DEPARTMENT OF ECE

CONVENING ORDER - BOARD OF STUDIES

The Board of Studies is the basic constituent of the academic system of an autonomous college. Its functions will include framing the syllabi for various courses, reviewing and updating syllabi from time to time, introducing new courses of study, determining details of continuous assessment, recommending panels. of examiners under the semester system, etc. The Board of studies is constituted with the following members:

S.No	Name of the Member	Designation/occupation	category
1	Mr.P.Sudheer Kumar	i/c Head of the Department	Chairman
2	Dr.B.T.Krishna	Professor, ECE Department, JNTUK Kakinada	University Nominee
3	Dr. M.S.S.Rukmimi	Professor, ECE Department, Vignan University, Vadlamudi	Subject experts outside parent university
4	Dr. Ellison M.S	Professor, ECE Department, VIT-AP University	
5	Mr. K.Kartheek	Principal engineer-implementation, Microchip	Industrialist
6	Mr.R.RAVINDRA REDDY	Asst.Professor	Faculty Member
7	Mr.R.SAMA NAIK	Asst. Professor	Faculty Member
8	Mr.SHAJAHAN PATAN	Asst.Professor	Faculty Member
9	Miss. R.Santha Kumari	Associate Engineer, Infinite, Bangalore	Alumni Member

P.T.O.

Term: The term of the nominated members shall be three years.

Meetings: The Board of Studies shall meet at least twice a year.

Functions:

The Board of Studies of a Department in the college shall:

- Prepare syllabi for various courses keeping in view the objectives of the college, interest of the stakeholders and national requirement for consideration and approval of the Academic Council;
- Suggest methodologies for innovative teaching and evaluation techniques;
- Suggest panel of names to the Academic Council for appointment of examiners;
- Coordinate research, teaching, extension and other academic activities in the Department / College.

HOD
Dept. of ECE

Copy to:

1. Principal.
2. IQAC

AMR/B.Tech- ECE/BOS/2026-27/Circular/2 Date: 26-06-2026

Meeting Notice

Greetings from A.M. Reddy Memorial College of Engineering and Technology We request you to participate in ECE Department Board of Study meeting scheduled on 28th June 2026 at 11.00 PM through online (ZOOM).

S.No	Name of the Member	Designation/occupation	category
1	Mr.P.Sudheer Kumar	i/c Head of the Department	Chairman
2	Dr.B.T.Krishna	Professor, ECE Department, JNTUK Kakinada	University Nominee
3	Dr. M.S.S.Rukmimi	Professor, ECE Department, Vignan University, Vadlamudi	Subject experts outside parent university
4	Dr. Ellison M.S	Professor, ECE Department, VIT-AP University	
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6	Mr.R.RAVINDRA REDDY	Asst.Professor	Faculty Member
7	Mr.R.SAMA NAIK	Asst. Professor	Faculty Member
8	Mr.SHAJAHAN PATAN	Asst.Professor	Faculty Member
9	Miss. R.Santha Kumari	Associate Engineer, Infinite, Bangalore	Alumni Member

Agenda of the meeting–

- Introducing the members of Board of Studies.
- Finalization of AMR-24 CBCS (Choice Based Credit System) – Syllabus for III year I Sem which is related to B.Tech – ECE Department.
- Course structure modifications (If any)
- Discuss on the courses in III B.Tech – ECE- I SEM
- Any other matters.

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AMR/B.Tech-VLSI/BOS/2026-2027/MOM/2 Date: 29-06-2026.

DEPARTMENT OF ECE

MINUTES OF MEETING - BOARD OF STUDIES (BOS)

The Meeting of the Board of Studies of ECE was held on 26th June 2026 at 11.00 PM through online (ZOOM Platform). The following members were attended the online meeting.

S.No	Name of the Member	Designation/occupation	category	Signatures
1	Mr.P.Sudheer Kumar	i/c Head of the Department	Chairman	
2	Dr.B.T.Krishna	Professor, ECE Department, JNTUK Kakinada	University Nominee	
3	Dr. M.S.S.Rukmimi	Professor, ECE Department, Vignan University, Vadlamudi	Subject experts outside parent university	
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6	Mr.R.RAVINDRA REDDY	Asst.Professor	Faculty Member	
7	Mr.R.SAMA NAIK	Asst. Professor	Faculty Member	
8	Mr.SHAJAHAN PATAN	Asst.Professor	Faculty Member	
9	Miss. R.Santha Kumari	Associate Engineer, Infinite, Bangalore	Alumni Member	

