B.Tech
III Year V Semester

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)
AK20-REGULATIONS

B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20APC0413	ANTENNAS AND WAVE PROPAGATION	3	0	0	3

Course Outcomes:
Upon completion of the course students will be able to
CO1: Apply parametric equations for the calculation of antenna parameters in far field region.
CO2: Identify Loop antenna, helical antenna, horn antenna and its parameters.
CO3: Compute Micro-strip antenna, Reflector and Lens antennas and its parameters.
CO4: Analyze principle of pattern multiplication for antenna arrays.
CO5: Illustrate different modes of Wave propagation in atmospheric layers.

UNIT I:
ANTENNA BASICS
Introduction, Basic antenna parameters - patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain, Antenna Apertures, Effective height, Polarization - Linear, Elliptical, & Circular polarizations, Antenna impedance, Front–to-back ratio, Antenna theorems.
DIPOLE ANTENNAS
Basic Maxwell's equations, Retarded potential-Helmholtz Theorem, Radiation from Small Electric Dipole, Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Natural current distributions, Fields from oscillating dipole, Illustrative problems.

UNIT II:
VHF, UHF AND MICROWAVE ANTENNAS-I
Loop Antennas: Introduction, Small Loop, Comparison of far fields of small loop and short dipole. **Arrays with Parasitic Elements:** Yagi - Uda Arrays, Folded Dipoles & their characteristics. **Helical Antennas:** Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. **Horn Antennas:** Types, Fermat's Principle, Optimum Horns, Design considerations of Pyramidal Horns, Illustrative Problems.

UNIT III:
VHF, UHF AND MICROWAVE ANTENNAS-II
Micro strip Antennas: Introduction, features, advantages and limitations, rectangular patch antennas-Geometry and parameters, characteristics of Micro strip antennas, Impact of different parameters on characteristics. **Reflector antennas:** Introduction, Flat sheet and corner reflectors, parabola reflectors-geometry, pattern characteristics, Feed Methods, Reflector Types - Related Features. **Lens Antennas:** Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications, Illustrative Problems.

UNIT IV:
ANTENNA ARRAYS
Definition, Patterns, arrays of 2 Isotropic sources different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End fire Arrays.
ANTENNA MEASUREMENTS
Introduction, Near and Far Fields, Pattern Measurement, Directivity Measurement, Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

UNIT V:
WAVE PROPAGATION
Introduction, Definitions, Characterizations and general classifications, different modes of wave propagation, Ray/Mode concepts.
Ground wave propagation: Introduction, Plane earth reflections, Space and surface waves, wave tilt,

curved earth reflections.

Space wave propagation: Introduction, Super refraction, duct propagation, fading and path loss calculations.

Sky wave propagation: Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi - HOP propagation, Illustrative problems.

Text Books:

16. John D. Kraus and Ronald J. Marhefka and Ahmad S. Khan, "Antennas and wave propagation," TMH, New Delhi, 4th Ed., (special Indian Edition), 2010.
17. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems," PHI, 2ndEdn, 2000.

Reference Books:

28. C.A. Balanis, "Antenna Theory- Analysis and Design," John Wiley & Sons, 2nd Edn., 2001.
29. K.D. Prasad, Satya Prakashan, "Antennas and Wave Propagation," Tech. India Publications, New Delhi, 2001.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO2: Problem analysis	2.1	2.1.2
CO3	PO2: Problem analysis	2.3	2.3.2
CO4	PO3: Design/Development of Solutions	3.2	3.2.2
CO5	PO2: Problem analysis	2.2	2.2.2

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B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20APC0414	DIGITAL COMMUNICATION SYSTEMS	3	0	0	3

Course Outcomes:

Upon completion of the course students will be able to

CO1: Understand the various pulse code modulation techniques.

CO2: Analyze and compute performance parameters in baseband pulse transmission.

CO3: Apply the knowledge of signal representations and describe their error probabilities in Digital Communication Systems.

CO4: Understand and analyze systems based on digital modulation techniques..

CO5: Analyze various Error detection and Error correction codes in Digital Communication Systems.

