



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electronics and Communications Engineering

Effective from the Academic Year 2020-2021 (R20 Regulations)

Fourth Year B. Tech (SEMESTER– VII)

		Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20ECD31, ...34	PC	Professional Elective-III	3	0	0	3	30	70	100	3
20ECD41, ...44	PC	Professional Elective-IV	3	0	0	3	30	70	100	3
20EC703	PC	Professional Elective-V	3	0	0	3	30	70	100	3
20ECJ31, ...34	JOE	Open/Job-Oriented Elective-III	3	0	0	3	30	70	100	3
20ECD21, ...14	JOE	Open/Job Oriented Elective-IV	3	0	0	3	30	70	100	3
20EC704/H S02	HSS	Industrial Management and Entrepreneurship Development	3	0	0	3	30	70	100	3
20EC705/S O03	SOC	Artificial neural networks	1	0	2	3	30	70	100	2
		Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VIII semester)								3
		TOTAL	19	0	2	21	210	490	700	23
		Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)								4

CIE: Continuous Internal Evaluation

SEE: Semester End Examination L: Lecture, T:

Tutorial,

P: Practical

BS: Basic Science Courses

ES: Engineering Science Courses

PC: Professional Core

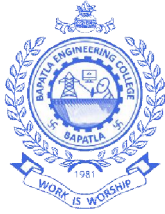
PEC Elective-III:

20ECD31: RADAR Engineering

20ECD32: Speech Processing

20ECD33: FPGA Design

20ECD34: MEMS



BAPATLAENGINEERINGCOLLEGE::BAPATLA (Autonomous)

Elective-IV:

20ECD41: Satellite Communication

20ECD42: Wireless Networks

20ECD43: Advanced DSP

20ECD44: Cloud Computing

Professional Elective: V

20ECD51: Low Power VLSI

20ECD52: Advanced Wireless Communication

20ECD53: Semiconductor Device Modeling

20ECD54: Advanced Sensors

20ECD55: 20ECD55 - System On Chip Architecture

Open/JOC-Elective III

20ECI01 Digital Image Processing

20ECI02 Embedded System & Design

JOCElective-IV

20ECJ41: Digital Image Processing

20ECJ42: Biomedical Signal Processing

20ECJ43: Robotics

20ECJ44: Deep Learning



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electronics and Communications Engineering

Effective from the Academic Year 2020-2021 (R20 Regulations)

Fourth Year B. Tech (SEMESTER– VIII)

Code		Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20ECP801	PC	Project work, Seminar and internship in Industry	-	-	-	3	30	70	100	12



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

RADAR Engineering -Professional Elective- III IVB. Tech– I Semester(20ECD31)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	30	Semester End Examination(3Hours)		:	70

Prerequisites: EM Waves and Transmission Lines, Antennas and wave Propagation.

Course Objectives: To learn

CO1: To understand the basic concepts of Radar communications system and its applications.

CO2: To know the working principles of CW, FM, MTI and Pulse Doppler radars.

CO3: To understand the working principles of Tracking Radars and Radar receivers.

CO4: To understand basic concepts of Electronic warfare and other types of Radars.

Course Outcomes: Students will be able to

CLO1: Understand the basic concepts of Radar communication system and its applications.

CLO2: Know the working principles of CW, FM, MTI and Pulse Doppler radars.

CLO3: Understand the working principles of Tracking Radars and Radar receivers.

CLO4: Know the basic concepts of Electronic warfare and other types of Radars.

SYLLABUS

UNIT – I

Introduction to RADAR: The simple form of the Radar equation, Radar Block Diagram and operation, Applications of RADAR, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Signal to Noise Ratio, Integration of Radar pulses, Radar Cross Section of Targets, Cross Section Fluctuations, Transmitter Power, Pulse Repetition Frequency And Range Ambiguities, Antenna Parameters, System Losses.

UNIT – II

CW and Frequency Modulated RADAR: The Doppler Effect, CW Radar, Frequency Modulated CW Radar, Multiple Frequency CW Radar.

MTI and Pulse Doppler radar: Introduction, Block Diagrams of MTI Radar Delay line cancellers, Multiple or Staggered Pulse Repetition Frequencies, Range Gated Doppler Filters.

UNIT – III

Tracking Radar: Tracking with Radar, Sequential lobbing, conical scan, Monopulse Tracking RADARS (amplitude comparison and phase comparison).

RADAR Receivers, Displays, And Duplexers: The RADAR Receiver, Noise Figure, Mixers, Low Noise front Ends, Displays, Duplexers and Receiver Protectors, Radome.

UNIT – IV

Electronic Warfare: Electronic counter measures and Electronic counter-counter measures, Introduction, Electronic counter measures, RADAR jamming, Electronic counter-counter measures, Electronic Support, Stealth applications.

Other Radar Topics: HF Over-the-Horizon Radar, Air-Surveillance Radar, Height Finder and 3D Radars, Bistatic Radar.



BAPATLAENGINEERINGCOLLEGE::BAPATLA (Autonomous)

TEXTBOOKS:

1. IntroductiontoRadarSystems, Merrill ISkolnik,2ndEdition,TMH,2007.
2. Fundamentals of RADAR, sonar and Navigation Engineering, KK Sharma, SK Kataria&Sons,FourthEdition, 2014.

REFERENCEBOOKS:

1. MicrowaveandRadarEngineeringbyDr.M.Kulkarni”,UmeshPublications,fifthedition NewDelhi,2009.
2. MicrowaveandRadarEngineering”,byGottapuSasiBhushanaRao,PearsonPublications, 2014.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Speech Processing-Professional Elective-III IVB. Tech-I Semester(20ECD32)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: None

Course Objectives: In this course, students will

CO-1: Learn about speech production and its parameters.

CO-2: Analyze speech signals mathematically.

CO-3: Understand speech enhancement and speech to text conversion.

CO-4: Discuss the concepts of speech quantization and coding.

Course Outcomes: Students will be able to

CLO-1: Know the fundamentals of speech signal production.

CLO-2: Perform mathematical analysis on speech signals.

CLO-3: Learn different speech enhancement techniques and evaluate their similarities.

CLO-4: Understand the functioning of speech quantizers and execution of coding.

UNIT- I

Introduction–Signal and Linear Systems, Frequency analysis, Discrete-time signals and systems, filters. Speech production and acoustic phonetics – Anatomy and physiology of speech organs, articulatory phonetics, acoustic phonetics. Short-time speech analysis – windowing, spectra of windows, signal – analysis in time domain, short time energy, magnitude, zero-crossing rate and autocorrelation function,

UNIT- II

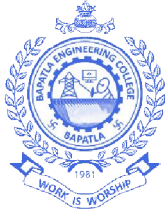
Linear predictive coding (LPC) analysis – Basic principles, computation of LP coefficients, spectral estimation, window considerations, emphasizing low frequencies, pole-zero LPC models. Cepstral analysis – Mathematical details, application of the cepstrum, pitch estimation using time domain and short-time spectral techniques.

UNIT- III

Speech enhancement – Nature of interfering sounds, speech enhancement techniques, spectral subtraction, enhancement by resynthesis. Automatic speech recognition – Basic pattern recognition approaches, parametric representation of speech, evaluating the similarity of speech patterns.

UNIT- IV

Speech quantization and coding-Uniform and Non-Uniform Quantizers and Coder, Companded Quantizers, Uniform Quantization of Non-uniform Sources: Adaptive Quantizers, Waveform Coding of Speech, Comparison of Different Waveform Coding Techniques, Parametric Speech Coding Techniques.



