

After the completion of course, the student should be able to

1. Numerically analyze various logic circuits and perform Boolean reduction
2. Design various combinational circuits as per different specifications.
3. Design various sequential circuits as per different specifications.
4. Analyze the behavior of various logic families.
5. Analyze and design A/D and D/A converter.

Module	Content	Hrs
1	**Logic Circuits** Boolean Algebra, theorems, SOP and POS minimization, Karnaugh Maps minimization, programmed minimization methods – Quine-McCluskey minimization algorithm, timing hazards – static and dynamic hazards.	8
2	**Combinational Logic Design** Introduction to combinational circuit: Realization of basic combinational functions like comparison, codeconversion, decoding, multiplexing, de-multiplexing, addition, subtraction. Delays and hazards in combinational circuits	8
3	**Sequential Logic systems** Basic sequential circuits- latches and flip-flops: Latches , SR flip-flop, JK flip-flop, M-S flip-flop, D flip-flop,T flip-flop; Multi-bit latches and registers, counters, shift register, application examples.	10
4	**Logic Families** CMOS logic; MOS transistors, basic CMOS inverter circuit, CMOS NAND and NOR gates, fan – in, fan – out, Electrical behavior of CMOS circuits, propagation delay, power consumption, CMOS logic families, bipolar logic introduction, BJT, TTL NAND and NOR gates, fan – in, fan – out, Electrical behavior of TTL circuits, propagation delay, power consumption. CMOS / TTL interfacing, Introduction to Emitter – coupled logic.	8
5	**A/D and D/A Converters** Analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs. Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, Specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit	8

Text Book:

- **John F. Wakerley, Digital Design Principles and Practices, fourth edition, Pearson Education India, 2008.**
- **Stephen Brown & ZvonkoVranesic, Fundamentals of Digital logic with VHDL design, third edition, McGraw Hill edition, 2014.**

Reference:

- **M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.**
- **R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.**
- **G K Kharate , Digital Electronics, Oxford University Press 2015.**

Course code		**Semester**	III	**Credits**	1	Scheme	0L:0T:2P
Course	DIGITAL LOGIC DESIGN LAB						**Category**: PCC

Course Outcomes:

After the completion of course, the student should be able to

1. Design and implement combinational circuits using gates.
2. Design combinational circuits using ICs
3. Implement digital sequential circuits using ICs.

Sr.No.	**Topics**	
1	Design of combinational logic circuits (Half Adder, Full Adder, Half Subtractor, Full Subtractor) using fundamental and Universal Logic gates	
2	Design of Multiplexer, Demultiplexer	
3	Design of Encoder and Decoder circuits	
4	Design of Code Converters	
5	Implementing 8 bit ALU	
6	Study of various parameters of logical families and comparative study of TTL and CMOS.	
7	Truth Table verification of RS, T, D,JK flip flop	
8	JK Master Slave Flip Flop. To simplify the given expression and to realize it using Basic gates and Universal gates	
9	To realize and study of Shift Register: SISO, SIPO,PIPO, PISO	
10	To realize and study Ring Counter and Johnson counter	
11	To realize synchronous and asynchronous counter.	
12	Analyze and Design A/D and D/A converter	

Course code		Semester	III	Credits	2	Scheme	1L:0T:2P
Course	PYTHON PROGRAMMING						Category: VSEC

Course Outcomes:

After the completion of course, the student should be able to

1. Understand basics concepts of Python programming
2. Understand object oriented programming in Python
3. Describe the different data structures and select appropriate data structure for the given application

Module	Content	Hrs
1	**Introduction to Python** Features, Byte code, execution, Python Virtual Machine, frozen binaries memory management, C vs Python,	2
2	**Data types and operators in Python** Comments, Doc-strings, built-in-data types, basic operators, membership operators, operator precedence and associativity, conditional statements, control statements.	3
3	**Arrays, Strings and Functions** Arrays, importing, indexing, slicing, processing, mathematical operations On Arrays, strings, operations on strings, defining and calling Functions, formal and actual arguments.	2
4	**Classes and Objects** Class creation, constructor, methods, inheritance: single, multilevel and multiple polymorphism, method overloading and method overriding, Abstract classes and interfaces.	4
5	**Data structures in Python** Linked list (single, double) , stacks, Stack operations ,queues, de-queues, Queue operation, Array,representation of Queue, Linked representation of Queue	3

Text Book:

- **Core Python Programming, 2nd Edition, Nageswara Rao, Dreamtech Press. New Delhi, 2018.**
- **E Balagurusamy, Introduction to computing and problem solving using python, McGraw Hill Education.**

Reference:

- **Martin Brown, Python, The complete Reference, Indian Edition, Tata McGraw Hill, ISBN: 9789387572942, 9387572943.**

Course code		**Semester**	III	**Credits**	1	Scheme	0L:0T:2P
Course	PYTHON PROGRAMMING LAB						**Category**: VSEC

Course Outcomes:

