E.G.S.PILLAYENGINEERINGCOLLEGE

(Autonomous)

Approved byAICTE,New Delhi|Affiliated to AnnaUniversity, Chennai Accredited byNAAC with „A"Grade|AccreditedbyNBA(CSE, EEE, MECH)

NAGAPATTINAM–611002

B.E.Electronicsand CommunicationEngineering

FullTimeCurriculumand Syllabus

ThirdYear– FifthSemester

Course Code	CourseName	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1702EC501	Analog Communication	3	0	0	3	40	60	100
1702EC502	Antenna and Wave Propagation	3	0	0	3	40	60	100
1702EC503	Digital Signal Processing	3	2	0	4	40	60	100
1702EC504	Computer Networks	3	0	0	3	40	60	100
	Professional Elective – I	3	0	0	3	40	60	100
	Professional Elective – II	3	0	0	3	40	60	100
LaboratoryCourse								
1702EC551	Analog Communication Laboratory	0	0	4	2	50	50	100
1702EC552	Digital Signal Processing Laboratory	0	0	4	2	50	50	100
	Technical Seminar	0	0	2	1	100	-	100
	Life Skills: Aptitude – I	0	0	2	1	100	-	100
	Total	**18**	**2**	**12**	**25**	**540**	**460**	**1000**

Professional Elective – I								
1703EC501	Nano Electronics	3	0	0	3	40	60	100
1703EC502	Automotive Electronics	3	0	0	3	40	60	100
1703EC503	Micro Electronics	3	0	0	3	40	60	100
1703EC504	Biomedical Engineering	3	0	0	3	40	60	100
1703EC505	Robotic Vision	3	0	0	3	40	60	100
Professional Elective – II								
1703EC506	Computer Architecture andOrganization	3	0	0	3	40	60	100
1703EC507	Advanced Microcontrollers	3	0	0	3	40	60	100
1703EC508	Measurement and Instrumentation	3	0	0	3	40	60	100
1703EC509	Virtual Instrumentation	3	0	0	3	40	60	100
1702CSX01	Operating Systems	3	0	0	3	40	60	100

L–Lecture|T–Tutorial|P–Practical|C–Credit|CA –ContinuousAssessment| ES–EndSemester

1702EC501	ANALOG COMMUNICATION	L	T	P	C
		3	0	0	3

Course Objectives:

1. To provide an introduction on different analog modulation and demodulation systems.
2. To study various types of noise and analyze the noise performance of various receiver.
3. To learn Pulse analog modulation and demodulation techniques.

Unit I	AMPLITUDE MODULATION SYSTEMS	9 Hours

Need for modulation – Classifications of modulation techniques-Generation and detection: AM, DSBSC, SSB-SC, VSB-Comparison of Amplitude modulation systems- AM transmitters-AM receivers-Super heterodyne receiver.

Unit II	ANGLE MODULATION SYSTEMS	9 Hours

Frequency modulation: Narrowband and wideband FM- Phase Modulation- Generation of FM signal: Direct FM, indirect FM- Demodulation of FM signals -FM stereo multiplexing- FM transmitters- FM receivers-Receiver parameter.

Unit III	RANDOM PROCESS	9 Hours

Random variables-Random process-Auto correlation process-Power spectral density-Stationary process-Wiener–Khinchin theorem, Transmission of random process through LTI system, WSS ergodic process-Gaussian Process.

Unit IV	NOISE IN COMMUNICATION SYSTEM	9 Hours

Noise calculation-Noise figure-Noise temperature-Noise equivalent bandwidth-Narrowband noise-Noise in AM receiver,Noise in DSBSC receiver-Noise in SSB receiver-Noise in FM receiver-Capture and threshold effect-Pre-emphasis and de-emphasis in FM system-Comparison of noise performance of AM and FM systems.

Unit V	PULSE ANALOG MODULATION	9 Hours

PAM-PWM-PPM-Time Division Multiplexing-PFM- Pulse TimeModulation systems: generation –detection-Sampling of Band limited Low pass signals-ideal and practical sampling- Anti aliasing and reconstruction filters

	Total:	45 Hours

Further Reading:

Working principle of MODEM, AM /FM broadcasting, Design of AM and FM radio, Television Receivers.

Course Outcomes:

After completion of the course, Student will be able to

1. Derive the mathematical model for time domain representation, spectrum and methods ofgeneration and detection of different AM systems.
2. Derive the mathematical model for time domain representation, spectrum and methods ofgeneration and detection of angle modulation systems.
3. Analyze and characterize the different types of random process.
4. Compare noise in AM and FM systems.
5. Analyze the bandwidth requirements and noise performance for Pulse analog modulation

References:

1. J.G. Proakis, "Digital Communications", McGraw Hill, 5th edition, 2007
2. Simon Haykin, Communication Systems, John Wiley, 2001.
3.Jack Quinn, 'Digital Data Communication", Prentice Hall; 1st edition,-199)
3. P.Michael Fitz, Fundamentals of Communication System, Tata McGraw-Hill -2008.
4. P.Rama Krishna rao, Analog Communication, Tata McGraw-Hill -2011
5. Taub and Schilling, Principles of communication systems, Tata McGraw-Hill, 1995.
6. Bruce Carlson et al, Communication systems, McGraw-Hill,2002.
7. Roddy and Coolen, Electronic communication, PHI, 2003.

1702EC502	ANTENNAS AND WAVE PROPOGATION	L	T	P	C
		3	0	0	3

Course Objectives:

1.To introduce the fundamental principles of antenna theory and various types of antennas.
2.Applying the principles of antennas to the analysis, design, and measurements of antennas.
3.To introduce the propagation of radio waves.

Unit I	**FUNDAMENTALS OF RADIATION**	**9 Hours**

Definition of antenna parameters – Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam width, Input Impedance. Matching – Baluns, Polarization mismatch, Antenna noise temperature, Radiation from oscillating dipole, Half wave dipole. Folded dipole, Yagi array.