BAPATLAENGINEERINGCOLLEGE::BAPATLA (Autonomous)

TEXT BOOKS:

1. Douglas O Shaughnessy, Speech Communications, second Edition, Oxford University Press, 2000.
2. L.R Rabiner and S.W. Schafer. Digital Processing of speech signals, Prentice Hall.

REFERENCE BOOKS:

1. Owens, Signal Processing of Speech.
2. Dellar and Proakis, Digital Signal Processing, PHI.
3. Dr. Shaila D. Apte, Speech and Audio Processing, Wiley India Edition.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

FPGA Design-Professional Elective- III IVB.Tech-I Semester(20ECD33)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: None

Course Objectives: To learn

CO1: VLSI circuit design processes.

CO2: Physical Design Automation concepts and designing Arithmetic Building Blocks.

CO3: To have an overview of different types of FPGA boards.

CO4: To know the process of Synthesis and Testability of different building blocks.

Course Outcomes: Students will be able to

CLO1: Implement circuit through various design styles (semi-Custom, Full-Custom). **CLO2:** Illustrate the features of Programmable Logic Devices, CPLD, and performance. **CLO3:** Summarize the various FPGA architectures, programmable interconnects.

CLO4: Account for the syntax and behavior of the VHDL language.

SYLLABUS

UNIT I

Programmable Logic Devices and VLSI Design styles: Read only memory, Programmable Logic Array, Programmable Array Logic, Design styles - Design Styles, Full-Custom, Standard

Cell, Gate Arrays, Field Programmable Gate Arrays, Sea of Gates, and Comparison of Different Design Styles.

UNIT II

Physical Design Automation of FPGAs: FPGA Technologies, Physical Design Cycle for FPGAs, Partitioning Routing-Routing Algorithm for the Non-Segmented Model, Routing Algorithms for the Segmented Model Basic Algorithm, Routing Algorithm for Staggered Model.

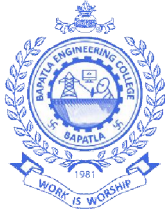
UNIT III

Field-

Programmable Gate Arrays: Hardware Description Languages, FPGA Boards and Software Tools, Transistor as a Switch, FPGA Building Blocks, Layout of the Xilinx Artix-7. XC7A35T FPGA, Interconnect Resources of FPGA, Clock Management, The XADC Block, High-Speed Serial I/O Transceivers, Peripheral Component Interconnect Express Interface, FPGA-Based Digital System Design Philosophy, Advantages and Disadvantages of FPGAs, Usage Areas of FPGAs.

UNIT-IV

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 (BIST).



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

TEXTBOOKS:

1. Cem Unsalan, Bora Tar "Digital System Design with FPGA Implementation Using Verilog and VHDL" McGraw-Hill Education, 2017.
2. N.A. Sherwani VLSI Physical Design Automation.

REFERENCE BOOKS:

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 M. Rabaey, "Digital Integrated Circuits", PHI, EEE, 1997.
4. Kamran Eshraghian, Douglas and A. Pucknell, "Essentials of VLSI Circuits and Systems", PHI, 2013 Edition.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

MEMS -Professional Elective- III IVB.Tech–ISemester(20ECD34)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites:None

Course Objectives:

CO1: To introduce the concepts of microelectromechanical devices.

CO2: To know the fabrication process of Microsystems.

CO3: To know the design concepts of micro sensors.

CO4: To know the design concept of micro actuators.

Course Outcomes:

CLO1: Interpret the basics of micro electromechanical systems including their applications. **CLO2:** Recognize the materials in micro fabrication and describe the fabrication processes including surface micromachining, bulk micromachining and LIGA.

CLO3: Analyze key performance aspects of electromechanical sensors and actuators.

CLO4: Analyze key performance aspects of electromechanical actuators.

SYLLABUS

UNIT I

INTRODUCTION: Introduction to Design of MEMS and NEMS, Overview of Nano and Microelectromechanical Systems, Applications of Micro and Nanoelectromechanical systems, Materials for MEMS and NEMS: Silicon, silicon compounds, polymers, metals.

UNIT II

FABRICATION TECHNOLOGIES: Photolithography, Ion Implantation, Diffusion, Oxidation, CVD, Sputtering Etching techniques, Micromachining: Bulk Micromachining, Surface Micromachining, and LIGA.

UNIT III

MICRO SENSORS: MEMS Sensors: Design of Acoustic wave sensors, Vibratory gyroscope, Capacitive Pressure sensors, Case study: Piezoelectric energy harvester.

UNIT IV

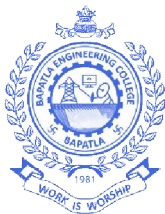
MICRO ACTUATORS: Design of Actuators: Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals, Actuation using Electrostatic forces, Case Study: RF Switch.

TEXTBOOKS:

1. Nadim, Maluf and Kirt Williams, "An Introduction to Micro Electro Mechanical System engineering, Artech house, Inc Boston 2003.
2. Stephen Beeby, Graham Ensell, Michael Kraft, Neil White "MEMS Mechanical Sensors", Artech house, Inc Boston 2003.

REFERENCE BOOKS:

1. Tai Ran Hsu, MEMS and Microsystems Design and Manufacture, Tata Mcraw Hill, 2002.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Satellite Communication-Professional Elective-IV IVB. Tech– I Semester 20ECD41)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination (3 Hours)			: 70

Prerequisites: None

Course Objectives:

CO1: To get knowledge of every aspects of satellite communication like orbital mechanics, launching techniques, satellite link design, earth station technology and different access system towards a satellite.

CO2: To explain the tools necessary for the calculation of basic parameters in a satellite communication system.

CO3: To produce graduates who understand how to analyze and manipulate digital signals and to determine the orbital issues to have the fundamental knowledge to do so, for navigation and GPS.

CO5: To Understand the principles of Global Positioning System (GPS) and working.

Course Outcomes: Students will be able to

CLO1: Understand the Fundamental Concepts of Satellite Communication, Orbital mechanics and Compute look angles.

CLO2: Study the Satellite subsystems and their effective working and satellite Link design models.

CLO3: Understand and examine the multiple access techniques (FDMA, TDMA, CDMA) used for Satellite Communication.

CLO4: Describe the VSAT systems used and its applications

SYLLABUS

UNIT I

Introduction: A brief history of Satellite communications, Orbital Mechanics and Launchers: Orbital mechanics, Look angle determination, Orbital perturbations, Orbit determination, Launch and Launch vehicles, Orbital effects in Communication System performance.

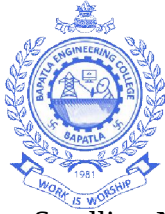
UNIT II

Satellites: Satellite sub systems, Attitude and Orbit Control system (AOCS), Telemetry, Tracking, Monitoring, Power Systems, Communication subsystems, satellite antennas. Satellite Link Design: Introduction, Basic transmission theory, System noise temperature and G/T ratio. Satellite Downlink and Uplink Design.

UNIT III

Multiple Access: Introduction, FDMA, TDMA, CDMA.

VSAT systems: Introduction, Overview of VSAT systems, Network Architectures, Access control Protocols, Basic techniques, VSAT Earth Station Engineering.



BAPATLAENGINEERINGCOLLEGE::BAPATLA (Autonomous)

UNIT IV

Satellite Navigation and Global positioning System: Introduction, Radio and satellite Navigation, GPS position location Principles, GPS Navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation, and Differential GPS.

TEXTBOOKS:

1. "Satellite Communications", Timothy Pratt, Charles Bostian, Jeremy Allnutt, 2nd Edition JohnWileyIndia, 2006.
2. "SatelliteCommunications",byDennisRoddy,McGraw-HillInternationalEdition.