After the completion of course, the student should be able to

1. Write programs to implement classical numerical methods solving engineering problems in Python
2. Implement object oriented programming in Python
3. Implement different data structures and select appropriate data structure for the given application

Sr.No.	**Topics**	
1	Five python programs on operators & membership operators.	
2	Three python programs on conditional statements.	
3	Three python programs on control statements.	
4	Three Python programs on Arrays.	
5	Creating functions, classes and objects using python.	
6	To implement operator overloading, overriding	
7	To implement link list, stack, queues	
8	To perform operations on abstract data types	

Course code		Semester	IV	Credits	3	Scheme	3L:0T:0P
Course	SIGNALS AND SYSTEMS						Category: PCC

Course Outcomes:

After the completion of course, the student should be able to

1. Understand basic concepts of linear systems and how they interact with continuous-time and discrete time signals.
2. Analyze continuous-time and discrete time signals and systems in the time domain.
3. Analyze CT and DT signals and systems using Laplace descriptions
4. Analyze CT and DT signals and systems using Z-domain descriptions
5. Represent and interpret signals in Fourier domain

Module	Content	Hrs.
1	**Introduction to signals & Systems (CT and DT domain)** Definition of Signal, Signal classification, Signal manipulations, Periodicity in CT (Continuous Time) & DT (Discrete Time) domain, Concept of a system, System representations & classification, Concept of Impulse Response, Convolution in CT and DT domain	10
2	**Laplace Transforms** Definition & properties of Two-sided & one-sided Laplace Transform, Region of Convergence (ROC), System transfer function, Relationship with Fourier Transform & mapping, Zero state & zero input responses System Transfer function & Impulse response, Differential Equations	6
3	**Z Transform** Definition & properties of Two-sided & one-sided Z Transform, Region of Convergence (ROC), Relationship with Fourier and Laplace Transform , & mapping, Inverse Z Transform	8
4	**DT system Realization** Difference equation, FIR & IIR systems, System transfer function, System realization: Direct forms, Cascade & parallel forms,	6
5	**Fourier Series & Fourier Transform (CTFS, CTFT, DTFS & DTFT)** Introduction, properties and uses, amplitude & phase spectra, Energy Spectral Density, Power Spectral Density	6
6	**Time Domain Analysis of DT Systems** System Transfer function & Impulse response, Difference equation, Solution of a difference equation, zero input & zero state response calculations	6

Text Book:

- **Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley and Sons, 2nd edition, 2004.**
- **A Nagoor Kani, Signals and Systems, Tata McGraw Hill, 2nd Edition,2010.**
- **B.P. Lathi, Principles of Linear Systems and Signals, Oxford University Press, India, 2nd edition, 2010.**

Reference:

- **Michael J Roberts, Fundamentals of Signals and systems, Tata McGraw Hill, Indian Economy edition, 2009.**

- **Alan V. Oppenhiem, Alan S. Willsky and S. Hamid Nawab, Signals and Systems, Prentice-Hall of India, 2nd edition, 2002**

Course code		Semester	IV	Credits	3	Scheme	3L:0T:0P
Course	MICROPROCESSOR AND MICROCONTROLLER						

Course Outcomes:

After the completion of course, the student should be able to

1. Describe architecture of a typical microprocessor and microcontroller.
2. Design a microprocessor system consisting of a microprocessor / microcontroller, memory, I/ O and other relevant devices.
3. Design and implement assembly language programs for 8085 / 8051 microprocessor / microcontroller.
4. Design and implement I/O data transfer techniques

Module	Content	Hrs
1	**Introduction** **1.** Introduction to Microprocessors, Microcontrollers and Assembly Language.	3
2	**8085 Microprocessor Architecture and Memory Interfacing** 1. The 8085 architecture, Instruction cycles, machine cycles and T states. 2. Concept of wait states. Memory interfacing with timing considerations. 3. Clock, Reset and buffering circuits.	6
3	**8085 Assembly Language Programming** 1. The 8085 programming model, 2. Instruction classification, Instruction and Data format, 3. Process of writing, assembly and execution of simple assembly language program	6
4	**Programming Techniques** 1. Data transfer operations, Arithmetic & Logic operations, Branch operations, 2. Writing assembly language programs, Debugging a program. 3. Looping, Counting and indexing, counters and timers, 4. Code conversion, BCD arithmetic and 16 bit data operations. 5. Software Development Systems and Assemblers. 6. Concept of Stack and subroutines, parameter passing techniques, 7. Re-entrant and recursive subroutines..	10
5	**Parallel I/O Data Transfer Techniques** 1. Basic interfacing concepts, Interfacing input and output devices with examples, 2. Memory mapped I/O and I/O mapped I/O. I/O data transfer classification, Programmed I/O. 3. Interrupt driven program controlled I/O,Interrupt Requirements 4. Single level interrupt, Multi-level interrupt, Vectored interrupt. 5. 8085 interrupt structure and operation.	10