UNIT I:
SOURCE CODING SYSTEMS

Introduction, sampling process, quantization, quantization noise, Pulse-Code Modulation (PCM), Line codes-Types, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Delta modulation (DM), Differential PCM (DPCM), Processing gain, Adaptive DPCM (ADPCM), Comparison of the above systems.

UNIT II:
BASEBAND PULSE TRANSMISSION

Introduction, optimum filter, Matched filter, Properties of Matched filter, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, ideal Nyquist channel, Raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signaling schemes, Eye diagrams.

UNIT III:
SIGNAL SPACE ANALYSIS

Introduction, Geometric representation of signals, Gram Schmidt orthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Coherent detection of signals in noise, Correlation receiver, Equivalence of correlation and Matched filter receivers, Probability of error, Signal constellation diagram.

UNIT IV:
PASS BAND DATA TRANSMISSION

Introduction, Pass band transmission model, Coherent phase-shift keying – binary phase shift keying (BPSK), Quadrature shift keying (QPSK), Binary Frequency shift keying (BFSK), Error probabilities of BPSK, QPSK, BFSK, Generation and detection of Coherent BPSK, QPSK, & BFSK, Power spectra of above mentioned modulated signals

UNIT V:
CHANNEL CODING

Error Detection & Correction - Repetition & Parity Check Codes, Interleaving, Code Vectors and Hamming Distance, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes, Convolutional Codes – Code tree, state diagram, code trellis, Decoding Methods-Viterbi algorithm.

Text Books:

18. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.
19. B.P. Lathi, &Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.

Reference Books:

30. Sam Shanmugam, “Digital and Analog Communication Systems”, John Wiley,2005
31. A. Bruce Carlson, & Paul B. Crilly, “Communication Systems – An Introduction to Signals & Noise in Electrical Communication”, McGraw-Hill International Edition, 5th Edition, 2010
32. Bernard Sklar, “Digital Communications”, Prentice-Hall PTR, 2nd edition, 2001.
33. Herbert Taub& Donald L Schilling, “Principles of Communication Systems”, Tata McGraw-Hill, 3rd Edition, 2009. 5. J. G. Proakis, M Salehi, Gerhard Bauch, “Modern Communication Systems Using MATLABORATORY,” CENGAGE, 3rd Edition, 2013.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO3	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO4	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO5	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1

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Course Code	Course Title	L	T	P	Credits
20APC0415	INTEGRATED CIRCUITS AND APPLICATIONS	3	0	0	3

Course Outcomes:
Upon completion of the course students will be able to
CO1: Understand the basic building blocks of linear integrated circuits and its characteristics.
CO2: Analyze different feedback amplifiers and its frequency response.
CO3: Compare linear and non-linear applications of operational amplifiers.
CO4: Illustrate the importance of specialized applications of Operational Amplifier by using specialized ICs.
CO5: Describe the different types of A/D and D/A converters.

UNIT I:
DIFFERENTIAL AMPLIFIERS: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level Translator.
OPERATIONAL AMPLIFIERS: Introduction, Block diagram, Ideal op-amp, Equivalent Circuit, VoltageTransfer curve, open loop op-amp configurations. Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier.

UNIT II:
FEED BACK AMPLIFIERS: Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, properties of Practical op-amp.
FREQUENCY RESPONSE: Introduction, compensating networks, frequency response of internally compensated op-amps and non-compensated op-amps, High frequency op-amp equivalent circuit, open loop gainVs frequency, closed loop frequency response, circuit stability, slew rate.

UNIT III:
OP-AMP APPLICATIONS-1: DC and AC amplifiers, peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First and Second order Butterworth filter and its frequency response.

UNIT IV:
OP-AMP APPLICATIONS -2: Oscillators, Phase shift and Wein bridge oscillators, Square, triangular and sawtooth wave generators, Comparators, zero crossing detector, Schmitt trigger, characteristics and limitations.
SPECIALIZED APPLICATIONS: 555 timer IC (monostable & astable operation) & its applications, PLL,operating principles, Monolithic PLL, applications, analog multiplier and phase detection.

UNIT V:
A/D AND D/A CONVERTERS: Analog and Digital Data Conversions, D/A converter – specifications – weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R - 2R Ladder types - switches for D/A converters, high speed sample- and-hold circuits, A/D Converters – specifications – Flash type – Successive Approximation type –Counter type ADC– Dual Slope type ADC.