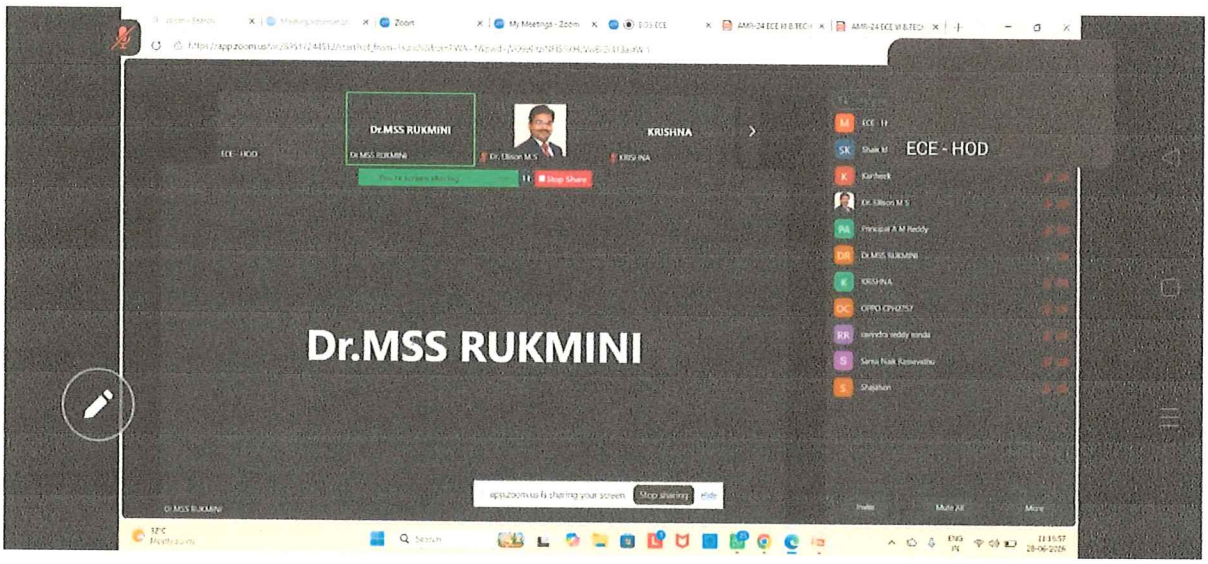
The Meeting began with chairman, Board of studies extending a warm welcome to all the members of participating in the meeting.

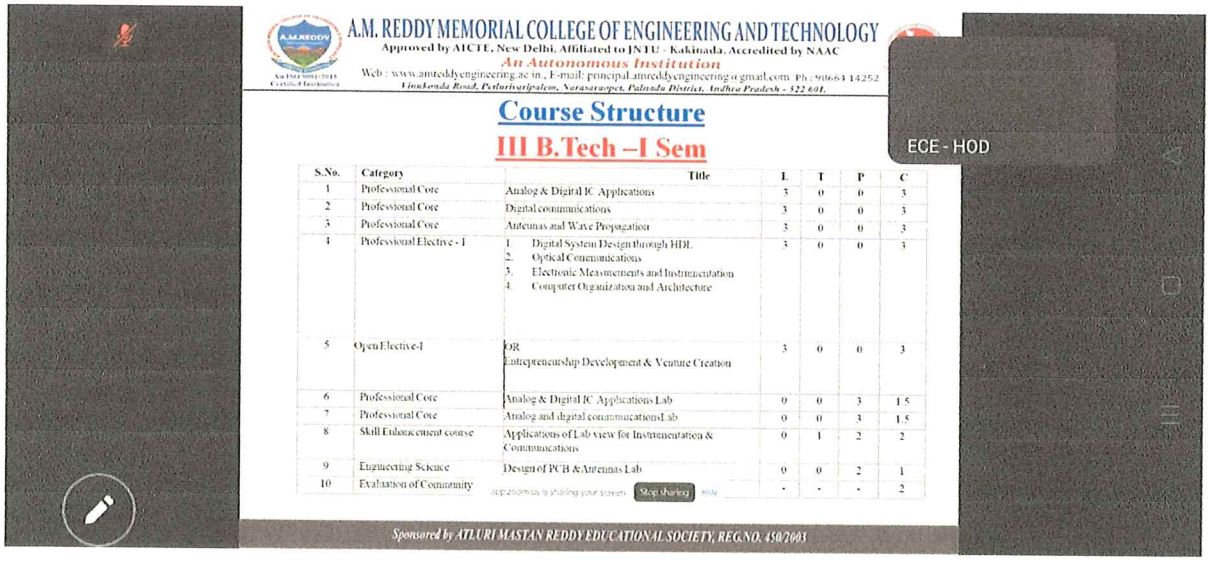
The following points were discussed and Ratified during the meeting

1. The following proposed AMR 24 Course Structure and the detailed syllabi of **B.Tech – ECE III YEAR-I SEM** were presented, discussed and Ratified.