REFERENCEBOOKS:

1. "AdvancedElectronicCommunicationSystems",byWTomasi,PearsonEducation.

:



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Wireless Networks-Professional Elective-IV IVB. Tech-I Semester(20ECD42)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: Mobile & Cellular Communications(20ECD22)

Course Objectives:

CO1: The student should get familiar with the wireless/mobile market and the future needs.

CO2: To get familiar with key concepts of wireless networks, standards, technologies.

CO3: To learn how to design and analyze various medium access.

CO4: To learn how to evaluate MAC and network protocols using network simulation software.

Course Outcomes: At the end of the course, student will be able to

CLO1: Understand the architecture of different wireless networks like spread spectrum, HiperLAN and Bluetooth.

CLO2: Understand the network architecture of WiMAX networks.

CLO3: Understand the wireless cellular networks from 1G to 4G.

CLO4: Understand the network architecture of wireless wide area networks.

SYLLABUS

UNIT - I

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs. Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms-Proactive: DSDV; Reactive: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-Location Services-DREAM,

UNIT - II

Broadcasting, Multicasting and Geocasting: Introduction, Broadcast Storm- Broadcasting in a MANET, Flooding-Generated Broadcast Storm, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge based methods, Multicasting-Issues in Providing Multicast in a MANET, Introduction to Geocasting.

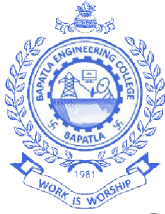
UNIT - III

Wireless Sensor Networks: Introduction, The Mica Mote, Sensing and Communication Range, Design Issues - Challenges, Energy Consumption, Clustering of Sensors - Regularly placed sensors, Heterogeneous WSNs, Mobile Sensors, and WSN Applications.

UNIT - IV

Attacks in Ad hoc and Sensor Networks: Active and passive attacks- Black hole, Gray hole, Wormhole, Rushing attacks, Sybil attack. DDoS attack.

Security: Introduction, Distributed Systems Security, Security in Ad Hoc Networks-Requirements, Security Solutions Constraints, Challenges, Secure Routing- Problems Affecting Secure Ad Hoc Routing, WSN Security.



BAPATLAENGINEERINGCOLLEGE::BAPATLA (Autonomous)

TEXTBOOKS:

1. SchillerJ.,MobileCommunications,AddisonWesley,2000.
2. VijayGarg,“WirelessCommunicationsandnetworking”,1stEdition,Elsevier2007.

REFERENCEBOOKS:

1. Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John WileyandSonsInc, 2002.
2. YiBingLinand
ImrichChlamtac,WirelessandMobileNetworkArchitectures,JohnWileyand SonsInc, 2000.
3. PandyaRaj,MobileandPersonalCommunicationsSystemsandServices,PHI,2000.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Advanced DSP-Professional Elective-IV IVB. Tech – I Semester(20ECD43)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: Courses on Signals and Systems, Digital Signal Processing

Course Objectives: To learn

CO1: Basics of Multirate system components, Polyphase decomposition of Digital filter banks.

CO2: Various types of Multirate Filter banks, Perfect Reconstruction of the filter banks.

CO3: Fundamental of Continuous Wavelets, STFT and the properties of Wavelets.

CO4: The concept of Digital Wavelet Transform and signal spaces and properties of it.

Course Outcomes: Students will be able to

CLO1: Analyze various types of Multirate components and sampling rate conversions in DSP.

CLO2: Construction of Two-Channel, L-Channel QMF.

CLO3: Understand the importance and properties of the Continuous Wavelet Transform and know the difference between continuous and discrete wavelet transform.

CLO4: Know about the discrete wavelet transforms, scaling functions, function spaces, nested spaces and standard notations used in it.

SYLLABUS

UNIT-I

Basic sampler rate alteration devices, Filters in sampler rate alteration systems, Multistaged design of decimator and interpolator, Polyphase decomposition, Arbitrary-Rate sampler rate converters, Digital filter banks, Nyquist filters.

UNIT-II

Two-Channel Quadrature –Mirror Filter banks, Perfect reconstruction Two-Channel FIR Filter banks, L-Channel QMF banks, Multilevel Filter banks.

UNIT- III

Continuous wavelet and Short Time Fourier Transform: Introduction, Wavelet Transform, Mathematical Preliminaries, Continuous Time-frequency representation of signals, Windowed Fourier Transform (STFT), Uncertainty principle and Time-Frequency tiling, Properties of Wavelets used in Continuous Wavelet Transforms, Continuous versus Discrete Wavelet Transform.

UNIT- IV

Discrete Wavelet Transform: Introduction, HAAR Scaling functions and Function spaces, Nested Spaces, HAAR Wavelet Function, Orthogonality, Normalization of HAAR bases at different scales, standardizing the Notations, Refinement relation with respect to Normalized bases, Daubechies Wavelets.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

TEXTBOOKS:

1. Digital Signal Processing, A computer Based Approach by Sanjit K Mitra, Tata McGraw Hill Publishing.
2. Insight into Wavelets from Theory to Practice by K.P. Soman, K.I. Ramachandran, N.G. Reshmi, PHI Publications, Third Edition, 2010.

REFERENCE BOOKS:

1. Multirate Systems and Filter Banks, P.P. Vaidyanathan, Pearson Education, Low Priced Edition, 2006.
2. Wavelet Transforms- Introduction to Theory and Applications, Raghuveer M. Rao, Ajitopardikar, Pearson Education, Asia.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Cloud Computing-Professional Elective-IV IVB. Tech – I Semester(20ECD44)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: None

Course Objectives: The objective of this course is to

CO1: Understand the importance of cloud, migration to cloud and integration as a service. **CO 2:** Different Cloud Deploy Models & Service Models in enterprise cloud environment. **CO3:** Cloud Virtual Machines Migration and cloud enhancing service. **CO4:** Cloud Data security issues, workflow engines and SLA management for clouds.

Course Outcomes: After successful completion of the course, the students can be able to:

CLO1: Analyze the Integrate Enterprise cloud Environments, Cloud Deployment.
CLO2: Determine the use of Cloud Virtual Machines and cloud enhancing service.
CLO3: Evaluate the Secure Distributed Data Storage and workflow engines for clouds.
CLO4: Describe the data security and SLA Management.

SYLLABUS

UNIT- I

Introduction to cloud computing: Cloud Computing in a Nutshell, roots of Cloud Computing, Layers and Types of Clouds, Desired Features of Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers.

Migration into a Cloud: Introduction, Broad Approaches to Migrating into the Cloud

Enriching the 'Integration as a Service' Paradigm for the Cloud Era: An Introduction, The Onset of Knowledge Era, The Evolution of SaaS, The challenges of SaaS paradigm, New integration scenarios, The integration methodologies, SaaS integration products and platforms, SaaS Integration Services, Business to Business Integration (B2Bi) Services, A Framework of Sensor Cloud Integration.

UNIT-II

The Enterprise Cloud Computing Paradigm: Relevant deployment models for enterprise cloud computing, Issues for Enterprise Applications on the Cloud, Transition Challenges, Business Drivers toward a Marketplace for Enterprise Cloud Computing, The Cloud Supply Chain.

Virtual Machines Provisioning and Migration Services: Virtualization Technology overview, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action, Provisioning in the Cloud Context.

UNIT- III

Secure Distributed Data Storage in Cloud Computing: Introduction, Cloud Storage: from LANs to WANs, Technologies for Data Security in Cloud Computing.

Workflow Engine for Clouds: Introduction, Workflow Management Systems and Clouds, Architecture of Workflow Management Systems, Utilizing Clouds for Workflow Execution.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

UNIT– IV

SLA Management in Cloud Computing: Traditional Approaches to SLO Management, Types of SLA, Life Cycle of SLA, SLA Management in Cloud, Automated Policy-based Management.