Text Books:

1) D. Roy Chowdhury, "Linear Integrated Circuits", New Age Int. (P) Ltd, 2nd Edition, 2003.
2) K. LalKishore,"Operational Amplifiers & Linear Integrated Circuits", Pearson Education, 2007.

Reference Books:

1) Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", PHI, 4th Edition, 1987.
2) R.F.Coughlin & Fredrick Driscoll, "Operational Amplifiers & Linear Integrated Circuits", 6th Edition, PHI.
3) David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2nd Edition, 2010.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Engineering knowledge	1.1	1.3.1
CO: 2	PO 1: Engineering knowledge	1.1	1.3.1
CO: 3	PO 3: Design/Development of Solutions	3.2	3.2.3
CO: 4	PO 3: Design/Development of Solutions	3.2	3.2.3
CO: 5	PO 3: Design/Development of Solutions	3.2	3.2.3

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Course Code	Course Title	L	T	P	Credits
20APC0515	OPERATING SYSTEMS	3	0	0	3

Course Outcomes:
Upon completion of the course students will be able to
CO1: Distinguish between the different types of operating system environments.
CO2: Apply the concepts of process synchronization & CPU scheduling.
CO3: Develop solutions to deadlock and memory management.
CO4: Analyze various disk scheduling algorithms and file system interfaces.
CO5: Analyze the various security issues and goals of protection.

UNIT I:
Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Computing Environments, Open- Source Operating Systems
System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.
Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT II:
Threads: overview, Multi-core Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.
Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.
CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT III:
Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.
Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory
Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV:
Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.
File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.
File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT V:
I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.
Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection
Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks,

Computer–security classifications.

Text Books:

20. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley, Eight Edition, 2018

Reference Books:

1. Operating systems by A K Sharma, Universities Press,
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Operating Systems, A.S.Godbole, Second Edition, TMH.
4. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
5. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
6. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.
7. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
8. Operating System Desgin, Douglas Comer, CRC Press, 2nd Edition.
9. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.

Online Learning Resources:

https://nptel.ac.in/courses/106/106/106106144/ http://peterindia.net/OperatingSystems.html

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO3	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO4	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO5	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1

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B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20AOE0202	PROGRAMMABLE LOGIC CONTROLLERS	3	0	0	3

Course Outcomes:

Upon completion of the course students will be able to

CO1: Understand the purpose, functions, and operations of a PLC and Identify the basic components of the PLC and how they function.

CO2: View a directory of processor files using PLC software and Ability to gain knowledge on Programmable Logic Controllers.

CO3: Will understand different types of Devices to which PLC input and output modules are Connected and To provide the knowledge about understand various types of PLC registers.

CO4: Able to create ladder diagrams from process control descriptions.

CO5: Ability to apply PLC timers and counters for the control of industrial processes. Able to use different types PLC functions, Data Handling Function.

UNIT - I

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT - II

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT - III

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT - IV

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT - V

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

Text Books:

1. "John W Webb and Ronald A Reiss", Programmable Logic Controllers – Principle and Applications, PHI, 5th Edition 2003.
2. "JR Hackworth and F. D Hackworth Jr", Programmable Logic Controllers – Programming Method and Applications by - Pearson, 2004

Reference Books:

1. "W. Bolton", Programmable Logic Controllers, Newnes, 4th Edition 2000.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO2: Problem analysis	2.4	2.4.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO5	PO1: Engineering knowledge	1.3	1.3.1

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Course Code	Course Title	L	T	P	Credits
20APC0213	CONTROL SYSTEMS	3	0	0	3

Course Outcomes:

Upon the completion of the course, students will be able to

CO1: Formulate mathematical model and transfer function of the physical systems.
CO2: Determine the stability of linear systems in time domain.
CO3: Perform frequency domain analysis using bode and polar plot.
CO4: Formulate and design state-space analysis

UNIT - I
CONTROL SYSTEMS CONCEPTS

Basic elements of control systems- open and close loop systems - Transfer function – Modelling of Electrical systems and mechanical systems – Block diagram reduction techniques – Signal flow graphs.