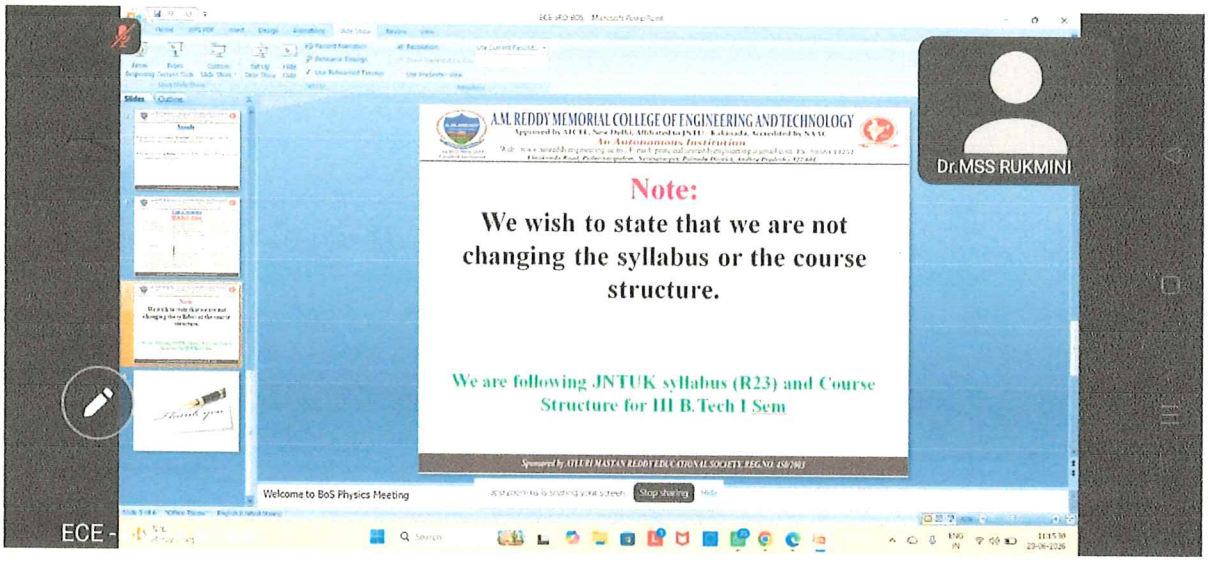
2. The Chairman of BoS informed the members that we are following JNTUK B.Tech ECE- Syllabus without any modifications

The BOS chairman concluded the session and mail the same for approval and requested the experts to approve and ended with Vote of Thanks.





S.No.	Category	Title	L	T	P	C
1	Professional Core	Analog & Digital IC Applications	3	0	0	3
2	Professional Core	Digital communications	3	0	0	3
3	Professional Core	Antennas and Wave Propagation	3	0	0	3
4	Professional Elective - I	1. Digital System Design through HDL 2. Optical Communications 3. Electronic Measurements and Instrumentation 4. Computer Organization and Architecture	3	0	0	3
5	Open Elective-I	OR Entrepreneurship Development & Venture Creation	3	0	0	3
6	Professional Core	Analog & Digital IC Applications Lab	0	0	3	1.5
7	Professional Core	Analog and digital communications Lab	0	0	3	1.5
8	Skill Enhancement course	Applications of Lab view for Instrumentation & Communications	0	1	2	2
9	Engineering Science	Design of PCB & Antennas Lab	0	0	2	1
10	Evaluation of Community		-	-	-	2



Chairman

BCS – Dept. of ECE

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

B.Tech. III Year I Semester

S.No.	Category	Title	L	T	P	C
1	ProfessionalCore	Analog & Digital IC Applications	3	0	0	3
2	ProfessionalCore	Digital communications	3	0	0	3
3	Professional Core	Antennas and Wave Propagation	3	0	0	3
4	Professional Elective - I	1. Digital System Design through HDL 2. Optical Communications 3. Electronic Measurements and Instrumentation 4. Computer Organization and Architecture	3	0	0	3
5	Open Elective-I	OR Entrepreneurship Development & Venture Creation	3	0	0	3
6	ProfessionalCore	Analog & Digital IC Applications Lab	0	0	3	1.5
7	ProfessionalCore	Analog and digital communicationsLab	0	0	3	1.5
8	SkillEnhancementcourse	Applications of Lab view for Instrumentation & Communications	0	1	2	2
9	Engineering Science	Design of PCB &Antennas Lab	0	0	2	1
10	EvaluationofCommunityServiceInternship		-	-	-	2
Total			**15**	**1**	**10**	**23**
MC	Minor Course (Student may select from the same specialized minors pool)		3	0	3	4.5
MC	Minor Course through SWAYAM / NPTEL (Minimum 12 Week, 3 credit course)		3	0	0	3
HC	Honors Course (Student may select from the same Honors pool)		3	0	0	3
HC	Honors Course (Student may select from the same Honors Pool)		3	0	0	3

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year-I Semester	ANALOG & DIGITAL IC APPLICATIONS	L	T	P	C
		3	0	0	3

Course Outcomes:

CO1 Apply the operational principles and characteristics of op-amps to design and analyze analog circuits such as amplifiers and active filters.(K3: Apply)

CO2 Design waveform generators and comparator circuits using op-amps for signal processing applications.(K4: Analyze)

CO3 Implement and troubleshoot combinational and sequential logic circuits using digital ICs.(K4: Analyze)

CO4 Compare different data conversion techniques (DAC and ADC) and implement digital-to-analog and analog-to-digital conversion circuits in real-time applications.