Data Security in the Cloud: An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, Homo Sapiens and Digital Information, Cloud Computing and Data Security Risk, Cloud Computing and Identity, The Cloud, Digital Identity, and Data Security, Content Level Security—Pros and Cons.

TEXTBOOKS:

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing Principles and Paradigms, Wiley Publications.
2. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010.

REFERENCE BOOKS:

1. Michael Miller, Cloud Computing—Web-Based Application That Change the Way You Work and Collaborate Online, Pearson Publications.
2. Thomas Erl, Zaigham Mahmood, & Ricardo Puttini, Cloud Computing—Concepts, Technology & Architecture Pearson Publications.

WEB RESOURCES:

1. Cloud computing course by Prof. Soumya K. Ghosh is available at <https://nptel.ac.in/courses/106105167/>
2. Cloud computing and Distributed Systems course by Dr. Rajiv Misra is available at <https://nptel.ac.in/courses/106104182/>



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Low Power VLSI-Professional Elective-V IVB. Tech – I Semester(20ECD51)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: None

Course Objectives: To learn

CO1: The introduction and the background of LOW power dissipation and understand the MOS transistor operations.

CO2: To obtain knowledge about the operation of different MOS Inverters and MOS Combinational Circuits.

CO3: To understand how the different Source of Power Dissipation occurred in the circuits. **CO4:** To Understand the operation how to Minimizing Leakage Power in different ways and understand the different CAD Tools for Low Power VLSI Circuits.

Course Outcomes: Students will be able to

CLO-

1: Understand the concepts of the velocity saturation; impact Ionization and hot Electron Effect.

CLO-2: Implement Low power design approaches for system level and circuit level measures.

CLO-3: Analyze the concepts different types of Sources of Power Dissipation.

CLO-4: Understand the concepts of different fabrication of multiple threshold voltages, different approaches for minimizing leakage power.

SYLLABUS

UNIT I

Introduction: Historical background, why low power, sources of power dissipations, low power design methodologies.

MOS Transistors: Introduction, the structure of MOS Transistor, the fluid model, modes of operation of MOS transistor, Electrical Characteristics of MOS Transistors, MOS Transistors as Switch.

UNIT II

MOS Inverters: Introduction, inverters and its characteristics, configurations, inverter ratio in different situations, switching characteristics, delay parameters, driving parameters, driving large capacitive loads.

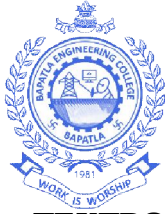
MOS Combinational Circuits: Introductions, Pass-transistor logic, Gate logics, MOS Dynamic Circuits.

UNIT III

Source of Power Dissipation: Introduction, short-circuit power dissipation, Switching power dissipation, glitching power dissipation, leakage power dissipation.

UNIT IV

Minimizing Leakage Power: introduction, fabrication of multiple threshold voltages, approaches for minimizing leakage power, adiabatic logic Circuits, Battery-Driven System, CAD Tools for Low Power VLSI Circuits.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

TEXTBOOKS:

1. Ajit.Pal, LowpowerVSLICircuitsandsystems, springer.
2. SungMoKang, Yusuf Leblebici, CMOSDigital IntegratedCircuits, TataMcgragHill.

REFERENCEBOOKS:

1. NeilH.EWestandK.Eshraghain, PrinciplesofCOMSVLSIDesign, 2ndEdition, AddisonWesley(Indianreprint).
2. Bellamour, andM.I.Elmasri, LowpowerVLSI CMOSCircuitDesign, KluwerAcademicPress, 1995.
3. AnanthaP.ChandrakasanandRobertW.Brodersen, LowPowerDigitalCMOSDesign, KluwerAcademicPublishers, 1995.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Advanced Wireless Communication-Professional Elective-V IVB. Tech– I Semester(20ECD52)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: None

Course Objectives (COs): The main objectives of this course are:

CO1: To understand the fundamental concepts and physical modeling of wireless communication systems.

CO2: To impart the capacity of Multi-Antenna Systems

CO3: To provide fundamental concepts of Massive MIMO and Milli-Meter Wave Systems

CO4: To understand the concepts of MIMO Beam forming and NOMA.

Course Outcomes (CLOs): On successful completion of this course students will be able to:

CLO1: Understand the fundamental concepts, Physical Modelling, and, Multi-antenna system of wireless communication systems.

CLO2: Design the capacity model of Multi-Antenna Systems, optimal and sub-optimal MIMO receivers.

CLO3: Understand the need for Massive MIMO and Milli-Meter Wave Technology.

CLO4: Understand the fundamental concepts of MIMO Beam forming and NOMA Technology.

SYLLABUS

UNIT-I

Advanced Wireless Communication: Introduction to Wireless Communication, Physical Modeling for Wireless Channels, Baseband and Passband Representation, Rayleigh Fading Channels, Bit Error Rate of Wired / Wireless Channel, Deep Fade, and Probability of Error Analysis.

Multi-Antenna System: Introduction to Multi-Antenna Diversity, Receive Diversity: Single-Input Multiple-Output (SIMO), BER of SIMO with Maximal-Ratio-Combining, Receive Combining Techniques, MISO and MIMO Wireless System.

UNIT-II

Capacity of Multi-

Antenna Systems: Capacity of SISO Additive White Gaussian Noise (AWGN) Channel, Capacity of Multi-Antenna AWGN and Wireless Channels, Capacity of Slow-Fading Channels, Fast-Fading Channels, Capacity of Fixed MIMO Channel with Transmit Channel State Information (CSI), Capacity of Fixed MIMO Channel Without Transmit CSI, Optimal and Suboptimal MIMO Receivers.

UNIT-III

Massive Multiple-Input Multiple-Output (MIMO): Massive MIMO Fundamentals, Basics of Channel Estimation, Channel Estimation of Multi-cell Multiuser System, Element Wise-MMSE, LS, and Other Channel Estimation Techniques, Spectral Efficiency Analysis. Millimeter-Wave (mm-Wave) Systems: mm-Wave System and Challenges, mm-Wave Channels, mmWave Design Considerations.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

UNIT– IV

MIMO Beamforming: Architecture, System Model, Objectives and Algorithms.

Non-Orthogonal Multiple Access (NOMA): Motivation of NOMA, Two-User NOMA, Achievable Throughput, Multi-User NOMA, MIMO NOMA.

TEXTBOOKS:

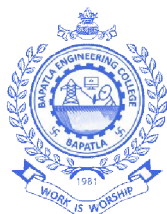
1. Ezio Biglieri, "MIMO Wireless Communications" Cambridge University Press.
2. Aditya K. Jagannatham, "Principles of Modern Wireless Communication Systems"

REFERENCE BOOKS:

1. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2nd Edition, Pearson Education, 2003.
2. Wireless Communications" 1st Edition, Kindle Edition, Goldsmith.

ONLINE SOURCES:

1. <https://archive.nptel.ac.in/courses/117/104/117104099/>.
2. <https://developer.arm.com/ip-products/processors/cortex-m/cortex-m3>.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Semiconductor Device Modelling-Professional Elective-V IVB. Tech– I Semester(20ECD53)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: Analog Electronics, Analog Integrated Circuits and Applications.

Course Objectives: In this course, students will learn the following topics

CO1: To understand the physics of MOSFET operation and its characteristics.

CO2: Analysis of SOI MOSFET electrical characteristics.

CO3: To standard the advanced Nanoscale transistors.

CO4: To develop a standard equation for the transistor fabrication and verification.