Unit II	**ANTENNA ARRAYS**	**9 Hours**

N element linear array, Pattern multiplication, Broadside and End fire array – Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial Arrays, Tchebychev polynomial

Unit III	**APERTURE AND SLOT ANTENNAS**	**9 Hours**

Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna , Reflector antenna , Aperture blockage , Feeding structures , Slot antennas ,Microstrip antennas – Radiation mechanism – Application ,Numerical tool for antenna analysis

Unit IV	**SPECIAL ANTENNAS**	**9 Hours**

Principle of frequency independent antennas –Spiral antenna, Helical antenna, Log periodic. Modern antennas- Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications, Antenna Measurements-Test Ranges, Measurement of Gain, Radiation pattern, Polarization, VSWR

Unit V	**PROPAGATION OF RADIO WAVES**	**9 Hours**

Modes of propagation , Structure of atmosphere , Ground wave propagation , Tropospheric propagation , Duct propagation, Troposcatter propagation , Flat earth and Curved earth concept Sky wave propagation – Virtual height, critical frequency , Maximum usable frequency – Skip distance, Fading , Multi hop propagation

TOTAL: 45 PERIODS

Total:	**45 Hours**

Further Reading:

Concept and benefits of smart antennas, Fixed weight beamforming basics, Adaptive beamforming

Course Outcomes:

After completion of the course, Student will be able to

1. To introduce the fundamental principles of antenna theory and various types of wire antennas.
2. To design and analyze Antenna arrays
3. To know the applications of some basic and practical configurations such as dipoles, loops, and broadband, aperture type and horn antennas.
4. Applying the principles of antennas to the analysis, design, and measurements of antennas
5. To introduce different modes of propagation of radio waves

References:

1.John D Kraus, Ronald J Marhefka, Ahmad S Khan, Antennas for All Applications, 3rd Edition, TheMcGraw Hill Companies. 2010.

2.K. D. Prasad, “Antenna & Wave Propagation”, SatyaPrakashan, New Delhi

3.John D Kraus, “ Antenna& Wave Propagation”, 4th Edition, McGraw Hill, Communications and Networking, Morgan Kaufmann Publishers, An Imprint of Elsevier, 2008.

4.C.A. Balanis, “Antenna Theory - Analysis and Design", John Wiley.

5.Vijay K Garg, Wireless Communications and Netwoking, Morgan Kaufmann Publishers, An Imprint of Elsevier, 2008.

17EC503	Digital Signal Processing B.E – ECE	L	T	P	C
		3	2	0	4

Course Objectives:	
	1. To study about a programmable Digital signal processor.
	2. To learn discrete Fourier transform, properties and its computation
	3.To know the characteristics of IIR filter and to learn the design of IIR filters for filtering undesired signals.
	4. To know the characteristics ofFIR filter and to learn the design of FIR filter for filtering undesired signals.
	5. To understand Finite word length effects and DSP Applications.

Unit I	**DISCRETE FOURIER TRANSFORM**	**9 Hours**

Discrete Signals and Systems- A Review – Introduction to DFT – Properties of DFT – CircularConvolution - Filtering methods based on DFT – FFT Algorithms –Decimation in time Algorithms,Decimation in frequency Algorithms – Use of FFT in Linear Filtering.

Unit II	**IIR FILTER DESIGN**	**9 Hours**

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design byImpulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF)filter design using frequency translation.

Unit III	**FIR FILTER DESIGN**	**9 Hours**

Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques(Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques – Finiteword length effects in digital Filters: Errors, Limit Cycle, Noise Power Spectrum.

Unit IV	**FINITE WORDLENGTH EFFECTS AND DSP APPLICATIONS**	**9 Hours**

Fixed point and floating point number representations – Quantization- Truncation and Roundingerrors - Quantization noise – quantization error – Overflowerror – Roundoff noise power - limit cycle oscillations due to product round off and overflow errors –DSP applications -Multirate signal processing: Decimation, Interpolation,Adaptive Filters.

Unit V	**DIGITAL SIGNAL PROCESSORS**	**9 Hours**

Introduction – TMS320c5X Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial DSP Processors –TMS320C64XX, TMS320 C54X.

Total:	**45+15 Hours**

Further Reading:	http://www.ti.com/processors/dsp/overview.html
	Spectrum estimation.
	Linear estimation and prediction

Course Outcomes:	
	After completion of the course, Student will be able to
	1. gain the knowledge about DSP Processors.
	2.apply DFT for the analysis of digital signals & systems.
	3. design of IIR filters for filtering undesired signals.
	4. design of FIR filters for filtering undesired signals.
	5. characterize finite Word length effect on filters and to design the Multirate Filters and Adaptive Filters.

References:

1. J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, New Delhi, PHI. 2003.

2. S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', McGraw Hill Edu, 2013.

4. B.Venkataramani and M.Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications" – Tata McGraw – Hill Publishing Company Limited. New Delhi, 2003.

3. Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab", Cengage Learning,2014.

5. R. Lakshmi Rekha, "Digital Singal Processing" – ALR Publications – 2016.

1702EC504	COMPUTER NETWORKS (Common to B.E / B.Tech – CSE, IT & ECE)	L	T	P	C
		3	0	0	3

Course Objectives:

1. To understand networking concepts and basic communication model
2. To understand network architectures and components required for data communication.
3. To analyze the function and design strategy of physical, data link, network layer and transport layer
4. To acquire basic knowledge of various application protocol for internetsecurity issues and services.

Unit I	INTRODUCTION AND CONCEPTS OF NETWORKS	9 Hours

Networks – Categories of Networks –Network hardware– Network software– Network Architecture – TCP/IP reference models – Network LAN technologies - Transmission media.

Unit II	DATA LINK LAYER AND PHYSICAL LAYER	9 Hours

Data link layer: Functionality of data link layer- Data link control and protocols – Error Detection and Error Correction - MAC – Ethernet- Wireless LAN- Broadband wireless – Bluetooth – Data link layer switching – **Physical layer:** Basis for data communication- Wireless transmission- Transmission media- Multiplexing- Channel capacity- switching

Unit III	NETWORK LAYER	9 Hours

Network layer – Functionality of network layer- Network addressing- Network routing- Routing algorithms- Internetworking- Quality of service- Network layer protocols- Switching concepts – Circuit switching – Packet switching- Network layer design issues.

Unit IV	TRANSPORT LAYER	9 Hours

Functionality of transport layer- Transport layer service – Elements of transport protocols- Transmission control protocol– Congestion control and avoidance – User datagram protocol- Delay tolerant networking- Transport for Real Time Applications (RTP).

Unit V	APPLICATIONS AND SECURITY	9 Hours

Applications protocols– Client and server model- Network services- DES- RSA- Web security- Recent trends, development and issues

Total:	45 Hours

Further Reading:

1. Socket Programming
2. Connectionless Transport " UDP

Course Outcomes:

After completion of the course, Student will be able to

1. Able to trace the flow of information from one node to another node in the network
2. Able to Identify the components required to build different types of networks
3. Able to understand the functionalities needed for data communication into layers
4. Able to choose the required functionality at each layer for given application
5. Able to understand the working principles of various application protocols and fundamentals of security issues and services available.