UNIT-II
TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

UNIT- III
STABILITY ANALYSIS IN TIME DOMAIN

Stability - concept and definition, Characteristic equation – Location of poles – Routh Hurwitz criterion - The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT- IV
FREQUENCY RESPONSE ANALYSIS

Bode plot - Correlation between frequency domain and time domain specifications-Bode Diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots - Polar Plots-Nyquist Plots- Phase margin and Gain Margin – Stability Analysis.

UNIT- V
STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model-State Transition Matrix and it's Properties-System response through State Space models-The concepts of controlLaboratoryility and observability, Duality between controlLaboratoryility and observability.

TEXT BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering", 5th edition, Prentice Hall of India Pvt. Ltd., 2010.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering" 5th edition, New Age International (P) Limited Publishers, 2007.

REFERENCE BOOKS:

1. M. Gopal, "Control Systems Principles & Design" 4th Edition, Mc Graw Hill Education, 2012.

2. B. C. Kuo and Farid Golnaraghi, "Automatic Control Systems" 8th edition, John Wiley and sons, 2003.
3. Joseph J Distefano III, "Feedback and Control Systems", Allen R Stubberud & Ivan
4. Williams, 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
5. Graham C. Goodwin, "Control System Design" Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
6. Gene F. Franklin, "Feedback Control of Dynamic Systems", J.D. Powell and Abbas Emami-Naeini, 6th Edition, Pearson, 2010.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO2: Problem analysis	2.4	2.4.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO4: Conduct investigations of complex problems	4.3	4.3.1

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Course Code	Course Title	L	T	P	Credits
20APE0401	VLSI DESIGN	3	0	0	3

Course Outcomes:

Upon the completion of the course, students will be able to

CO1: Understand the IC fabrication process of MOS Transistors and Their Electrical Properties.
CO2: Understand and analyze the basic Integrated circuits.
CO3: Design VLSI circuits at Gate-level using stick diagrams and layouts.
CO4: Implement VLSI circuits at Physical-level through various design styles
CO5**:** Testing of integrated circuits using VHDL synthesis and VLSI circuits.

UNIT-I

IC Fabrication: MOS transistors – working, MOS switches, Basic steps of IC fabrication- PMOS, NMOS, CMOS & BiCMOS, and SOI process technologies.

Basic Electrical Properties of MOS and BiCMOS Circuits: MOS design equations: Ids–Vds relationship, Threshold Voltage, Body effect, Channel length modulation ,gm, gds, figure of merit ω0; Pass transistor, NMOS Inverter, CMOS Inverter analysis and design, Various pull-ups loads, BiCMOS Inverters.

UNIT-II

Basic Circuit Concepts: Capacitance, resistance estimations- Sheet Resistance Rs, MOS Device Capacitances, routing Capacitance, Analytic Inverter Delays, Driving large Capacitive Loads, Fan-in and fan-out.

UNIT-III

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2µm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

Gate-level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits: Psuedo NMOS Logic, Dynamic CMOS Logic.

UNIT-IV

Physical Design: Floor Planning Methods, Global Interconnect, Floor Plan Design.

VLSI Design styles: Full-custom, Standard Cells, Gate-arrays, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices.

UNIT-V

VHDL Synthesis: VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools.

Test and Testability: Fault-modeling and simulation, test generation, design for testability: Built-in-self-test.

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, ―Essentials of VLSI circuits and systems‖, PHI, 2013 Edition.
2. K. Lal Kishore and V.S.V. Prabhakar,―VLSI Design‖, IK Publishers

REFERENCES:

1. Weste and Eshraghian,―Principles of CMOS VLSI Design‖, Pearson Education,1999.
2. Wayne Wolf, ―Modern VLSI Design‖, Pearson Education, 3rd Edition, 1997.
3. John P. Uyemura, ―Chip Design for Submicron VLSI: CMOS layout and Simulation‖, Thomson Learning.
4. Fault Tolerant and Fault Testable Hardware Design, ParagK.Lala

List of COs	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.4	1.4.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
	PO2: Problem Analysis	2.3	2.3.2
CO3	PO3: Design/Development of Solutions	3.4	3.4.2
CO4	PO1: Engineering knowledge	1.4	1.4.1
CO5	PO4:Conduct investigations of complex problems	4.3	4.3.4
	PO5: Modern tool usage	5.2	5.2.1

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B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20APE0402	COMPUTER ORGANIZATION	3	0	0	3

Course Outcomes:

Upon completion of the course students will be able to

CO1: Remember basic operations about computer

CO2: Illustrate various configurations avaiLaboratoryle in processor operations

CO3: Compute different arithmetic operations done by a computer

CO4: Analyze peripheral devices and its internal interfacing with computer

CO5: Implement parallel processing techniques in computer operations.