CO5 Design and interface digital systems using programmable logic devices like PLDs and FPGAs.(K4: Analyze)

UNIT–I

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, features of 741 Op-Amp, Modes of Operation-Inverting, Non-Inverting, Differential, Instrumentation Amplifier, ACAmplifier, Differentiatorsand Integrators, Comparators, SchmittTrigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT-II

Op-Amp, IC-555 & IC565 Applications: Introduction to Active Filters, Characteristics of Bandpass, Bandreject and All Pass Filters, Analysis of 1[st] order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer-Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL-Block Schematic, principle and Applications.

UNIT-III

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT-IV

Combinational Logic ICs: Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, De-multiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT-V

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS40XX Series ICs - All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

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Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXTBOOKS:

1. RamakanthA.Gayakwad-Op-Amps&LinearICs,PHI,2003.
2. FloydandJain-DigitalFundamentals,8th Ed.,PearsonEducation,2005.

REFERENCEBOOKS:

1. D.RoyChowdhury–LinearIntegratedCircuits,NewAgeInternational(p)Ltd,2nd Ed.,2003.
2. John.F.Wakerly–DigitalDesignPrinciplesandPractices,3rd Ed.,Pearson,,2009.
3. Salivahana-LinearIntegratedCircuitsandApplications,TMH,2008.
4. WilliamD.Stanley-OperationalAmplifierswithLinearIntegratedCircuits,4th Ed.,Pearson Education India, 2009

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year-I Semester	DIGITAL COMMUNICATIONS	L	T	P	C
		3	0	0	3

Course Outcomes:

- To Describe basic components of Digital Communication Systems and to determine the performance of different pulse digital modulation techniques
- To determine the performance of digital modulation techniques for the generation and digital representation of the signals.
- To design optimum receiver for Digital Modulation techniques and to determine the probability of error for various digital modulation schemes
- To compute and analyze error detecting and error correction codes block codes, cyclic codes.
- To compute and analyze convolution codes and Turbo codes.

UNIT I

PULSE DIGITAL MODULATION: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems.Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems, Time division multiplexing, Frequency division multiplexing.

UNIT II

DIGITAL MODULATION TECHNIQUES: Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT III

DATA TRANSMISSION: Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK, QPSK.

UNIT IV

LINEAR BLOCK CODES: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH codes

UNIT V

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CONVOLUTION CODES: Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm, Turbo Codes.

TEXT BOOKS:

1. Digital communications - Simon Haykin, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003
3. Digital Communications- J.Das, S.K.Mullick, P.K.Chatterjee, John willy & sons, 1986.

RERFERENCES:

1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.
2. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh &Sapre, TMH, 2004
3. Modern Analog and Digital Communication – B.P.Lathi, Oxford reprint, 3rd edition, 2004.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year-I Semester	ANTENNAS AND WAVE PROPAGATION	L	T	P	C
		3	0	0	3

Course Outcomes:

- Identify basic antenna parameters.
- Quantify the fields radiated by various types of antennas
- Design and analyze antenna arrays
- Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro-strip antennas
- Analyze antenna measurements to assess antenna's performance

UNIT-I:

ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – Single Wire, 2-Wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Field Regions, Main Lobe and Side Lobes, Beamwidth, Radiation Intensity, Directivity, Antenna Efficiency, Gain, Beam Efficiency, Bandwidth, Polarization, Input Impedance, Beam Area and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

UNIT-II:

THIN LINEAR WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, **Radiation Efficiency**, Beamwidth, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum, Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and R_r relations for small loops

UNIT-III:

ANTENNA ARRAYS : 2 element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, End-fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays. Directivity Relations (no derivations), Related Problems. Binomial Arrays, Effects of Uniform and Non-uniform Amplitude Distributions, Design Relations Arrays with Parasitic Elements, Yagi-Uda Arrays, Folded Dipoles and their characteristics

UNIT-IV

BROADBAND ANTENNAS: Log periodic antenna, Basic principle, Helical Antennas – Significance, Geometry, basic properties; Design considerations for monofilar helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING (AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

UHF AND MICROWAVE ANTENNAS:

Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; **Paraboloidal Reflectors**: – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Case grain Feeds.

Microstrip Antennas-Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas –Geometry and Parameters, Impact of different parameters on characteristics, illustrated Problems.

UNIT-V

ANTENNA MEASUREMENTS:FRIIS Transmission Equation, Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

WAVE PROPAGATION: TYPES of propagations.Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF and Skip Distance; Space Wave Propagation – Mechanism, LOS and Radio Horizon, Field strength equation, illustrated Problems.