References:

1. Achyut S Godbole,AtulHahate, " Data Communications and Networks", Second edition 2011
2. Andrew S.Tannenbaum David J. Wetherall, "Computer Networks" Fifth Edition , Pearson Education 2011
3. Douglas E. Comer, ―Internetworking with TCP/IP (Volume I) Principles, Protocols and Architecture‖, Sixth Edition, Pearson Education, 2013.
4. Forouzan, " Data Communication and Networking", Fifth Edition , TMH 2012.
5. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition,2012.
6. Larry L. Peterson & Bruce S. Davie, "Computer Networks – A systems Approach", Fifth Edition, Morgan Kaufmann, 2012
7. William Stallings, ―Data and Computer Communications‖, Tenth Edition, Pearson Education, 2013

1702EC551	ANALOG COMMUNICATION LABORATORY	L	T	P	C
		0	0	4	2
Course Objectives:	**The student should be made to:**				
	1. Understand the basics of analog communication.				
	2. Study the different modulators.				
	3. Know the noise performance in communication system.				
List of Experiments:					
1. Generation and Demodulation of AM.					
2. Generation and Demodulation of FM.					
3. FM modulation using PLL.					
4. Study of PAM,PWM and PDM					
5. Study of FDM and TDM.					
6. Generation of AM using MATLAB.					
7. Generation of FM using MATLAB.					
8. Study of Super heterodyne receiver.					
9. Performance analysis of noise in Communication system.					
10. Removal of noise in AM and FM.					
	Total:	**45 Hours**			
Additional Experiments:	Pace Maker Circuit				
	Industrial Instrumentation amplifier				
Course Outcomes:					
	After completion of the course, Student will be able to				
	1. Design of AM and FM Circuits.				
	2. Design of AM and FM Circuits using MATLAB.				
	3. Determine the different multiplexing technique.				
	4. Design of Super Heterodyne receiver.				
	5. Compute the noise performance in communication system.				

1702EC552	DIGITAL SIGNAL PROCESSING LAB (Common to B.E / B.Tech – ECE,CSE & IT)	L	T	P	C
		0	0	4	2

Course Objectives:	**The student should be made to:**
	1. To make the students understand the behavior and response of the filter using different methods
	2. To study the output response of the system, sampling rate conversion and FFT spectrum
	3. To know the generation of the signals and arithmetic operations using TMS320C5X DSPProcessor.

List of Experiments:	
1.	Generation of Signals
2.	Properties of Discrete time Systems-Linearity, Stability, Causality &Time Variance.
3.	Sampling of an audio signal with different sampling rate and reconstruct the sampled signal.
4.	Computation of DFT of a signal using basic equation and FFT & power spectrum estimation using DFT
5.	Design and Simulation of IIR filters.
6.	Design and Simulation of FIR filters
7.	Multirate signal processing-Down sampling , Up sampling , Decimation and Interpolation
8.	Arithmetic operations in DSPs
9.	Generation of waveforms using DSPs
10.	Computation of convolution and correlation between signals using DSPs
11.	Implementation of IIR Filters using DSPs
12.	Implementation of FIR Filters using DSPs
	Total: 45 Hours

Additional Experiments:	https://www.texasinstruments.in
	Basic experiments using ADSP processor

Course Outcomes:	
	After completion of the course, Student will be able to
	1. Design of digital filter and Generation of various signals, Analysis of signal and systemproperties.
	2. Computation of circular and linear convolution.
	3. Determine the frequency transformation and Analysis of sampling rate.
	4. Design of digital filters.
	5. Analyze the power spectral density of the system.

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	TECHNICAL SEMINAR	L	T	P	C
		0	0	2	1
Course Objectives:	**The student should be made to:**				
	1. To develop self-learning skills of utilizing various technical resources to make a technical presentation.				
	2. To promote the technical presentation and communication skills.				
	3. To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.				
	4. To promote the ablility for Interacting and sharing attitude.				
	5. To encourage the commitment-attitude to complete tasks.				
The students are expected to make two presentations on advanced topics (recent trends) related to III or IV semester subjects. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Students are encouraged to use various teaching aids such as power point presentation and demonstrative models					
Evaluation Scheme:Continuous Assessment (100) **Distribution of marks for Continuous Assessment:** Presentation I (40) Report (10) Presentation II (40) Report (10) **Total Marks (100)**					
		Total:		**45 Hours**	
Course Outcomes:					
	After completion of the course, Student will be able to				
	1. Identify and utilize various technical resources available from multiple field.				
	2. Improve the technical presentation and communication skills.				
	3. Improve communicative competence.				
	4. Interact and share their technical knowledge.				
	5. Understand and adhere to deadlines and commitment to complete the assignments.				

	LIFE SKILLS: APTITUDE - I B.E – ECE	L 0	T 0	P 2	C 1

Course Objectives:

1. To brush up problem solving skill and to improve intellectual skill of the students
2. To be able to critically evaluate various real life situations by resorting to Analysis Of key issues and factors
3. To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
4. To enhance analytical ability of students
5. To augment logical and critical thinking of Student

Unit I	**INTRODUCTION TO NUMBER SYSTEM, BASIC SHORTCUTS OF ADDITION, MULTIPLICATION, DIVISION**	**5 Hours**

Classification of numbers – Types of Numbers - Divisibility rules - Finding the units digit - Finding remainders in divisions involving higher powers - LCM and HCF Models - Fractions and Digits – Square, Square roots – Cube, Cube roots – Shortcuts of addition, multiplication, Division.

Unit II	**Ratio and proportion, Averages**	**5 Hours**

Definition of Ratio - Properties of Ratios - Comparison of Ratios - Problems on Ratios - Compound Ratio - Problems on Proportion, Mean proportional and Continued Proportion Definition of Average - Rules of Average - Problems on Average - Problems on Weighted Average - Finding average using assumed mean method.

Unit III	**Percentages, Profit And Loss**	**5 Hours**

Introduction Percentage - Converting a percentage into decimals - Converting a Decimal into a percentage - Percentage equivalent of fractions - Problems on percentages - Problems on Profit and Loss percentage- Relation between Cost Price and Selling price - Discount and Marked Price - Two different articles sold at same Cost Price - Two different articles sold at same Selling Price - Gain% / Loss% on Selling Price.

Unit IV	**Coding and decoding, Direction sense**	**5 Hours**

Coding using same set of letters - Coding using different set of letters - Coding into a number - Problems on R-model - Solving problems by drawing the paths - Finding the net distance travelled - Finding the direction - Problems on clocks - Problems on shadows - Problems on direction sense using symbols and notations.