UNIT-I

BASICS RELATED TO COMPUTER

Computer types, Functional units, basic operational concepts, Bus structures, Data types, Software: Languages and Translators, Loaders, Linkers, Operating systems. Memory locations – addresses and encoding of information – main memory operations – Instruction formats and instruction sequences – Addressing modes and instructions – Simple input programming – pushdown stacks – subroutines.

UNIT-II

COMPUTER CONFIGURATION PROCESSING

Register transfer Language, Register transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, shift Micro operations, Arithmetic Logic Shift Unit. Stack organization, instruction formats, Addressing modes, Data transfer and manipulation, Execution of a complete instruction, Sequencing of control signals, Program Control.

UNIT-III

ARITHMETIC OPERATIONS

Control Memory, address Sequencing, Micro Program Example, Design of Control Unit. Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT-IV

PERIPHERAL DEVICES AND ITS INTERFACING

Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication. Memory hierarchy, main memory, auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

UNIT-V

PARALLEL PROCESSING

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors. Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence.

Text Books:

1.M. Morris Mano, “Computer system Architecture”, Prentice Hall of India (PHI), Third edition.

2. William Stallings,“Computer organization and programming”, Prentice Hall of India(PHI) Seventh Edition, Pearson Education(PE) Third edition, 2006.

Reference Books:

3. Carl Hamacher, ZvonksVranesic, SafwatZaky, “Computer Organization” 5th Edition, McGraw Hill, 2002.

4. Andrew S.Tanenbaum, “Structured Computer Organization”,4th Edition PHI/Pearson

5. John L.Hennessy and David A.Patterson, “Computer Architecture a quantitative approach”, Fourth Edition Elsevier

6. Joseph D. Dumas II, “Computer Architecture: Fundamentals and Principals of Computer Design”, BS Publication.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.4	1.4.1
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of solutions	2.3	2.3.1
CO3	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO4	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO5	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
	PO 4: Conduct investigations of complex problems	4.2	4.2.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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AK20-REGULATIONS

B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20APE0403	DIGITAL SYSTEM DESIGN	3	0	0	3

Course Outcomes:

Upon completion of the course students will be able to

CO1: Understand and analyze different Logic families and its interfacing

CO2: Design different applications by understanding VHDL

CO3: Analyze different combinational circuits and its logic

CO4: Design logical analysis of different sequential circuits.

CO5: Apply logical synthesis on designing applications.

UNIT-I

CMOS LOGIC:

Introduction to logic families, CMOS logic, CMOS logic families; BIPOLAR LOGIC AND INTERFACING: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families.

UNIT-II

HARDWARE DESCRIPTION LANGUAGES:

HDL Based Digital Design, The VHDL Hardware Description Language–Program Structure, Types, Constants and Arrays, Functions and procedures, Libraries and Packages, Structural design elements, Dataflow design elements, Behavioral design elements, The Time Dimension, Simulation, Test Benches, VHDL Features for Sequential Logic Design, Synthesis.

UNIT-III

COMBINATIONAL LOGIC DESIGN PRACTICES:

Description of basic structures like Decoders, Encoders, Comparators, Multiplexers (74 –series MSI); Design of complex Combinational circuits using the basic structures; Designing Using combinational PLDs like PLAs, PALs ,PROMs CMOS PLDs; Adders & subtractors, ALUs, Combinational multipliers; VHDL models for the above standard building block ICs.