TEXT BOOKS:

1. Antenna Theory: Analysis And Design- Constantine A. Balanis, 3rd Edition, A John Wiley & Sons, Inc., Publication
2. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
3. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

REFERENCES:

1. Antennas andWave Propagation-G.S.N. Raju, Pearson publications, 2006.
2. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, StandardPublishers Distributors, Delhi.
3. Antennas – John D. Kraus, McGraw-Hill, 2nd Edition, 1988.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III YearI Semester	DIGITAL SYSTEM DESIGN THROUGH HDL (PE-I)	L	T	P	C
		3	0	0	3

Course Outcomes:

- Understand the language constructs and programming fundamentals of Verilog HDL.
- Choose the suitable abstraction level for a particular digital design
- Construct Combinational and sequential circuits in different modelling styles using Verilog HDL
- Design and synthesize combinational and sequential logic circuits
- Analyze and Verify the functionality of digital circuits/systems using test benches.

UNIT-I: Introduction to Verilog HDL and Gate Level Modelling:
Verilog as HDL, Levels of Design Description Basics of Concepts of Verilog, Data Types, System Task, Compiler directives, modules and ports. AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flipflops with Gate Primitives, Delay.

UNIT-II: Behavioural Modelling:
Introduction, structured processors, procedural assignments, timing controls, conditional statements, multi-way branching, loops, sequential and parallel blocks, generate blocks, Design of Decoders, Multiplexers, Flip-flops, Registers & Counters in Behavioral model.

UNIT-III: Modelling at Data flowLevel:
Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators, Design of Decoders, Multiplexers, Flip-flops, Registers & Counters in dataflow model, Switch Level Modelling: Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitive delays.

UNIT-IV: FSM Design:
Functions,Tasks, User-defined,Primitives:Introduction,Function,Tasks,User-Defined Primitives (UDP), FSM Design (Moore and Mealy Machines), Encoding Style: From Binary to One Hot. Introduction to Synthesis, Synthesis of combinational logic, Synthesis of sequential logic with latches and flip-flops, Synthesis of Explicit and Implicit State Machines

UNIT-V: Components Test and Verification:
Test Bench – Combinational Circuits Testing, Sequential Circuits Testing, Test Bench Techniques, Design Verification, Assertion Verification

Text Books:

1. Samir Palnitkar, "Verilog HDL A Guide to Digital and Synthesis" ,2nd Edition, Pearson

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Education,2006.
2. Michael, D. Ciletti, "Advanced digital design with the Verilog HDL", Pearson Education India,2005.

Reference Books:

1. Padmanabhan, Tripura Sundari -Design through Verilog HDL, Wiley, 2016
2. S. Brown, Zvonko – Vranesic, Fundamentals of Digital Logic with Verilog Design, TMH, 3[rd]Edision 2014.
3. J. Bhasker, A Verilog HDL Primer 2[nd] edition, BS Publications, 2001.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year-I Semester	OPTICALCOMMUNICATIONS	L	T	P	C
		3	0	0	3

Course Outcomes:

- Choose necessary components required in modern optical communications systems.
- Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
- Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
- Choose the optical cables for better communication with minimum losses
- Design, build, and demonstrate optical fiber experiments in the laboratory.

UNITI

Overview of optical fiber communication - Historical development, The general system, advantages of optical fibercommunications.Opticalfiberwaveguides-Introduction,Ray theory transmission,TotalInternalReflection,Acceptance angle, Numerical Aperture, Skew rays, Cylindricalfibers- Modes, V-number, Mode coupling, StepIndexfibers,GradedIndexfibers,Singlemodefibers- Cutoffwavelength,ModeFieldDiameter,EffectiveRefractiveIndex, Related problems.

UNITII

Fibermaterials:- Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in opticalfibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacitydetermination, Group delay, Types of Dispersion:- Material dispersion, Wave-guide dispersion, Polarization-Modedispersion,Intermodal dispersion, Pulsebroadeningin Gradedindexfiber,Relatedproblems.

UNITIII

Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing-Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss-Multimode fiber joints, singlemodefiberjoints.

UNITIV

Optical sources-LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product.Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations,Resonant frequencies, Reliability of LED&ILD, Optical detectors- Physical principles of PIN and APD, Detectorresponsetime, Comparison ofPhoto detectors, Related problems.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING (AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

UNITV

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium NumericalAperture, Laser diode to fiber coupling, Optical receiver operation-Fundamental receiver operation, Digital signaltransmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantumlimit, Analog receivers.Optical system design - Point-to- point links- Component choice and considerations, Linkpowerbudget,Risetimebudgetwithexamples,LinecodinginOpticallinks,WDM,Necessity,Principles,Measurementof Attenuation and Dispersion, Eyepattern.

TEXTBOOKS:

1. OpticalFiberCommunications–GerdKeiser,McGraw-HillInternationaledition,3rdEdition,2000.
2. FiberOptic Communications– JosephC.Palais, 4thEdition, Pearson Education, 2004.