Unit V	**Number and letter series Number and Letter Analogies, Odd man out**	**5 Hours**

Difference series - Product series - Squares series - Cubes series - Alternate series - Combination series - Miscellaneous series - Place values of letters - Definition of Analogy - Problems on number analogy - Problems on letter analogy - Problems on verbal analogy - Problems on number Odd man out - Problems on letter Odd man out - Problems on verbal Odd man out

Total:	**30 Hours**

ASSESSMENT PATTERN :

1. Two tests will be conducted (25 * 2) - 50 marks
2. Five assignments will be conducted (5*10) - 50 Marks

Course Outcomes:

After completion of the course, Student will be able to

1. Learners should be able to understand number and solving problems least time using various shortcut
2. Solve problems on averages; compare two quantities using ratio and proportion.
3. Calculate concept of percentages, implement business transactions using profit and loss.
4. Workout concepts of Coding and Decoding, ability to visualize directions and understand the logic behind a sequence.
5. Learners should be able to find a series the logic behind a sequence.

References:

1. Arun Sharma, 'How to Prepare for Quantitative Aptitude for the CAT', 7th edition, McGraw Hills publication, 2016.
2. Arun Sharma, 'How to Prepare for Logical Reasoning for CAT', 4th edition, McGraw Hills publication, 2017.
3. R S Agarwal, 'A modern approach to Logical reasoning', revised edition, S.Chand publication, 2017.
4. R S Agarwal, 'Quantitative Aptitude for Competitive Examinations', revised edition, S.Chand publication, 2017.
5. Rajesh Verma, "Fast Track Objective Arithmetic", 3rd edition, Arihant publication, 2018.
6. B.S. Sijwalii and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihnat publication, 2014.

1703EC501	NANO ELECTRONICS (Common to B. E / B. Tech – CSE, IT & ECE)	L	T	P	C
		3	0	0	3

Course Objectives:

1. To be exposed of basic electronics and quantum electronics.
2. To be familiar with basic Nanoelectronics devices and Plasmonics.
3. To learn about optoelectronics and Spintronics.
4. To know various architecture methodologies

Unit I	INTRODUCTION TO ELECTRONICS AND QUANTUM DEVICES:	9 Hours

Classification Of Solids-Energy Level-Intrinsic and Extrinsic Semiconductor-Conduction In Metal And Semiconductor-Semiconductor Diodes-Basic Principle Of Led-Charge And Spin In Single Quantum Dots-Coulomb Blockade-Electrons In Mesoscopic Structures-Single Electron Transfer Devices (Sets)-Electron Spin Transistor –resonant tunnel diodes ,tunnel FETs-quantum interference transistors devices(QUITs)-quantum dot cellular automata(QCAs)-quantum bits(qubits).

Unit II	NANOELECTRONICS DEVICES AND PLASMONICS:	9 Hours

Electronic transport in 1,2 and 3 dimensions-quantum confinement –energy sub bands –effective mass-diode conduction-mean free path in 3D-ballistic conduction –phase coherence length –quantized conductance-buttiker-landauer formula-electron transport in pn junctions-short channel nano transistor - single photon transistor using surface plasmon-nanowire surface plasmons-interaction with matter-channel plasmon-polarising guiding by sub wavelength metal groves-surface plasmon polarizations and localized surface plasmon.

Unit III	OPTOELECTRONIC CRYSTAL ANS ITS FABRICATION:	9 Hours

Linear optonic crystal –maxwells equations bloch's theorem transmission spectra –non linear optics in linear optonic crystals slab –nonlinear optonic crystal and its application-fabrication of optonic crystals structures(1D,2D&3D)-applications;1D crystals -coupler waveguide-high-Q cavities –optonic crystal fiber-4 tunable optonic crystal filters.

Unit IV	SPINTRONICS:	9 Hours

Spin tunnelling devices-magnetic tunnel junction –tunnelling spin polarization –giant tunnelling using MgO tunnel barriers-tunnel-based spin injectors-spin injections and spin transport in hybrid nanostructures –spin filters -spin diodes –magnetic tunnel transistor-spin relaxation and spin dephasing-memory devices and sensors-ferroelectric random access memory-MRAMS-field sensors –multferro electric sensors-spintronic biosensors

Unit V	NANOELETRONIC ARCHITECTURES AND COMPUTATIONS	9 Hours

Architecture principles-mono and multi processor systems-parallel data processing –power dissipation and parallelism –classic systolic arrays –molecular devices-properties –self-organization –size dependent limitations,computation:montecarlo simulations –computational methods and simulations from ab initio multiscale modelling –modelling of nanodevices

Total: 45 Hours

Further Reading:

1. Quantum Dots for fiber optic communication
2. Quantum cellular automata

Course Outcomes:

After completion of the course, Student will be able to

1. Explain the theory, principle of basic electronics and quantum electronics.
2. Explain the characteristics of Nanoelectronics and Plasmonic devices.
3. Summarize the various type's Optoelectronic crystals and its working principle.
4. Explain the characteristics, theory and construction of Spintronics devices.
5. Design an architecture Nanoelectronics system design

References:

1. W.Rainer,Nano electronics and information technology,wiley, 3rd 2012.
2. K.E.Drexlex,Nanosystems,Wiley, revised edition 2014
3. M.C.Gupta,J.Balloto the Handbook of photonics.CRC Press Taylor and Francis Group, 2nd edition 2006.
4. J.M.Martinez-Durat,RaulJ.Martin-palma."Nanotechnology for microelectronics and optoelectronics", 1st edition, 2006, Elsevier.
5. V.Kochelp,M.stroscio,''Introduction to nanoelectronics,Cambridge university press(2013).
6. RainerWaser,''Nano electronics and information technology;advanced electronic material and novel devices'',Wiley-VCH(2010).

1703EC502	AUTOMOTIVE ELECTRONICS	L	T	P	C
		3	0	0	3

Course Objectives:

To learn Automotive mechanical, transmission and braking systems and to update the latest trends followed in the industry.

Unit I	AUTOMOTIVE MECHANICAL SYSTEMS: VEHICLE SYSTEMS	9 Hours

Power Train System (Air System, Fuel System (Carburettor& Diesel Fuel Injection, Ignition System, Exhaust System and other Auxiliary Systems (Cooling, Lubrications & Electrical Systems)), Transmission System (Front, Rear &4 wheel Drive, Manual, Automatic Transmission, Differential). Braking System (Drum, Disc, Hydraulic, Pneumatic), Steering System (Rack and Pinion, Power Steering).

Unit II	ELECTRONICS IN AUTOMOTIVE SYSTEMS	9 Hours

Need for Electronics in Automotive Systems: Performance (Speed, Power, and Torque), Control (Emission, Fuel Economy, Drivability, and Safety) & Legislation (Environmental legislation for pollution & Safety Norms). Overview of Vehicle Electronic Systems: Basic electrical components and their operation in an automobile: Power train subsystem (Starting systems, Charging systems - Ignition systems – Electronic fuel control), Chassis subsystem (ABS, TCS, & ESP) – Comfort and safety subsystems (Night Vision, Airbags, Seatbelt Tensioners, Cruise Control-Lane-departure-warning, Parking).