Course Outcomes: Students will be able to

CLO1: Explain the equations, approximations and techniques available for deriving a model with specified properties, for a general device characteristic with known qualitative theory.

CLO2: Apply suitable approximations and techniques to derive the model referred to above starting from drift-diffusion transport equations (assuming these equations hold).

CLO3: Offer clues to qualitative understanding of the physics of a new device and conversion of this understanding into equations.

CLO4: Explain how the equations get lengthy and parameters increase in number while developing a compact model.

SYLLABUS

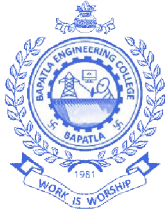
UNIT– I

MOS Capacitor: Energy band diagram of Metal-Oxide-

Semiconductor contacts, Mode of Operations: Accumulation, Depletion, Midgap, and Inversion, 1D Electrostatics of MOS, Depletion Approximation, Accurate Solution of Poisson's Equation, CV characteristics of MOS, LFCV and HFCV, Non-idealities in MOS, oxide fixed charges, interfacial charges, Midgap gate Electrode, Poly-Silicon contact, Electrostatics of non-uniform substrate doping, ultrathin gate-oxide and inversion layer quantization, quantum capacitance, MOS parameter extraction.

UNIT-II

Physics of MOSFET: Drift-Diffusion Approach for IV, Gradual Channel Approximation, Sub-threshold current and slope, Body effect, Pao & Sah Model, Detail 2D effects in MOSFET, High field and doping dependent mobility models, High field effects and MOSFET reliability issues (SILC, TDDB, & NBTI), Leakage mechanisms in thin gate oxide, High-K Metal Gate MOSFET devices and technology issues, Intrinsic MOSFET capacitances and resistances, Meyer model.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

UNIT III

SOI MOSFET: FDSOI and PDSOI, 1D

Electrostatics of FDSOI MOS, VT definitions, Back gate coupling and body effect parameter, IV characteristics of FDSOI-FET, FDSOI-sub-threshold slope, Floating body effect, single transistor latch, ZRAM device, Bulk and SOI FET: discussions referring to the ITRS.

UNIT IV

Nanoscale Transistors: Diffusive, Quasi Ballistic & Ballistic Transports, Ballistic planar and nano wire -FET modeling: semi-classical and quantum treatments. Advanced MOSFETs: Strain Engineered Channel materials, Mobility in strained materials, Electrostatics of double gate, and Fin-FET devices.

TEXTBOOKS:

1. S.M.Sze & Kwok K.Ng, Physics of Semiconductor Devices, Wiley.
2. B.G.Streetman, S.K.Banerjee, Solid State Electronic Devices, Pearson, (2016).

REFERENCE BOOKS:

1. N.Arora, MOSFET modeling for VLSI Simulation: Theory and Practice, World.
2. Yannis Tsidis, Operation and Modeling of the MOS Transistor, Oxford University Press.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Advanced Sensors-Professional Elective-V IVB. Tech – I Semester(20ECD54)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: None

Course Objectives: The objective of this course is to

CO 1: Understand the working principles of various semiconductor sensors and their application.

CO2: Understand the working principles of chemical and biomedical sensors and their application.

CO3: Know various micro sensors for measuring various physical quantities.

CO4: Know various smart sensors and their application.

Course Outcomes: After successful completion of the course, the students can be able to:

CLO1: State the working principle of any semiconductor sensor and its application.

CLO2: State the working principle of any chemical or biomedical sensor and its application.

CLO3: List applications of micro sensors.

CLO4: Design signal processing for any measurement application.

SYLLABUS

UNIT – I

SEMICONDUCTOR SENSORS: Metal Oxide Semiconductors, Hall Elements, Silicon Sensors, Silicon planar technology, Micro machine technology, mechanical, magnetic, chemical and other signals, IC sensors.

UNIT – II

CHEMICAL AND BIOMEDICAL SENSORS: Polymers, chemically modified electrodes, Membrane electrodes, Thick Film Devices, catalytic devices, Gas sensors. **OPTICAL SENSORS:** Lasers, photo-detectors and optical fiber as sensors, integrated optics.

UNIT – III

MICRO SENSORS: Thin film sensors, Applications of Micro sensors, Mechanical, Magnetic and Chemical signals, Acoustic steam leak detector.

UNIT – IV

INTERFACING AND SIGNAL PROCESSING: Intelligent and smart sensors, concepts of redundant and multi – sensory systems, operation in coded mode and mapping mode.

TEXTBOOKS:

1. Middle Hock Sand Andel SA–Silicon Sensors, Academic Press, London, 1989
2. Edmonds TE–Chemical Sensors-, Blackie London 1988.

REFERENCE BOOKS:

1. Patranabis D– Sensors and Transducers, Wheeler Publishing.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

System On Chip Architecture -Professional Elective-V IVB. Tech – I Semester(20ECD55)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisite: Embedded System Design

Course Objectives:

CO1: To introduce the architectural features of system on chip.

CO2: To imbibe the knowledge of customization using case studies.

CO3: To explore the knowledge in Memory Design for SOC.

CO4: To Know the Interconnect Customization.

Course Outcomes:

CLO1: Expected to understand SOC Architectural features.

CLO2: To acquire the knowledge on processor selection criteria and limitations

CLO3: To acquires the knowledge of memory architectures on SOC.

CLO4: To understands the interconnection strategies and their customization on SOC.

Syllabus

UNIT – I

Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT – II

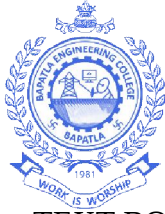
Processors: Introduction, Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT – III

Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I , and D – Caches , Multilevel Caches, Virtual to real translation, SOC Memory System , Models of Simple Processor – memory interaction.

UNIT - IV

Interconnect Customization: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization.



BAPATLAENGINEERINGCOLLEGE::BAPATLA (Autonomous)

TEXT BOOKS:

1. Computer System Design System-on-Chip by Michael J. Flynn and Wayne Luk, Wiley India Pvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber – 2 nd Ed., 2000, Addison Wesley Professional.

REFERENCE BOOKS:

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM
3. System on Chip Verification – Methodologies and Techniques –PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Digital Image Processing-Open/JOC-Elective III IVB. Tech– I Semester(20ECI01)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: None

Course Objectives: In this course, students will learn the following topics

CO1: Recall and summarize the digital image fundamentals and be exposed to basic image processing techniques.

CO2: Illustrate various filtering techniques for images in terms of spatial and frequency domain.

CO3: Be familiar with image restoration enhancement.

CO4: To understand the importance of Colour image processing techniques.

Course Outcomes: Students will be able to

CLO1: Understand the digital image fundamentals and basic image processing techniques.

CLO2: Make use of spatial and frequency domain filtering for Image enhancement.

CLO3: Compare various Image Restoration techniques.

CLO4: Explain various Color image processing operations and Evaluate Image compression using various techniques.

SYLLABUS

UNIT– I

INTRODUCTION: What Is Digital Image Processing? The Origin of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

DIGITAL IMAGE FUNDAMENTALS: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels.

UNIT– II

SPATIAL AND FREQUENCY DOMAIN FILTERING: Background. Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filters, Smoothing Spatial Filters, and Sharpening Spatial Filter. The basics of filtering in the Frequency Domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters.



BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

UNIT– III

IMAGE RESTORATION: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only- Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering.

UNIT– IV

COLOR IMAGE PROCESSING: Color Fundamentals, Color Models, Pseudo color Image Processing, Basics of Full-Color Image Processing.

IMAGE COMPRESSION: Fundamentals, Compression Model, Huffman coding, Arithmetic coding, LZW coding, Run length coding.