RERFERENCES:

1. FiberOpticCommunications–D.K.Mynbaev,S.C.GuptaandLowell L.Scheiner,PearsonEducation,2005.
2. TextBookonOpticalFiberCommunicationanditsApplications–S.C.Gupta,PHI,2005.
3. FiberOpticCommunicationSystems–GovindP.Agarwal ,JohnWiley,3rdEdiition,2004.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year-I Semester	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
		3	0	0	3

Course Outcomes:

- Understand the various Analog and Digital measuring Instruments
- Aware of the principles and operations of various oscilloscopes
- Learn measurements using various bridges
- Familiarize different Signal Generators and function generators
- Learn various transducers and Intelligent sensors

UNIT I

Measuring Instruments: Introduction, Errors in Measurement, Accuracy, Precision, Resolution and Significant figures, Basic PMMC Meter- construction and working, DC and AC Voltmeters-Multirange, Range extension, DC Ammeter, Multimeter for Voltage, Current and resistance measurements.

Digital Instruments: Digital Voltmeters – Introduction, DVM's based on V–T, V–F and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multimeters, Digital frequency meters, Digital measurement of time.

UNIT II

Oscilloscopes: Introduction, Block diagram of CRO, Basic principle of CRT, CRT Construction and features, vertical amplifiers, horizontal deflection system- sweep, trigger pulse, delay line, sync selector circuits. Dual beam and dual trace CROs, Sampling and Digital storage oscilloscopes.

UNIT III

Bridges: DC Bridges for Measurement of resistance - Wheat stone bridge, Kelvin's Bridge, AC Bridges for Measurement of inductance- Maxwell's bridge, Hay's Bridge, Anderson bridge, Measurement of capacitance - Schearing Bridge, Wien Bridge, Errors and precautions in using bridges.

UNIT IV

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator.

UNIT V

Transducers: Introduction, Types of Transducers, Electrical transducers, Selecting a transducer, Resistive transducer, Strain gauges, Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Temperature transducers-RTD, LVDT.

Intelligent Sensors: definition of intelligent instrumentation, types of instruments, Classification, Smart sensors, Cogent Sensors, Soft or Virtual sensors, Self-Adaptive Sensors,

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Self-Validating Sensors, Temperature Compensating Intelligent Sensors, Pressure Sensor, Indirect Sensing. (**Text Book 3**)

TEXT BOOKS

1. H. S. Kalsi, "Electronic Instrumentation", Third edition, Tata McGraw Hill, 2010.
2. A. D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 6th Edition, 2010.
3. ManabendraBhuyan, —Intelligent Instrumentation: Principles and Applications CRC Press, 2011.

REFERENCE BOOKS

1. A.K. Sawhney, DhanpatRai& Co., "A course in Electrical and Electronic Measurements and Instrumentation", 9th Edition, 2010.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2006.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III YearI Semester	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

Course Outcomes:

- Understand the representation of data, the register transfer language and Microoperations.
- Know the basic computer organization and design, programming the basic computer and design the microprogrammer control unit.
- Know the development of central processing unit and explain various algorithms for computer arithmetic operations.
- Interface various Peripheral devices and various data transfer operations.
- Study the memory Hierarchy and different types of memories.

UNIT-1 :

Introduction: Digital Computers, Von Neumann computers, Basic organization of a computer, **Data Representation:** Data types, Complements, Fixed-point representation, Conversion of fractions, Floating-point representation.

Register Transfer and Microoperations: Register transfer language, Register transfer, Bus and Memory transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit

UNIT-2

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference instructions, Input-Output and Interrupt, Complete Computer Description, Design of Basic computer

Programming the Basic Computer: Introduction, Machine Language, Assembly language, The Assembler, Program Loops, Programming Arithmetic and Logic Operations

Microprogrammed Control: Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit (**Preferably from Reference Book 2**)

UNIT-3

Central Processing Unit: Introduction, General Register Organization, Stack organization, Instruction Formats, Addressing Modes, Data transfer and Manipulation, Program Control, Reduced Instruction Set Computer

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT – 4

Input-Output organization :Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING (AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

UNIT– 5

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Text Book

1. M.Morris Mano," Computer System Architecture," Pearson Publishers, Revised Third Edition

Reference Books

1. John P Hayes, "Computer Architecture and Organization,"Mc-Graw Hill Publishers, Third Edition
2. Carl Hamacher, "Computer Organization," Tata Mc-Graw Hill Publishers, Fifth Edition.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III YearI Semester	ELECTRONIC DEVICES AND CIRCUITS	L	T	P	C
		3	0	0	3

Course Outcomes:

- Apply the basic concepts of semiconductor physics.
- Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
- Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
- Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.
- Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.

UNIT-I:

Review of Semi Conductor Physics: Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors

Junction Diode Characteristics : Energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance.

UNIT-II:

Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Varactor Diode, Photodiode, Tunnel Diode, UJT, PNPN Diode, SCR. Construction, operation and V-I characteristics.

Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter(Series inductor), Capacitor filter(Stunt inductor), π-Filter, comparison of various filter circuits in terms of ripple factors.

UNIT- III: Transistor Characteristics:

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristicsμ, g_m, $r_d$parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING (AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

UNIT- IV: Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE}, Ic, and β, Stability factors, (S,S',S''), Bias compensation, Thermal runaway, Thermal stability.FET Biasing- methods and stabilization.