Unit III	INTEGRATED DEVELOPMENT ENVIRONMENT	9 Hours

Introduction to Integrated development environment (IDE) – Getting started, HW / SW configuration (boot service, Host – target interaction) – Booting reconfiguration – Managing IDE – Target servers, agents, Cross development, debugging – Introduction to an IDE for lab board – RTOS, PC based debugger

Unit IV	EMBEDDED SYSTEM IN AUTOMOTIVE APPLICATIONS	9 Hours

Engine management systems – Gasoline / Diesel systems, various sensors used in system – Electronic transmission control - Vehicle safety system – Electronic control of braking and traction – Body electronics – Infotainment systems – Navigation systems – System level tests – Software calibration using engine and vehicle dynamometers – Environmental tests for Electronic Control Unit - Application of Control elements and control methodology in Automotive System

Unit V	EMBEDDED SYSTEM COMMUNICATION PROTOCOLS	9 Hours

Introduction to control networking – Communication protocols in embedded systems – SPI, I2C, USB – Vehicle communication protocols – Introduction to CAN, LIN, FLEXRAY, MOST, KWP2000

	Total:	45 Hours

Further Reading: Heat Combustion – Fast moving acceleration –ABS – Fuel Injector

Course Outcomes:

After completion of the course, Student will be able to

1. Describe various mechanical systems in an automobile
2. Illustrate different types of electronic systems in an automobile
3. Outline the various stages of Integrated development environment to design an embedded system
4. Explain the various embedded systems used in automotive applications
5. Compare Vehicle Communication Protocols (K3).

References:

1. JoergSchaeuffele, Thomas Zurawka, ―Automotive Software Engineering Principles, Processes, Methods and Tools‖, SAE International, 2005.
2. BOSCH Automotive Handbook, 6th Edition, 2014.
3. Jean J.Labrosse, ―µC/OS-II Real Time Kernel,CMP Books‖, 2nd edition, 2002.
4. Denton. T, ―Automobile Electrical and Electronic Systems‖, 4th edition, 2012.
5. Ronald K. Jurgen, ―Automotive Electronics Handbook‖, McGraw Hill Publications, 1999.
6. Nicholas Navit, ―Automotive Embedded System Handbook‖, CRC Press, Taylor and Francis Group, 2009.

1703EC503	**MICROELECTRONICS** (Common to B. E / B. Tech – CSE, IT & ECE)	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

1. To be exposed of basics of semiconductor and applications.
2. To be familiar with advanced semiconductors and its applications.
3. To study the different types of amplifiers and its types.
4. To know about fabrication methodologies and circuit designing.

Unit I	**INTRODUCTION TO MICROELECTRONICS:**	**9 Hours**

Basic physics of semiconductor-diode models and circuits-physics of MOS transistor-MOS amplifiers – operational amplifiers- semiconductor theory- diodes –bipolar junction transistor(BJT)-BJT amplifiers-field effect transistor –FET amplifiers.

Unit II	**MOSFET AND IC AMPLIFIERS:**	**9 Hours**

Devices structure and physical operation-VI characteristics-biasing in MOS amplifier circuits-small signal operation and models-SPICE MOSFET-IC design philosophy-comparison of MOSFET and BJT-current sources –current mirrors-current steering circuits-high frequency response.

Unit III	**MULTI STAGE AMPLIFIER AND FEEDBACK:**	**9 Hours**

MOS differential pair –small signal operation of MOS differential pair-BJT differential pair-other non ideal characteristics and differential pair-differential amplifier with active words-multistage amplifiers-general feedback structure-four basic feedback topologies-series,shunt feedback-determining the loop gain- stability problems-effect of feedback in amplifiers poles-frequency compensation.

Unit IV	**MICROELECTRONICS FABRICATION:**	**9 Hours**

Clean room technology-silicon wafer production-thermal oxidation –lithography –advanced lithography – etching-diffusion process and ion implementation-thin film deposition –packaging –yields processing-CMOS & BIPOLAR process integration in practice-photo lithography-CVD epitaxy-plasma etching.

Unit V	**MICROELECTRONIC DEVICES AND CIRCUITS:**	**9 Hours**

Modelling-uniform semiconductor equilibrium-Uniform excitation of semiconductors- Nonuniform Situations:The Five basic equations-Non uniform Carrier Injection :Flow Problems –Non uniformly Doped Semiconductors-Junction Diodes-Bipolar Junction Transistors-The MOS capacitor-Field effect Transistors-Single Transistor Linear Amplifiers Stags-Differential Amplifiers Stages-High Frequency Analysis of Linear Amplifiers.

	Total:	**45 Hours**

Further Reading:

1. Commercial applications of Microelectronic circuits.
2. FINFET

Course Outcomes:

After completion of the course, Student will be able to

1.Explain the theory, principle of semiconductors and its devices.
2.Learn the characteristics of advanced semiconductors and its applications
3.Discuss the working principle and characteristics of different types of amplifiers.
4.Explain the fabrication methodology of microelectronics components and devices
5.Explain the various characteristics of microelectronics devices and circuits

References:

1. Claudio talarico,A.S.Sedra and K.C.Smith, “Microelctronics”5/e,oxford university press 2003.
2.Richard C.Jaeger“Introduction to microelectronic fabrication”2nd edition, Prentice Hall 2002.
3.ClitonG.Fonsand“Microelectronic devices and Circuits” Tata McGraw-2006.
4.Behzadrazavi“Fundamentals of microelectronics”, Johnwiley India pvt,ltd,2008.
5.Microelectronics – analysis and design,sundaram Natarajan. Tata McGraw hill.2007

1703EC504	BIOMEDICAL ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives:	
	1.To gain knowledge about the various physiological parameters and the methods of recording and also the method of transmitting these parameters.
	2. To study about the various assist devices used in the hospitals and Biotelemetry.
	3. To gain knowledge about various recently developed diagnostic and therapeutic techniques.