TEXTBOOKS:

1. R.C.Gonzalez, R.E.Woods, Digital Image Processing 4th Edition, Pearson Education Publishers, 2019.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson Learning, Second Edition, 2001.

REFERENCE BOOKS:

1. S.Jayaraman, S.Esakkirajan, T.Veerakumar, Digital Image Processing, McGraw Hill Publications, 2010.
2. S.Sridhar, Digital Image Processing, Oxford University Press, 2016.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Embedded System & Design-Open/JOC-Elective III IVB. Tech- I Semester (20ECI02)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination (3 Hours)			: 70

Prerequisites: None.

Course Objectives (COs): The main objectives of this course are:

CO1: To impart basic design and architectural concepts of embedded systems.

CO2: To impart the concepts of Real-Time Operating Systems and provide the scheduling Algorithms.

CO3: To provide fundamentals of prevalent IP-Core: ARM Cortex M3/M4 & Design of an embedded system using ARM Cortex Processor.

CO4: To explain instruction set of ARM Cortex M3/M4 processor and explain the ALP's.

Course Outcomes (CLOs): On successful completion of this course students will be able to:
CLO1: Have a basic understanding of different methodologies and approaches in the design of embedded systems.

CLO2: Understand the requirements, and concepts of Real-Time Operating systems for real-time task processing.

CLO3: Analyze the basic concepts, architecture, memory management unit, and features of Embedded Processors.

CLO4: Understand the basic concepts of ARM instruction set and design the embedded applications.

SYLLABUS

UNIT -I

Embedded Systems Design: Introduction to Embedded System, categories of embedded system, specialties, and recent trends in Embedded System. Architecture of an Embedded System: Hardware Architecture, Software Architecture, Application Software, Communication Software, Development/Testing Tools.

UNIT-II

Overview of RTOS: Architecture of the Kernel, Tasks, Task scheduler, real-time tasks, Task scheduling, Interrupt Service Routine, Memory Management, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes.

Classification of scheduling algorithms: Clock driven Scheduling, Event-driven Scheduling, Resource sharing, Priority inversion problem, Deadlock.

UNIT-III

Embedded Processors: Introduction to ARM family, ARM Architecture- Pipeline, Registers, Operation modes, Big Endian and Little Endian. Cache Mechanism, Memory Management Unit.

UNIT- IV

ARM Instructions: ARM and Thumb Instruction Sets, Data Processing Instructions, Data Transfer Instructions, Control Flow Instructions, Basic Assembly Language Programs.

Case Study: Smart Phone, Digital Camera, and Automatic Washing Machine.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

TEXTBOOKS:

1. KVKK Prasad, "Embedded/Real Time Systems" Dream tech Press, 2005.
2. Andrew N. Sloss/Dominic Symes/Chris Wright, "ARM System Developer's Guide Designing and Optimizing" Elsevier, 2004.

REFERENCE BOOKS:

1. Frank Vahid/Tony Givargis, "Embedded System Design A Unified Hardware/Software Introduction" John Wiley & Sons, Inc.
2. Jonathan W. Valvano, "Embedded Systems: Real-Time Operating Systems for ARM Cortex-M Microcontrollers" CreateSpace, Volume 3, 5th Edition, 2019.

ONLINE SOURCES:

1. <http://users.ece.utexas.edu/~valvano/>
2. <http://www.nptelvideos.in/2012/11/embedded-systems.html>
3. <https://developer.arm.com/ip-products/processors/cortex-m/cortex-m3>



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Digital Image Processing-Open/Job Oriented Elective-IV IVB. Tech– I Semester(20ECJ41)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: NONE

Course Objectives: In this course, students will learn the following topics

CO1: Recall and summarize the digital image fundamentals and to be exposed to basic image processing techniques.

CO2: Illustrate various filtering techniques for images in terms of spatial and frequency domain.

CO3: Be familiar with image restoration enhancement.

CO4: To understand the importance of Colour image processing techniques.

Course Outcomes: Students will be able to

CLO1: Understand the digital image fundamentals and basic image processing techniques

CLO2: Make use of spatial and frequency domain filtering for Image enhancement.

CLO3: Compare various Image Restoration techniques.

CLO4: Explain various Color image processing operations and also Evaluate Image compression using various techniques.

SYLLABUS

UNIT – I

INTRODUCTION: What Is Digital Image Processing? The Origin of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

DIGITAL IMAGE FUNDAMENTALS: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels.

UNIT – II

INTENSITY TRANSFORMATIONS AND SPATIAL FILTERING: Background. Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filters, Smoothing Spatial Filters, Sharpening Spatial Filters.

FILTERING IN THE FREQUENCY DOMAIN: Background, Extension to Functions of two variables, Some properties of 2D Discrete Fourier Transform, The basics of filtering in the Frequency Domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters.

UNIT – III

IMAGE RESTORATION: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering.

COLOR IMAGE PROCESSING: Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

UNIT – IV

IMAGE COMPRESSION: Fundamentals, Some basic compression Methods, Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run length coding, Symbol based coding, Bitplane coding, Block transform coding, Predictive coding.

MORPHOLOGICAL IMAGE PROCESSING: Preliminaries, Erosion and Dilation, Opening and Closing, The Hit & Miss Transformation.

TEXTBOOKS:

1. R.C.Gonzalez, R.E. Woods, Digital Image Processing 4th Edition, Pearson Education Publishers, 2019.
2. S.Jayaraman, S.Esakkirajan, T.Veerakumar, Digital Image Processing, McGraw Hill Publications, 2010.

REFERENCE BOOKS:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson Learning, Second Edition, 2001.
2. S.Sridhar, Digital Image Processing, Oxford University Press, 2016.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Biomedical Signal Processing-Open/Job Oriented Elective-IV IVB. Tech– I Semester(20ECJ42)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: Biology for Engineers, Digital signal processing, Bio-Medical Instrumentation.

Course Objectives: In this course, students will learn the following topics

CO1: To understand Sources and characteristics of noise and artifacts in bio signals.

CO2: To understand use of bio signals in diagnosis, patient monitoring.

CO3: To explore research domain in biomedical signal processing.

CO4: To explore application of established engineering methods to complex biomedical signals.

Course Outcomes: Students will be able to

CLO1: The student will be able to model a biomedical system.

CLO2: The student will be able to understand various sources of bio signal distortions. **CLO3:** The students will be able to analyze ECG signal with characteristic feature points. **CLO4:** The students will be able to analyze EEG signal with characteristic feature points.

SYLLABUS

UNIT– I

Mathematics for Bio-Medical Signal Processing: STFT - Introduction to wavelets – CWT and DWT with Haar wavelet, Random Processes: Stationary random process, Ergodicity, Power spectral density and autocorrelation function of random processes. Noise power spectral density analysis, Noise bandwidth and noise figure of systems.

UNIT– II

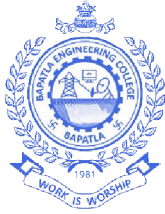
Data Compression Techniques: Lossy and Lossless data reduction Algorithms. ECG data compression using Turning point, AZTEC, CORTES, Huffman coding, vector quantization, DICOM Standards.

UNIT-III

Cardiological Signal Processing: Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia Detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition. Adaptive Noise Cancelling: Principles of Adaptive Noise Cancelling, Adaptive Noise Cancelling with the LMS Adaptation Algorithm, Noise Cancelling Method to Enhance ECG Monitoring, Fetal ECG Monitoring.