UNIT-IV

SEQUENTIAL MACHINE DESIGN PRACTICES:

Review of design of State machines; Standard building block ICs for Shift registers, parallel / serial conversion , shift register counters, Ring counters; Johnson counters, LFSR counter ; VHDL models for the above standard building block ICs. Synchronous Design example using standard ICs

UNIT –V

DESIGN EXAMPLES (USING VHDL):

Barrel shifter, comparators, floating-point encoder, and dual parity encoder. Sequential logic Design: Latches & flip flops, PLDs and their VHDL models.

Text Books:

1.John F.Wakerly ,“Digital Design Principles and Practices” 4th edition, Pearson Education., 2009

2.Charles H.Roth,Jr., “Fundamentals of Logic Design” 5th edition , CENGAGE Learning 2012.

Reference Books:

3. M.Morris Mano and Michael D. Cilleti., “Digital Logic Design” 4th edition Pearson Education., 2013

4. Stephen Brown and ZvonkoVranesic, “Fundamentals of digital logic with VHDL design” 2nd edition McGraw Hill Higher Education.

5. J. Bhasker, “A VHDL PRIMER” 3rd edition Eastern Economy Edition, PHI Learning,2010

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.4	1.4.1
	PO 3: Design/Development of solutions	3.3	3.3.1
	PO 4: Conduct investigations of complex problems	4.2	4.2.2
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of solutions	2.3	2.3.1
	PO 5: Modern tool usage	5.2	5.2.1
CO3	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO4	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO5	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
	PO 4: Conduct investigations of complex problems	4.2	4.2.1

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B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20APC0416	DIGITAL COMMUNICATION SYSTEMS LABORATORY	0	0	3	1.5

Course Outcomes:

Upon completion of the course students will be able to

CO1: Capable of Applying Digital communication Concepts using modulation schemes.
CO2: Analyze real time behavior of modulation schemes using line codes.
CO3: Visualize spectra of different digital modulation schemes.
CO4: Simulate Digital communication concepts using digital modulation schemes
CO5: Simulate Digital Modulation Techniques

Minimum of Ten experiments to be conducted (Five from each Part-A&B)

HARDWARE EXPERIMENTS (PART – A)

1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Differential phase shift keying.
7. QPSK modulation and demodulation.

SOFTWARE EXPERIMENTS (PART-B)

Modeling of Digital Communications using MATLABORATORY

1. Pulse code modulation.
2. Differential pulse code modulation.
3. Frequency shift keying.
4. Phase shift keying.
5. Differential phase shift keying.
6. QPSK modulation and demodulation.

Equipment required for Laboratoryoratories:

1. RPS - 0 – 30 V
2. CROs - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators (3 Nos.) 0 – 1000 M Hz.
5. Multimeters
6. Laboratory Experimental kit for Pulse Code Modulation (Experiment No.3 of part – A)
7. Required Electronic Components (Active and Passive) which include required ICs
8. Arbitrary Wave form generators/ PNS generators – 2 Nos. (to generate digital data at required data rates)
9. Licensed MATLABORATORY software for 30 users with required tool boxes.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO: 1	PO 4: Conduct investigations of complex problems	4.3	4.3.1
CO: 2	PO 4: Conduct investigations of complex problems	4.1	4.1.2
CO: 3	PO 4: Conduct investigations of complex problems	4.3	4.3.3
CO: 4	PO 4: Conduct investigations of complex problems	4.2	4.2.1
CO: 5	PO 4: Conduct investigations of complex problems	4.3	4.3.3

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B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20APC0417	INTEGRATED CIRCUITS AND APPLICATIONS LABORATORY	0	0	3	1.5

Course Outcomes:
Upon completion of the course students will be able to
CO1: Understand and perform various linear application of op-amp.
CO2: Understand and perform various non-linear application of op-amp.
CO3: Design and analyze oscillators and multivibrator circuits using op-amp
CO4: Design and test filter circuits using op-amp
CO5: Design and study various application of TL082IC.

Minimum of Ten experiments to be conducted
All experiments are based upon 741 / TL 082/ASLK Kits.