UNIT- V: Small Signal Low Frequency Transistor Amplifier Models:
BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.
FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

Text Books:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, SecondEdition,2007
2. Electronic Devices and Circuits by David A. Bell, Oxford University Press
3. Electronics devices & circuit theory- Robert L.Boylestad and LouiNashelsky, Pearson/Prentice hall, tenth edition,2009

References:

1. Integrated Electronics-J. Millman, C. Halkias,Tata Mc-Graw Hill, Second Edition,2009
2. Electronic Devices and Circuits-K. Lal Kishore, BS Publications, Fourth Edition,2016.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year I Semester	SIGNALS AND SYSTEMS	L	T	P	C
		3	0	0	3

Course Outcomes:

- Differentiate the various classifications of signals and systems
- Analyze the frequency domain representation of signals using Fourier concepts
- Classify the systems based on their properties and determine the response of LTI Systems.
- Know the sampling process and various types of sampling techniques.
- Apply Laplace and z-transforms to analyze signals and Systems(continuous & discrete).

UNIT- I: INTRODUCTION: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems, Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function.

UNIT–II: FOURIER SERIES AND FOURIER TRANSFORM:
Fourier series representation of continuous time periodic signals, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of standard signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Related problems

UNIT-III:
CORRELATION: Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation.

SAMPLING THEOREM: Graphical and analytical proof or Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Aliasing, Related problems.

UNIT–IV:
LAPLACE TRANSFORMS: Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT–V:
Z–TRANSFORMS: Concept of Z-Transform of a discrete sequence. Region of convergence in Z- Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms, Distinction between Laplace, Fourier and Z transforms.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING (AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

TEXT BOOKS:

1. Signals, Systems & Communications-B.P.Lathi,BSPublications,2003.
2. Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab,PHI,2ndEdn,1997
3. Signals & Systems-SimonHaykinandVanVeen,Wiley,2ndEdition,2007

REFERENCE BOOKS:

1. PrinciplesofLinearSystemsandSignals–BPLathi,OxfordUniversityPress,2015
2. Signals and Systems–TK Rawat, Oxford University press,2011.

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year-I Semester	ANALOG AND DIGITAL IC APPLICATIONS LAB	L	T	P	C
		0	0	3	1.5

PART-A: (Minimum **SIX** Experiments to be conducted):

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Integrator and Differentiator Circuits using IC 741.
3. Active Filter Applications – LPF, HPF (first order)
4. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
5. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
6. Function Generator using OP AMPs.
7. IC 555 Timer – Astable& Mono-stable Operation Circuit.
8. Schmitt Trigger Circuits – using IC 741 and IC 555.
9. IC 565 – PLL Applications.
10. IC 566 – VCO Applications.
11. 4 bit DAC using OP AMP.

Equipment required for Laboratories:
1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components:- IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 etc.
8. Analog IC Tester

PART-B: (Minimum **SIX** Experiments to be conducted):

The students are required to design and draw the internal structure of the following Digital Integrated Circuits and to develop HDL(VHDL, Verilog HDL) source code, perform simulation using relevant simulator and analyze the obtained simulation results using appropriate synthesizer. Further, it is required to verify the logic with necessary hardware.

List of Experiments:
1. Realization of Logic Gates
2. 3 to 8 Decoder- 74138
3. 8*1 Multiplexer-74151 and 2*1 De-multiplexer-74155
4. 4-Bit Comparator-7485.
5. D Flip-Flop- 7474
6. Decade Counter- 7490
7. Universal shift register-74194/195
8. RAM (16*4)-74189 (read and write operations)

Equipment Required:
1.Xilinix Vivado/Equivalent Standard IDE
2. Personal computer with necessary peripherals
3.Hardware kits- Various FPGA families.

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III Year-I Semester	ANALOG AND DIGITAL COMMUNICATIONS LAB	L	T	P	C
		0	0	3	1.5

List of Experiments:

(Fourteen experimentstobedone-**Thestudentshavetocalculatetherelevantparameters**)–

(a. Hardware, b. MATLAB Simulink c. MATLAB Communication toolbox)

Part-A

1. Amplitude Modulation-Modulation &Demodulation
2. AM-DSBSC-Modulation &Demodulation
3. Diode Detector
4. Pre-emphasis & De-emphasis
5. Frequency Modulation-Modulation &Demodulation
6. Verification of Sampling Theorem
7. Pulse Amplitude Modulation &Demodulation
8. PWM,PPM–Modulation &Demodulation

Part-B

1. Time division multiplexing.
2. Frequency Division Multiplexing
3. Pulse code modulation.
4. Differential pulse code modulation.
5. Delta modulation.
6. Frequency shiftkeying.
7. Phase shift keying.
8. Differential phase shift keying.
9. Companding
10. Source Encoder and Decoder
11. Linear Block Code-Encoder and Decoder and Binary Cyclic Code–Encoder and Decoder
12. Convolution Code–Encoder and Decoder

Note: All the above experiments are to be executed/completed using hardware boards and also to be simulated on Mat lab.