UNIT-IV

Neurological Signal Processing: Modeling of EEG Signals, Detection of spikes and spindles, Detection of Alpha, Beta and Gamma Waves. Auto Regressive (A.R.) modeling of seizure EEG. Sleep Stage analysis, Inverse Filtering, Least squares and polynomial modeling.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

TEXT BOOKS:

1. D.C.Reddy, "Biomedical Signal Processing, Principles and Techniques", Tata McGraw Hill Publishing Company Limited, First Edition, 2005
2. Willis J.Tompkins, "Biomedical Digital Signal Processing", Prentice Hall India Private Limited, First Edition, 2006.

REFERENCE BOOKS:

1. Rangaraj M.Rangayyan "Biomedical Signal Analysis – A case study approach" IEEE press series in biomedical engineering, First Edition, 2002.
2. Weitkunar R, "Digital Bio Signal Processing", 1991, Elsevier.
3. Akay M, "Biomedical Signal Processing", IEEE Press.
4. Cohen. A, "Biomedical Signal Processing- Vol. I Time & Frequency Analysis", 1986, CRC Press.
5. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, 2009, TMH.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Robotics-Open/Job Oriented Elective-IV IVB. Tech – I Semester (20ECJ43)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination (3 Hours)			: 70

Prerequisites: NONE

COURSE OBJECTIVES:

CO1: To understand the basic concepts associated with the design & functioning of Robots.

CO2: To study about the drives and effectors used in Robots.

CO3: To study about the sensors used in Robots.

CO4: To learn about analyzing robot kinematics and robot programming.

COURSE OUTCOMES:

CLO1: Understand the concepts of robot and its applications.

CLO2: Design robot with various links, mechanisms and effectors.

CLO3: Study various sensors and its applications.

CLO4: Develop student skills in performing kinematic analysis of robot system and programming.

SYLLABUS

UNIT I

FUNDAMENTALS OF ROBOT

Robot–Definition–Robot Anatomy–Co-ordinate Systems, Work Envelope, types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Functions– Need for Robots– Different Applications.

UNIT II

ROBOT DRIVES SYSTEMS AND END EFFECTORS

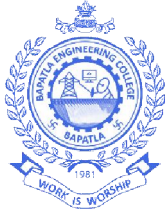
Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features, Applications and Comparison of Drives End Effectors – Grippers – Mechanical Grippers, Pneumatic and Hydraulic

Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT III

SENSORS AND MACHINE VISION

Requirements of a sensor, Principles and Applications of the following types of sensors– Position of sensors (Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, Pneumatic Position Sensors), Range Sensors (Triangulation Principle, Structured, Lighting Approach, Time of Flight Range Finders, Laser Range Meters), Proximity Sensors (Inductive, Hall Effect, Capacitive, Ultrasonic and Optical Proximity Sensors), Touch Sensors, (Binary Sensors, Analog Sensors), Wrist Sensors, Compliance Sensors, Slip Sensors. Camera, Frame Grabber, Sensing and Digitizing Image Data – Signal Conversion, Image Storage, Lighting Techniques. Image Processing and Analysis– Data Reduction: Edge detection, Segmentation Feature Extraction and Object Recognition- Algorithms. Applications– Inspection, Identification, Visual Servoing and Navigation.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

UNIT IV

ROBOT KINEMATICS AND ROBOT PROGRAMMING

Forward Kinematics, Inverse Kinematics and Differences; Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional), Four Degrees of Freedom (In 3 Dimensional) – Deviations and Problems. Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effector commands, and Simple programs.

TEXTBOOKS:

1. M.P. Groover, "Industrial Robotics – Technology, Programming and Applications", McGraw-Hill, 2001.
2. Fu, K.S. Gonzalez, R.C., and Lee, C.S.G., "Robotics Control, Sensing, Vision and Intelligence", McGraw-Hill Book Co., 1987.

REFERENCE BOOKS:

1. Yoram Koren, "Robotics for Engineers", McGraw-Hill Book Co., 1992.
2. Janakiraman, P.A., "Robotics and Image Processing", Tata McGraw-Hill, 1995.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Deep Learning-Open/Job Oriented Elective-IV IVB. Tech-I Semester(20ECJ44)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: NONE

Course Objective:

CO1: This course will introduce the theoretical foundations, algorithms.

CO2: To understand methodologies, and applications of neural networks and deep learning.

CO3: It will help to design and develop application-specific deep learning models

CO4: It leads to provide the practical knowledge handling and analyzing real world applications.

Course Outcomes (COs): At the end of the course, students will be able to

CLO1: Understand the fundamental issues and basics of machine learning.

CLO2: Differentiate machine learning with deep learning techniques

CLO3: Understand the concept of CNN and transfer learning techniques.

CLO4: Learned to use RNN for language modelling and time series prediction.

SYLLABUS

UNIT- I

Machine Learning Basics: Learning algorithms, Maximum likelihood estimation, Building machine learning algorithm, Neural Networks Multilayer Perceptron, Back-propagation algorithm and its variants Stochastic gradient descent, Curse of Dimensionality.

UNIT- II

Introduction to Deep Learning & Architectures: Machine Learning Vs. Deep Learning, Representation Learning, Width Vs. Depth of Neural Networks, Activation Functions: RELU, LRELU, ERELU, Unsupervised Training of Neural Networks, Restricted Boltzmann Machines, Auto Encoders.

UNIT- III

Convolutional Neural Networks: Architectural Overview – Motivation - Layers – Filters – Parameters sharing – Regularization, Popular CNN Architectures: ResNet, AlexNet.

Transfer Learning: Transfer learning Techniques, Variants of CNN: DenseNet, PixelNet.

UNIT- IV

Sequence Modelling–

Recurrent and Recursive Nets: Recurrent Neural Networks, Bidirectional RNNs – Encoder-decoder sequence to sequence architectures - BPTT for training RNN, Long Short Term Memory Networks.

Auto Encoders: Undercomplete Autoencoders – Regularized Autoencoders – stochastic Encoders and Decoders – Contractive Encoders.

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, “Deep Learning”, MIT Press, 2017.
2. Umberto Michelucci “Applied Deep Learning. A Case-based Approach to Understanding Deep Neural Networks” Apress, 2018.

REFERENCE BOOKS:

1. Antonio Gulli, Sujit Pal "Deep Learning with Keras", Packt Publishers, 2017.
2. Francois Chollet "Deep Learning with Python", Manning Publications, 2017.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Industrial Management and Entrepreneurship Development – HSS IVB. Tech– I Semester (20EC704/HS02)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 30	Semester End Examination (3 Hours)			: 70

Prerequisites: None

Course Objectives:

CO1: To provide students an insight into the concepts of general, scientific management and various forms of business organizations along with awareness about various organization structures.

CO2: It aims to provide the students with an understanding of basics of human resource management, marketing management.

CO3: To make the students understand inventory control concepts, fundamentals of TQM, and supply chain management.

CO4: To provide an understanding of financial management and realize the importance of Entrepreneurship.

Course Outcomes: After completion of the course, the student must be able to

CLO1: Describe the various functions of the management. Learn various forms and structures of Business organizations.

CLO2: Understand how resources to be planned and understand various motivation theories, Leadership styles and marketing management.

CLO3: Develop knowledge about inventory control. Gain the knowledge on Total quality Management and understand supply chain management.

CLO4: Grasp complete knowledge on importance of entrepreneurship and ability to understand Capital and various types of capital.

SYLLABUS

UNIT– I

General Management: Management definition, Functions of Management and Principles of Management.

Scientific Management: Definition, Principles of Scientific Management.

Forms of Business Organization: Choice of form of organization, Salient features of Sole Proprietorship, Partnership, Joint Stock Company: Private Limited and Public Limited companies; Cooperatives societies, Public sector organizations, State ownership, Public corporation, Merit and demerits of above types. **Introduction to Strategic Management.**

UNIT– II

Human Resource Management: Functions of HR management, human resource planning, recruitment, selection, placement, training & development and performance appraisal, Motivation theories, leadership styles.