Unit I	**PHYSIOLOGIC SYSTEM AND BIO-POTENTIAL RECORDIN**G	**9 Hours**
The origin of Bio-potentials, Bio potential electrodes, Endocrine System, Nervous system, Vision system, Respiratory System, ECG, EEG, EMG,PCG, lead systems and recording methods, typical waveforms and signal characteristics.		
Unit II	**BIOLOGICAL AMPLIFIERS AND NON- ELECTRICAL PARAMETER MEASUREMENT**	**9 Hours**
Biological amplifier, Blood flow meter, Cardiac output, Respiratory measurement, Blood pressure, Temperature, Pulse, Blood Cell Counters.		
Unit III	**ASSIST DEVICES AND DIATHERMY**	**9 Hours**
Cardiac pacemakers, DC Defibrillator, Dialysis, Shortwave, Ultrasonic and Microwave type and their applications, Surgical Diathermy		
Unit IV	**BIOTELEMETRY AND ITS APPLICATIONS**	**9 Hours**
Introduction to Biotelemetry, Component of Biotelemetry, Application of Biotelemetry, Radio pill, Electrical safety.		
Unit V	**RECENT TREND IN IMAGING SYSTEM AND MEDICAL INSTRUMENTS**	**9 Hours**
X-Ray machines and Digital radiography, Biological effect of NMR imaging and Ultrasound, Medical Thermography, Endoscope unit, Laser in medicine, Cryogenic application,Computer tomography		
	Total:	**45 Hours**

Further Reading:	
	1.Human Anatomy 2.Biological Electrodes 3.Recent trend in medical application.

Course Outcomes:	
	After completion of the course, Student will be able to
	1.Classify various Bio-Signals and Waveform in Medical Science
	2. Explain the Biological amplifiers and Non electrical parameter measurement.
	3.Identify the devices in Medical field for particular application
	4. Discuss the application of Biotelemetry.
	5. Illustrate recent trends in medical Science

References:

1. Leslie Cromwell, “Biomedical Instrumentation and Measurement”, Prentice Hall of India, New Delhi, 2007.
2. John G.Webster, “Medical Instrumentation Application and Design”, 3rd Edition, Wiley India Edition, 2007.
3. Khandpur, R.S., “Handbook of Biomedical Instrumentation”, TATA McGraw - Hill, New Delhi, 2003.
4.JosephJ.Carr and John M.Brown, “Introduction to Biomedical Equipment Technology”, John Wiley and Sons, New York, 2004.
5.Joseph D.Bronzino,”The Biomedical Engineering Hand Book”,Second Edition, CRC Press,2000.

1703EC505	ROBOTIC VISION	L	T	P	C
		3	0	0	3

Course Objectives:

1. To learn the image fundamentals and mathematical transforms necessary for robotic vision
2. To understand the image segmentation and edge detection methods
3. To study the concepts of optics and lens systems

Unit I **INTRODUCTION** **9 Hours**

Introduction to robotic vision- 2D image transform, image filtering,relationship with other related fields- image formationperspectiveprojection-orthographic projection- brightness- lenses- image sensing- sensing color.

Unit II **IMAGE SEGMENTATION & EDGE DETECTION** **9 Hours**

Simple geometrical properties- area & position- orientation- projection- run length codingtopologicalproperties- sequential labeling algorithm- local counting & iterative modification. Image segmentation- thresholding- histogramming- merging and splittingalgorithm- edges in images-differential operators- discrete approximations- edge detection and localization

Unit III **IMAGE RECOGNITION** **9 Hours**

Future Extraction, Transform Based, Sift, Image Classification, Bayes Classification, Svm, Deep Learning

Unit IV **VIDEO ANALYTICS** **9 Hours**

Video surveillance, four ground extraction, pedestrian deduction, video analytics for navigation, abounded objects deduction

Unit V **MACHINE LEARNING** **9 Hours**

Learning –Types of Machine Learning –Supervised Learning –The Brain and the Neuron –Design a Learning System –Perspectives and Issues in Machine Learning –Concept Learning Task –Concept Learning as Search – Finding a Maximally Specific Hypothesis –Version Spaces and the Candidate Elimination Algorithm –Linear Discriminants–Perceptron –Linear Separability –Linear Regression.

Total: 45 Hours

Further Reading:

Robot Vision in Industrial Assembly and Quality Control Processes-Multi-Task Active-Vision in Robotics-An Approach to Perception Enhancement in Robotized Surgery using Computer Vision

Course Outcomes:

After completion of the course, Student will be able to

1. Identify the basic concepts of robotic vision and image formation
2. Analyze the geometric and topological properties of binary images
3. Apply the edge detection and segmentation techniques on real time images
4. Diagnose the degree of complications involved in optics related to robotic vision
5. Analyze the applications of robotic vision systems

References:

1. C.Rafeal Gonzalez and E.Richard Woods, Digital Image Processing, Third Edition, Pearson Education 2008.
2. Christopher M.Bishop“Pattern Recognition and Machine Learning”, 2nd printing 2011 edition.
3. Richard Duda, Peter Hart, David Stork, “Pattern Classification”, Publisher: Wiley; Second edition 2007.
4. Berthold Klaus paul horn, Robot vision, The MIT Press, McGraw Hill, 2012
5. Ales Ude, Robot vision, In-teh,2010
6. Ramesh Jain, Rangachar Kasturi and Brian G. Schunck, Machine Vision, McGraw Hill, 2006.
7. Anil K. Jain, Fundamentals of Digital Image Processing, PHI, 2006.

17EC006	COMPUTER ARCHITECTURE AND ORGANIZATION (Common to B.E / B.Tech – CSE, IT & ECE)	L	T	P	C
		3	0	0	3

Course Objectives:

1. Describe software and hardware interaction layers in computer architecture
2. Describe central processing unit
3. Describe various machine language instructions
4. Describe various addressing modes
5. Describe various instruction types and Instruction cycle

Unit I	INTRODUCTION OF COMPUTER ORGANIZATION AND DATA REPRESENTATION IN COMPUTER SYSTEM	9 Hours

Main Components of Computers, Standard Organization, Historical Developments, Computer Level Hierarchy, Von Neumann and Non-Von Neumann Model, Positional Numbering Systems, Signed Integer Representation, Fixed and Floating Point Representation, Character Codes, Codes for Data Recording and Transmission, Error Detection and Error Correction.

Unit II	SIMPLE COMPUTER AND INSTRUCTION SET ARCHITECTURE	9 Hours

Introduction, MARIE, Instruction Processing, Simple Program, Hardwired Control, Micro programmed Control, Real World Example of Computer Architecture, Instruction Formats, Instruction Types, Addressing, Instruction Level Pipelining, Real World Example of ISA.

Unit III	MEMORY AND STORAGE SYSTEM	9 Hours

Memory - Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization, Memory Hierarchy, Cache and Virtual Memory, Interfacing Memory to a Processor, Real World Example of Memory Management, Amdahl's Law, I/O Architecture, External Memory - Optical Disk, Magnetic Tape, RAID, Solid State Drives, Data Compression, Computer Peripherals, Operating System Support.