1. Study the characteristics of negative feedback amplifier
2. Summing and Subtractor Amplifier
3. Design of an instrumentation amplifier
4. Study the characteristics of regenerative feedback system with extension to design an Astable multi vibrator
5. Study the characteristics of integrator circuit
6. Design of Analog filters – I
7. Design of Analog filters – II
8. DC-DC Converter
9. Design of a function generator
10. Design of a Voltage Controlled Oscillator
11. Design of a Phase Locked Loop (PLL)
12. Design of a low drop out regulator

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: **Engineering knowledge**	1.4	1.4.1
CO: 2	PO 1: **Engineering knowledge**	1.4	1.4.1
CO: 3	PO 2: **Problem Analysis**	2.4	2.4.4
CO: 4	PO 3: **Design/Development of Solutions**	3.4	3.4.2
CO: 5	PO 2: **Problem Analysis**	2.3	2.3.2

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B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20AHE9902	Principles of Effective Public Speaking	1	0	2	2

Course Outcomes:

Students will be able to:

CO1: Apply knowledge of principles, concepts and skills learned in speech preparation.
CO2: Develop skills in effective listening.
CO3: Develop skills in speech composition.
CO4: Use supporting materials and presentation aids in speech preparation.

UNIT-I

Introduction to Public Speaking:

Basic communication concepts - Effective listening, the listening process, and types of listening; Listening barriers; Identifying and improving listening styles.

UNIT-II

Selecting Topic and Knowing your Audience

Identifying sources; Tools and techniques for selecting and refining speech topics; identifying speech purposes; Central idea statement; Audience analysis techniques.

UNIT-III

Speaking with a Purpose

Methods of speech preparation - Informative, persuasive, and ceremonial speeches

UNIT-IV

Delivering your speech and using Visual Aids

The mechanics of verbal and nonverbal communication in speech delivery - Effective delivery techniques; Incorporating presentation aids in presentation.

References:

1. DeVito, J.A. (2009). The Essential Elements of Public Speaking. (3rd ed.) Boston: Pearson Education, Inc.

2. Lucas, S.E. (2009). The Art of Public Speaking. (10th ed.) New York: McGraw - Hill Co.

3. Zarefsky, D. (2011). Public Speaking: Strategies for Success. (6th ed. Boston: Pearson Education, Inc).

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.2
CO2	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.1

CO3	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.2
CO4	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation,make effective presentations, and give and receive clear instructions.	10.3	10.3.1

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B. Tech III Year V Semester

Course Code	Course Title	L	T	P	Credits
20AMC9904	PROFESSIONAL ETHICS AND HUMAN VALUES	2	0	0	0

Course Outcomes:

Upon completion of the course students will be able to

CO1: It ensures students sustained happiness through identifying the essentials of human values and skills

CO2: The students will understand the importance of Values and Ethics in their personal lives and professional careers

CO3: The students will learn the rights and responsibilities as an employee, team member and a global citizen.

CO4: Students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.

CO5: Students can able to develop appropriate technologies and management patterns to create harmony in professional and personal life..

UNIT - I:

Introduction to Human Values: Need, basic Guidelines, Content and Process for Value Education, Self Exploration - 'Natural Acceptance' and Experiential Validation. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities. Understanding Happiness and Prosperity correctly.

UNIT - II:

Understanding Harmony in the Family and Society: Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the harmony in the society (society being an extension of family). Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT – III:

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT – IV:

Professional Practices in Engineering: Work Place Rights & Responsibilities, Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers – The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – V:

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Depletion, Pollution, Ethics in Manufacturing and Marketing, Media Ethics, War Ethics, Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

1.R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2.Professional Ethics: R. Subramanian, Oxford University Press, 2015. 3.Ethics in Engineering Practice & Research, Caroline Whit beck, Cambridge University Press 2015.

REFERENCE BOOKS:

1. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.
2.Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
3. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritcha Michael J Rabins, Cengage learning, 2015.
4. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	**PO 8:** Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice	8.3, 8.4	8.3.1, 8.4.1 8.4.2
CO: 2	**PO 8:** Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice	8.3, 8.4	8.3.1, 8.4.1 8.4.2
CO: 3	**PO 8:** Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice	8.3, 8.4	8.3.1, 8.4.1 8.4.2
CO: 4	**PO 8:** Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice	8.3, 8.4	8.3.1, 8.4.1 8.4.2
CO: 5	**PO 8:** Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice	8.3, 8.4	8.3.1, 8.4.1 8.4.2