	6. 8259A programmable interrupt controller features and operation – single and cascaded. 7. Hardware I/O (Direct Memory Access)	
6	**Intel MCS 51 family** 1. Introduction to Single chip microcontrollers of Intel MCS 51 family. 2. Architectural and operational features. Instruction set. 3. CPU timing and machine cycles. 4. Interrupt structure and priorities. 5. Internal Timer /counters, serial interface. 6. Interfacing of external memory. 7. Power saving modes. 8. 8051 variants. 9. 89C51 devices	7

Text Book:

- **Ramesh S Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085, Sixth edition, Penram International Publishing (India), 2013.**

- **Kenneth Short, Microprocessors and Programmed Logic, second edition, Prentice Hall of India, 1987.**

Reference:

- **Kenneth Ayala, The 8051 Microcontroller & Embedded Systems Using Assembly and C, Cengage Learning, first edition, 2010**
- **Muhammad A Mazidi, The 8051 Microcontroller and Embedded Systems: Using Assembly and C, second edition, 2008**

Course code		**Semester**	IV	**Credits**	1	Scheme	0L:0T:2P
Course	MICROPROCESSOR AND MICROCONTROLLER LAB						**Category**: PCC

Course Outcomes:

After the completion of course, the student should be able to

1. Understand and use microprocessor circuits and kits.
2. Design and implement assembly language programs for 8085 / 8051 microprocessor / microcontroller.
3. Design and program parallel data transfer techniques

Sr.No.	**Topics**	
1	Two programs on Data transfer operations based on 8085 microprocessor	
2	Five programs on Arithmetic & Logic operations with increasing complexity based on 8085 microprocessor	
3	Three programs on sorting based on 8085 microprocessor	
4	Three programs on I/O operations and interrupts based on 8085 microprocessor	
5	Three programs on Arithmetic & Logic operations with increasing complexity based on 8051 microcontroller.	
6	Two programs on I/O operations and interrupts based on 8051 microcontroller.	

Course code		Semester	IV	Credits	3	Scheme	3L:0T:0P
Course	ANALOG COMMUNICATION SYSTEM						Category: PCC

Course Outcomes:

After the completion of course, the student should be able to

1. Understand basic analog communication processes.
2. Understand and solve problems on modulation.
3. Analyze transmitter and receiver circuits.
4. Analyze and interpret pulse analog techniques.

Module	Content	Hrs
1	**Basics of Communication System** Block diagram, electromagnetic spectrum, signal bandwidth and power, types of communication channels, Introduction to time and frequency domain, Types of noise, signal to noise ratio, noise figure and noise temperature, Friis transmission formula.	6
2	**Amplitude Modulation and Demodulation** DSB Full carrier AM – principles, modulator circuits, transmitters, different types of AM modulators, Suppressed – carrier AM, SSB, ISB – Principles, transmitters. Receiver characteristics, TRF and Superheterodyne receivers, AM detectors.	10
3	**Angle Modulation and Demodulation** Frequency modulation, Phase modulation, Effect of noise, FM modulators, Transmitters, FM detectors, Receiver circuits	10
4	**Radio Receivers** TRF, Super - heterodyne receiver, receiver parameters and choice of IF , AM receiver circuits and analysis, simple AGC, delayed AGC, forward AGC, and communication receiver, FM receiver circuits, comparison with AM receiver	8
5	**Analog Pulse Modulation** Sampling Theorem for Low – pass and Band – pass signals – proof with spectruM Aliasing. Sampling Techniques principle, generation, Demodulation , spectrum. PAM, PWM, PPM – generation and detection	8

Text Book:

- "Electronic Communication Systems", Roy Blake, Thomson Asia Pte. Ltd., Singapore, 2nd edition.
- "Electronics communication system ", Kennedy and Davis Tata McGraw Hill, 5th Edition,2011

Reference:

- **"**Modern Digital And Analog Communication Systems", B.P.Lathi, Oxford,4th Edition ,2011.
- "Principles of Communication Systems", Herbert Taub and Donald Schilling, Tata McGraw-Hill, 3rd edition
- **"**Electronic Communication Systems", Wayne Tomasi ,Pearson Education, 5th Edition,2008

Course code		**Semester**	IV	**Credits**	1	Scheme	0L:0T:2P
Course	ANALOG COMMUNICATION SYSTEM LAB						**Category**: PCC

Course Outcomes:

After the completion of course, the student should be able to

1. Implement of generation of various types of signals
2. Generate and demodulate various modulations scheme.
3. Learn practical methods of how real communication takes place in communication systems.

Sr.No.	**Topics**	
1	RF Amplifier Characteristic	
2	Generation of AM	
3	Detection of AM	
4	Generation of FM.	
5	Detection of FM	
6	Study of AM super heterodyne receiver.	
7	Generation and detection of PM	
8	Generation and detection of PAM, PPM and PWM.	
9	Radio Receiver Characteristics	