Unit IV	PARALLEL ORGANIZATION AND ALTERNATIVE ARCHITECTURE	9 Hours

Parallel Processing – Multiple Processor Organization, Cache Coherence and MESI Protocol, Multi Core Computer – Hardware and Software Performance Issues, Intel X86 Multicore Organization, RISC Machines, Flynn's Taxonomy, Parallel and Multiprocessor Architecture, Alternative Parallel Processing Approaches.

Unit V	SYSTEM SOFTWARE AND PERFORMANCE MEASUREMENTS	9 Hours

Operating Systems, Protected Environments, Programming Tools, Database Software, Transaction manager, Computer Performance Equation, Mathematical Preliminaries, Bench Marking, CPU Performance Optimization, Disk Performance.

Total:	45 Hours

Further Reading:

1. Input–Output Design and Organization, Data Formats
2. Modern Computer Systems, Communication Channel Technology

Course Outcomes:

After completion of the course, Student will be able to

1. Describe historical overview of computer and Numerical Representation Techniques.
2. Illustrate different types of Fundamental Computer Organization and Instruction Set.
3. Outline the Basic Memory Concept and External Storing Devices.
4. Explain the various Processing in Emerged in Recent Years.
5. Compare the Various Performance Analysis and System Software.

References:

1.David Tarnoff, "Computer Organization and Design Fundamentals", First Edition, 2007.

2. M. Morris Mano, "Computer System Architecture", 3rd Edition, Publisher: Pearson 2011.

3.MostafaAbd-El-Barr, Hesham El-Rewini, "Fundamentals of Computer Organization and Architecture", Wiley Interscience, John Wiley & Sons, Inc Publication, 2005.

4.Irv Englander, "The Architecture of Computer Hardware, System Software, and Networking", John Wiley & Sons, Inc Publication, 2009.

1703EC507	ADVANCED MICROCONTROLLERS	L	T	P	C
		3	0	0	3

Course Objectives:

1. To study about concepts of PIC and 8031/8051Microcontrollers
2. To know about Motorola Microcontroller
3. To explore knowledge about applications of Microcontrollers
4. To understand various system design Techniques

Unit I **8051/8031 MICROCONTROLLERS** **9 Hours**

IntroductiontosinglechipmicrocontrollersIntelMCS – 51familyfeatures,8051/8031architecture,pinconfiguration,I/OportsandMemoryorganization.Instructionsetandbasicassembly languageprogramming

Unit II **PIC MICROCONTROLLER** **9 Hours**

IntroductiontoPICmicro-controller ,CPU Architecture – Instruction set – interrupts- Timers- I2C Interfacing –UART- A/D Converter –PWM and introduction to C-Compilers

Unit III **MOTOROLA 68HC11 MICROCONTROLLERS** **9 Hours**

Instruction set addressing modes – operating modes- Interrupt system- Serial Communication Interface – A/DConverter.

Unit IV **INTERFACING AND APPLICATIONS OF MICRO CONTROLLERS** **9 Hours**

Interrupts,Timer/CounterandSerialCommunication. InterfacingLCDDisplay– KeypadInterfacing,MCSapplications:Squarewaveandpulsewavegeneration,LED,A/DConverterandD/AConverterinterfacingt o8051.

Unit V **SYSTEMDESIGN– CASESTUDIES** **9 Hours**

GenerationofGatesignalsforconverters and Inverters-MotorControl–ControllingDC/ AC appliances– Measurementoffrequency-Stand aloneDataAcquisitionSystem.

Total: **45 Hours**

Further Reading:

1.RTC- Interface with Motorola Microcontroller, PWM
2.UART- Interface with 68HC11 Motorola Microcontroller

Course Outcomes:

After completion of the course, Student will be able to

1. know basics of 8031/8051 Microcontrollers
2. Explain fundamentals of PIC Controller
3. understand concepts of Motorola 68HC11 Microcontrollers
4. Illustrate system design techniques using Microcontroller
5. examine applications and interfacing of Microcontroller

References:

1.MuhammedAliMazidiandJaniceGillispieMazidi–The 8051 Microcontroller and Embedded Systems Using Assembly and C,II edition ,PearsonEducationInc,2012.

2.MuhammadAliMazidi,RolinD.Mckinlay,DannyCausey‘PICMicrocontrollerandEmbeddedSystemsusingAssemblyandCforPIC18’,PearsonEducation2008.

3.John .B.Peatman , “ Design with PIC Microcontroller , Prentice hall, 1997.

4.AjayVDeshmukh–MicrocontrollersTheoryandApplications,TataMcGraw-Hill, 2015

5.Gene .H.Miller .” Micro Computer Engineering ,” Pearson Education , 2003

6.Rajkamal,”.Microcontrollers-Architecture,Programming,Interfacing&SystemDesign”,2ed,Pearson,2012

7.IScottMackenzieandRaphael C.W.Phan,“TheMicrocontroller”,Pearson,Fourthedition 2012

1703EC508	MEASUREMENT AND INSTRUMENTATION	L	T	P	C
		3	0	0	3

Course Objectives:

1. Learn the use of DC and AC bridges for measuring R, L and C
2. Learn the use of different types of analog meters for measuring electrical quantities such as current, voltage, power, energy, power factor and frequency
3. Learnthe applications of CRO, other electronic measuring devices, graphical programmingpalettes and tools in virtual instrumentation

Unit I **MEASUREMENT CONCEPTS** **9 Hours**

Principles of operation and construction of PMMC-Static and dynamic characteristics-units andstandards of measurements-error analysis-moving coil, moving iron meters, multi meters-True RMS
Meters-Bridge measurements: Maxwell, Kelvin, Hay, Schering, Anderson and Wien bridge-Q meters .

Unit II **TRANSDUCERS** **9 Hours**

Classification of transducers-selecting a transducer-strain gauges-temperature transducer – LVDTAdvantages and disadvantages-capacitive transducers-Piezo electric transducers – optoelectronictransducers.

Unit III **FUNCTION GENERATORS** **9 Hours**

Function generators-RF signal generators-Sweep generators-Frequency synthesizer-wave analyzer-Harmonic distortion analyzer-spectrum analyzer-heterodyne wave analyzer-frequency counters- Time
Interval measurement- Measurement of voltage, current, phase and frequency using CRO.

Unit IV **VIRTUAL INSTRUMENTATION** **9 Hours**

Introduction- Block diagram of a virtual instrument physical quantities and analog interfaces- Hardware
and soft ware user interface- Advantages over conventional instruments- Architecture of a virtualinstruments and its relation to the operating system-overview of software-lab view- Graphical userinterface-controls and indicators-labels and texts-data types – format-data flow programming – editingdebugging and running a virtual instrument-graphical programming palettes and tools.