Equipment

&Software required:

Software:

i) Computer Systems with latest specifications
ii) Connected in LAN(Optional)
iii) Operating system(Windows/Linux software)
iv) Simulations software(Simulink &MATLAB)

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Equipment:

1. RPS -0 –30V
2. CRO -0–20MHz.
3. Function Generators -0–1MHz
4. ComponentsandBreadboards
5. Multimetersandothermeters

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year-I Semester	APPLICATIONS OF LAB VIEW FOR INSTRUMENTATION & COMMUNICATIONS	L	T	P	C
		0	1	2	2

Course Outcomes:

- Develop loops, case structures, arrays, and clusters.
- Realize real time applications using NI DAQ hardware
- Implement Coding techniques using Lab VIEW
- Design automation and process control application
- Apply Lab VIEW for data processing applications

Unit I:

Introduction to Lab VIEW & Virtual Instrumentation: Overview of Lab VIEW: Graphical programming paradigm, Lab VIEW Environment: Front panel, block diagram, data flow programming, Creating simple Virtual Instruments (VIs), Debugging and troubleshooting techniques, Implementing loops, case structures, arrays, and clusters.

Unit II:

Data Acquisition & Signal Processing: Interfacing sensors (temperature, pressure, light, etc.) with LabVIEW, Real-time data acquisition using NI DAQ hardware, Signal generation: Sine, Square, Triangular waves, Fourier Transform (FFT) for frequency analysis, Filtering techniques: Low-pass, High-pass, Band-pass filters.

Unit III:

Communication System Implementation: AM and FM Modulation/Demodulation using Lab VIEW, Simulation of Digital Modulation Schemes (ASK, PSK, FSK), Eye diagrams and constellation plots for digital signals, Error detection and correction: Parity, CRC, Hamming Code.

Unit IV: Instrumentation & Automation Applications:

Real-time data logging and file handling (Excel/CSV), PID Controller Design for automation and process control, Motor speed control using Lab VIEW and DAQ, Signal visualization and user interface design.

Unit V: Advanced Applications:

Image Processing using Lab VIEW, Wireless communication using Bluetooth & Wi-Fi in Lab VIEW, IoT Integration-Cloud-based monitoring and remote data access, Project-based learning-

Textbooks & References

1. R. W. Larsen, Lab VIEW for Engineers, 1st ed., Prentice Hall, 2011.
2. G. W. Johnson and R. Jennings, Lab VIEW Graphical Programming, 4th ed., McGraw-Hill, 2017.

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3. National Instruments, "Lab VIEW Tutorials & Documentation," Available: https://www.ni.com.J. Jerome, Virtual Instrumentation Using Lab VIEW, 1st ed., PHI Learning Pvt

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B.TECH–ELECTRONICS AND COMMUNICATION ENGINEERING
(AMR 24 – III[rd] YEAR COURSE STRUCTURE & SYLLABUS)

III Year-I Semester	DESIGN OF PCB & ANTENNAS LAB	L	T	P	C
		0	0	2	1

Merits of PCB Machine:

1. CNC based for Better Accuracy and results.
2. Etching, Engraving and Drilling can be done with same Machine
3. Maintenance free machine compared to chemical method.
4. Compatible with multiple software Gerber / G code.
5. Reduction of time and Inventory.
6. Height mapping for bed level and depth sensing.
7. Surface mapping of bed
8. Power Optimized system ability to run on ups systems unlike other Machines.
9. High precision lead screw
10. 5umeter resolution, 0.001 repeatability, 2 layer with FR4
11. Scalability from a single prototype to a batch of 10-50 PCBs.

Scope of learning:

1. In house PCB proto type manufacturing process.
2. How to convert simulation results into real time Electronic boards/ Projects.
3. Designing according to project requirements.
4. Along with PCB other Multi materials support carbon fiber sheets, Drone frames, Engraved
5. Acrylic sheets. Engraving on aluminium.
6. Latest multi domain projects extension 3D printing and Additive Manufacturing.
7. Exposure to design the proto type products.

ANTENNAS LAB:

List of experiments: (Any Ten experiments using any simulation software)

1. Generation of EM-Wave
2. Impedance Matching using Smith Chart
3. Calculation of phase and group velocity calculation
4. Plot of Radiation pattern of dipole antenna
5. Plot of Radiation pattern of monopole antenna
6. Plot of Radiation pattern of Uniform Linear Array
7. Measurement of radiation pattern of all wired and aperture antennas

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8. Measurement of radiation pattern of planar antennas
9. Measurement of radiation pattern of reflector antennas
10. Measurement of radiation pattern of array antennas
11. Analysis of co-polarization and cross polarization
12. Performance analysis of Yagi -Uda antenna
13. Performance analysis of Helix antenna
14. Radio wave propagation path loss calculations