Marketing Management: Concepts of Selling and Marketing, Functions of Marketing, Marketing mix (4Ps); Advertising and sales promotion; Product lifecycle; distribution channels.

UNIT– III



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Materials Management: Inventory Control, Inventory costs, Basic EOQ model, Model with Price breaks, ABC analysis, FSN Analysis, VED Analysis.

Total Quality Management: Importance of quality, Difference between Inspection and Quality control, Components of total quality, Quality Function Deployment

Introduction to Supply Chain Management

UNIT– IV

Financial Management: Functions of finance, Types of Capital-Fixed and Working Capital, Break Even Analysis.

Entrepreneurship Development: Introduction, Entrepreneurial characteristics, Functions of an Entrepreneur; Factors affecting entrepreneurship; Role of communication in entrepreneurship; Entrepreneurial development- Objectives, Need of Training for enterprises; Finance for the enterprises.

TEXTBOOKS:

1. Management Science, A.R. Aryasri.
2. Industrial Engineering and production management by M Mahajan, Dhanapatrai Publications.

REFERENCE BOOKS:

1. Essentials of Management/Koontz and Heinz Weihrich/Tata-McGraw-Hill 10th Ed.
2. Manufacturing Organization and Management/Amrine/Pearson Education.
3. Marketing Management, Philip Kotler.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

Artificial Neural Networks -SOC IVB.Tech – I Semester(20EC705/SO03)

Lectures	1	Tutorial	0	Practical	2	Credits	2
Continuous Internal Assessment			: 30	Semester End Examination(3Hours)			: 70

Prerequisites: None

Course Objectives: To learn

CO1: The basic understanding of neural networks and Neural Network Architectures.

CO2: Classification of patterns and patterns association.

CO3: Implementation of competitive neural nets and back propagation algorithm.

Course Outcomes: Students will be able to

CLO-1: Illustrate the functionality of Artificial Neural Model for different structures and activation functions.

CLO-2: Design the characteristics of pattern classification and pattern associators.

CLO-3: Design different types of competitive neural networks.

SYLLABUS

UNIT – I

ARTIFICIAL NEURAL NETWORKS: BASIC CONCEPTS: Introduction, Computation in terms of patterns, The McCulloch-Pitts Neural Model, The Perceptron, Neural Network Architectures, Activation Functions, Learning by Neural Nets.

UNIT – II

PATTERN CLASSIFIERS: Hebb Nets, Perceptron, Adaline, Madaline

PATTERN ASSOCIATORS: Auto-associative Nets, Hetero-Associative Nets, Hopfield Networks, Bi-directional Associative Memory.

UNIT – III

COMPETITIVE NEURAL NETS: The MAXNET, Kohonen's Self Organizing Map (SOM), Learning Vector Quantization (LVQ), Adaptive Resonance Theory (ART).

UNIT – IV

BACKPROPAGATION: Multilayer Feed forward Net, The Generalized Delta Rule, The Back propagation Algorithm

Practical Exercises

1. Write a program to generate the activation functions that are being used in Neural Networks.
2. Write a program to realize the ANDNOT function using McCulloch-Pitts neural net.
3. Write a program to cluster the given samples using unsupervised learning (winner takes all algorithm).
4. Write a program to realize the logical AND with a neural net that learns the desired function through Hebb learning.
5. Write a program to realize the logical AND with a neural net that learns the desired function through Perceptron learning.
6. Write a program to realize the logical AND with a neural net that learns the desired function through LMS learning.
7. Write a program to realize a logical function with the help of ADALINE Learning.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

8. Write a program to realize a logical function with the help of MADALINE Learning (XOR problem).
9. Write a program to implement an auto-associative net to store the patterns $[-1 \ -1 \ -1 \ -1]$ and $[-1 \ -1 \ 1 \ 1]$. Test the performance of the net with the test patterns $[-1 \ -1 \ -1 \ -1]$ (stored pattern), $[1 \ 1 \ 1 \ 1]$ (unknown pattern.)
10. Write a program to implement a hetero-associative net to map four patterns $[1 \ 1 \ 0 \ 0]$, $[0 \ 1 \ 0 \ 0]$, $[0 \ 0 \ 1 \ 1]$ and $[0 \ 0 \ 1 \ 0]$ to two output patterns $[1 \ 0]$, $[0 \ 1]$ so that patterns $[1 \ 1 \ 0 \ 0]$ and $[0 \ 1 \ 0 \ 0]$ are associated with $[1 \ 0]$ and the patterns $[0 \ 0 \ 1 \ 1]$, and $[0 \ 0 \ 1 \ 0]$ are associated with $[0 \ 1]$.
11. Write a program to find weight matrix in bipolar form for the bi-directional Associative memory (BAM) network based on the following binary input output pairs.
 $S(1) = (1 \ 1 \ 0) \longleftrightarrow t(1) = (1 \ 0)$
 $S(2) = (1 \ 0 \ 1) \longleftrightarrow t(2) = (0 \ 1)$
12. Write a program for clustering the vectors by using Kohonen's SOM network.
13. Write a program for clustering the following vectors into two clusters by using an LVQ net.

Vector	Class
$(1 \ 1 \ 0 \ 0)$	1
$(0 \ 0 \ 0 \ 1)$	2
$(0 \ 0 \ 1 \ 1)$	2
$(1 \ 0 \ 0 \ 0)$	1
$(0 \ 1 \ 1 \ 0)$	2

14. Write a program for clustering the vectors by using ART-1 neural network.
15. Write a program to implement XOR function with momentum factor using back propagation algorithm.

TEXT BOOK:

1. Introduction to SOFT COMPUTING by Samir Roy and Udit Chakraborty, Pearson Publishing, 2013.

REFERENCE BOOKS:

1. Introduction to Neural Networks using Matlab 6.0 by S N Sivanandam, S Sumathi, S N Deepa, Tata McGraw Hill Publishing, 7th Reprint, 2008
2. J.M. Zurada Introduction to Artificial Neural Systems, Jaico Publications.
3. B. Yegnanarayana, Artificial Neural Networks, PHI, New Delhi.
4. Wasserman: Neural Computing – Theory and Practice.
5. Kishan Mehrotra, Chelkuri K. Mohan, Sanjay Ranka, elements of Artificial Neural Networks, Tenram International.



BAPATLA ENGINEERING COLLEGE::BAPATLA (Autonomous)

OPEN ELECTIVES OFFERED BY DIFFERENT DEPARTMENTS AT COLLEGE LEVEL

Department	Subject Code	Title of the subject	No of seats
EIE	20EIOE01	Sensors And Signal Conditioning.	60
IT	20ITOE01	Web Technologies	60
	20ITOE02	Cyber Security	60
Mech	20MEOE01	Automobile Engineering	120
	20MEOE02	Renewable Energy Sources	120
English	20ELOE01	Professional Communication	120
CSE	20CSOE01	Database Management System	60
	20CSOE02	Java Programming	60
ECE	20ECOE01	Digital Image Processing	60
Civil	20CEOE01	Air Pollution and Control	60
	20CEOE02	Remote Sensing and GIS	60
EEE	20EEOE01	Non-Conventional Energy Sources	120
	20EEOE02	Electrical Energy Conservation and Auditing	60
Physics	20PHOE01	Nano Materials	60
	20PHOE02	Opto Electronic Devices and Applications	60
	20PHOE03	Fiber Optic Communications	60
Total no.of elective seats offered to students at college level			1200