Unit V **MODERN MEASUREMENT TECHNIQUES** **9 Hours**

A/D &D/A converters-Elements of a digital data acquisition system-interfacing of transducers – multiplexing-Use of recorders in digital systems-digital recording system-liquid crystal display-computer controlled instrumentation-IEEE 488 bus-fiber optic measurements for power and systemloss.

Total: **45 Hours**

Further Reading:

Vector meters and distortion meters-Measurement of Pressure, Temperature, and velocity-Special typeof CRO-Front panel objects-functions and libraries-Optical time domains reflect meter.

Course Outcomes:

After completion of the course, Student will be able to

1. Describe the fundamental concepts and principles of instrumentation.
2. Explain the operation of various transducers required in measurements.
3. Explain about different types of Function generators and signal analyzers.
4. Design a Virtual Instruments using LabVIEW Software.
5. Choose a Computer controlled Instrumentation System for different applications.

References:

1. Ernest, Doeblin, Dhanesh and N.Manik, Measurement Systems - Application and Design, Tata McGraw - Hill, 2007

2. Sawhney A K, “Electrical And Electronic Measurements And Instrumentation” **Publisher:**Dhanpat Rai & Co. 2005.

3. Albert D.Helfrick and William D.Cooper, Modern Electronic Instrumentation and Measurement Techniques, PHI, 2003

4. B.C.Nakara, K.K.Chaudhry, Instrumentation Measurement and Analysis, Tata McGraw - Hill,2004.

5. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, PHI, 2003.

6. Alan. S. Morris, Principles of Measurements and Instrumentation, PHI, 2003

17EC009	VIRTUAL INSTRUMENTATION	L	T	P	C
		3	0	0	3

Course Objectives:

1. Analogic and digital measurements principles
2. Understanding Virtual Instrument concepts
3. Creating Virtual Instruments for practical works

Unit I **Introduction to Virtual Instrumentation:** **9 Hours**

Historical perspective – advantageblock diagram and architecture of a virtual instrument -Conventional Instruments versus Traditional Instruments - data-flow techniques, graphical programming in data flow, comparison with conventional programming.

Unit II **VI programming techniques** **9 Hours**

VIs and sub-VIs, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, State machine, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

Unit III **Data acquisition basics** **9 Hours**

Introduction to data acquisition on PC, Sampling fundamentals, Input/Output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements

Unit IV **VI Chassis requirements** **9 Hours**

Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI. Networking basics for office & Industrial applications, VISA and IVI

Unit V **VI toolsets, Distributed I/O modules and Applications** **9 Hours**

Application of Virtual Instrumentation Instrument Control, Development of process database management system, Simulation of systems using VI, Development of Control system, Industrial Communication, Image acquisition and processing, Motion control. **Applications** DistributedI/O modules-Virtual Laboratory, Virtual Oscilloscope, Virtual function generator, Motioncontrol. Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI /SCADA

Total: **45 Hours**

Further Reading:

LabVIEW Graphical Programming

Course Outcomes:

After completion of the course, Student will be able to

1. Understand importance and applications of virtual instrumentation
2. Understand basic data acquisition techniques of virtual instrumentation
3. Develop real time applications of virtual instrumentation
4. Analog and digital measurements principles
5. Understand the tool sets of virtual instrumentation

References:

1. Robert H. Bishop,LabVIEW 2009 Student Edition, Pearson College Division, 2009.
2. N.Mathivanan, PC-based Instrumentation: Concepts and Practice, Eastern Economy Edition, PHI Learning private Ltd,2007.
3. Kevin sJames, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation andControl, Newness, 2000.
4. Jovitha Jerome, Virtual Instrumentation Using Lab VIEW, Eastern Economy Edition, PHI LearningPrivate, 2010.

1702CSX01	OPERATING SYSTEMS (Common to B.E / B.Tech – ECE, CSE, IT)	L	T	P	C
		3	0	0	3

Course Objectives:	**The student should be made to:**
	1.Study the basic concepts and functions of operating systems.
	2.Understand the structure and functions of OS.
	3.Learn about Processes, Threads and Scheduling algorithms
	4.Understand the principles of concurrency and Deadlocks.
	5.Learn various memory management schemes
	6.Study I/O management and File systems.

Unit I	**INTRODUCTION**	**5 Hours**

Introduction- Operating System Structure – Operating System Operations – Process Management – Memory Management – Storage Management – Protection and Security – Distributed Systems –Computing Environments – System Structures: Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs. OS Generation and System Boot.

Unit II	**PROCESS MANAGEMENT**	**12 Hours**

Processes-Process Concept, Process Scheduling, Operations on Processes, Inter process Communication; Threads-Overview, Multicore Programming, Multithreading Models; Windows 7 -Thread and SMP Management. Process Synchronization - Critical Section Problem, Mutex Locks, Semophores, Monitors; CPU Scheduling and Deadlocks. Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks

Unit III	**MEMORY MANAGEMENT**	**10 Hours**

Memory Management: Background – Swapping – Contiguous memory allocation –Paging – Segmentation – Segmentation with paging. Virtual Memory: Background –Demand paging – Process creation – Page replacement – Allocation of frames –Thrashing. Case Study: Memory management in Linux.

Unit IV	**STORAGE MANAGEMENT**	**9 Hours**

File System : File concept – Access methods – Directory structure – File system mounting – Protection. File-System Implementation : Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery. Case studies: File system in Linux – File system in Windows XP

Unit V	**I/O SYSTEMS**	**9 Hours**

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem –streams – performance. Mass-Storage Structure: Disk scheduling – Disk management –Swap-space management – RAID – disk attachment – stable storage – tertiary storage. Case study: I/O in Linux.

Total:	**45 Hours**

Further Reading:

Linux System, LINUX Multifunction Server, VMware on Linux Host and Adding Guest OS.

Course Outcomes:

After completion of the course, Student will be able to

1. Understand Operating System Structure, Operations and Services& Illustrate the operating system concepts and its functionalities.
2. Understand the Process Concept, Multithreaded Programming, Process Scheduling and Synchronization
3. Apply the Concepts of Virtual Memory Management and File Systems
4. Analyze the Secondary Storage and I/O Systems
5. Evaluate the different Protection and Security Mechanisms for Operating System

References:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.

2.Andrew S. Tanenbaum, "Modern Operating Systems", Third Edition Prentice Hall of IndiaPvt. Ltd, 2010 (Case Study Topic).

3. Harvey M. Deitel, "Operating Systems", Pearson Education Pvt. Ltd, Second Edition, 2002.

4. William Stallings, "Operating System", Pearson Education, Sixth Edition, 2012.