

SEIA1301	DISCRETE ELECTRONIC CIRCUITS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE

- The objective of this course is to publicize the student with the design and analysis of Rectifiers and power supplies, Transistor biasing circuits, Small signal analysis of FET and MOSFET amplifiers, Frequency Response and Multistage amplifiers and Large Signal Amplifiers.

UNIT 1 SMALL SIGNAL AMPLIFIERS**9 Hrs.**

BJT amplifiers : CE, CB and CC amplifiers - multistage amplifiers - differential amplifier - designing BJT amplifier networks (analysis using hybrid π model) FET amplifiers : CS, CG and CD amplifiers - designing FET amplifier networks
Frequency response : low frequency response of BJT and FET amplifiers - Miller effect capacitance - high frequency response of BJT and FET amplifiers.

UNIT 2 LARGE SIGNAL AMPLIFIERS**9 Hrs.**

Class A, B, C, AB and D type of operation - efficiency of class A amplifier with resistive and transformer coupled load, efficiency class B, complementary symmetry amplifiers - distortion in power amplifiers - Thermal stability of power amplifier.

UNIT 3 FEEDBACK AMPLIFIERS & OSCILLATORS**9 Hrs.**

Block diagram, Four types of negative feedback connections - voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Oscillators - Classification, Barkhausen Criterion - Analysis of LC oscillators - Hartley, Colpitts, Clapp, RC oscillators - phase shift - Wien bridge - Frequency range of RC and LC Oscillators, Miller and Pierce Crystal oscillators.

UNIT 4 TUNED AMPLIFIERS**9 Hrs.**

Small signal tuned amplifiers - Analysis of capacitor coupled single tuned amplifier & inductively coupled single tuned amplifier - double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth - Stagger tuned amplifiers - large signal tuned amplifiers - Class C tuned amplifier - Efficiency and applications of Class C tuned amplifier.

UNIT 5 WAVE SHAPING AND MULTI VIBRATOR CIRCUITS**9 Hrs.**

High Pass and Low Pass RC Circuits and their Response for Sine, Step, Pulse, Square, Ramp and Exponential Input. Multivibrators – Astable Multivibrators - Emitter and Collector Coupled - Monostable, Bistable Multivibrators, and Schmitt Trigger Circuits, Blocking oscillator – Monostable & Astable blocking oscillator.

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Understand the working of different types of Amplifiers.
- CO2 - Analyze the Hybrid Model of BJT Amplifiers.
- CO3 - Design Small Signal Model of FET and MOSFET Amplifiers.
- CO4 - Explain Frequency response and Multistage Amplifiers.
- CO5 - Explain working of Multivibrators.
- CO6 - Design Large Signal Amplifiers.

TEXT / REFERENCE BOOKS

1. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, "Electronic Devices and Circuits", 2nd Edition, TMH, 2007.
2. G.K, "Electronic Devices and Circuits", Khanna Publishers, 23rd Edition, 2004.
3. David A., Bell, "Solid State Pulse Circuits", PHI, 2002.
4. Venkatraman R., "Pulse, Digital Circuits and Computer Fundamentals", Dhanpat Rai, (Paper Back), 2013.
5. Jacob Millman and C. Halkias, "Integrated Electronics, Analog and Digital Circuits and Systems", McGraw Hill, 1997.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A:** 10 Questions of 2 marks each-No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

SEEA1304	ELECTRICAL CIRCUITS AND NETWORKS ANALYSIS	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To impart knowledge on the fundamental principles on analysis of Electrical circuits.
- To Understand and Analyze Network Functions and Various Parameters.
- To Familiarize about Resonance Circuits.

UNIT 1 D.C. AND AC CIRCUITS**9 Hrs.**

Electrical Quantities, Ohm's Law, Resistors - Series and parallel Combinations, Kirchhoff's Laws, Node and Mesh Analysis - Sinusoidal Functions - RMS(effective) and Average Values - Phasor Representation - J operator - Sinusoidal Excitation Applied to Purely Resistive - Inductive and Capacitive Circuits - RL - RC and RLC Series and Parallel Circuits.

UNIT 2 NETWORK THEOREMS (BOTH DC & AC)**9 Hrs.**

Superposition Theorem - Reciprocity Theorem - Thevenin's Theorem - Norton's Theorem - Maximum power transfer Theorem.

UNIT 3 NETWORK TOPOLOGY**9 Hrs.**

Network Topology - Basic concepts of Graph theory, Network Graph, Tree, Incidence & Reduced Incidence Matrices, Cut sets, Tie sets, Cut set schedule, Tie set schedule - Application to network solutions - Duality and Dual Networks.

UNIT 4 NETWORK FUNCTION AND ITS PARAMETERS**9 Hrs.**

Network Functions - Driving point Impedance - Transfer Functions- Network Parameters - Z, Y, h and ABCD- Parameter Conversion Parameters of Important Networks - Lattice Network - T Network and π Network - Twin Network - Bartlett's Bisection Theorem and its Application - Interconnection of Two Port Networks.

UNIT 5 TRANSIENTS AND RESONANCE CIRCUITS**9 Hrs.**

Time Domain Analysis - Transient Response of RL, RC & RLC networks with DC Input and Sinusoidal AC Input- Series and Parallel Resonance - Frequency Response - Quality Factor and Bandwidth.

Max.45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Analyze and find various Electrical Quantities for D.C and A.C. Circuits.
- CO2 - Study and Apply the Network Theorems.
- CO3 - Design different Circuits based on its Topology.
- CO4 - Design and Convert the two port networks based on its application.
- CO5 - Describe the Transient Circuits with respect to its Switching Conditions.
- CO6 - Design Circuits based on Resonance Conditions.

TEXT / REFERENCE BOOKS

1. Sudhakar and Shyam Mohan Palli, "Circuits and Networks: Analysis and Synthesis", 3rd Edition, Tata McGraw Hill, 2008.
2. John.D.Ryder, "Networks Lines and Fields", 2nd Edition, PHI Publications, 2003.
3. Hayt W. H, Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 8th illustrated edition, 2011.
4. Kuo, "Network Analysis and Synthesis", John Wiley & Sons Inc, 2014.
5. Umesh Sinha, "Network Analysis and Synthesis", 5th Edition, Sathya Prakashan Publishers, 2010.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs****PART A:** 10 Questions of 2 marks each-No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

SEIA1503	SOFTWARE TOOLS FOR INSTRUMENTATION ENGINEERS	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To get the strong knowledge in Control System applications using Matlab, Labview, PLC, SCADA and DCS.
- To design simulink block for various Engineering Application.
- To understand the main challenges related with human machine interaction and solve it with various software tools.

UNIT 1 MATLAB PROGRAMMING**9 Hrs.**

Introduction to MATLAB Software: MATLAB Command window - Workspace - Working with the MATLAB- user interface - Basic commands- Assigning variables Operations with variables-programming with different loops and conditional statements-Applications in Biomedical and Control engineering (signal & image).

UNIT 2 SIMULINK**9 Hrs,**

Introduction-Introduction to simulink libraries-graphical user interface - selection of objects- blocks-lines- simulation-application programs-limitations- Steps for creating fuzzy logic tool box -GUI editor-rule viewer -membership function editor-rule editor.

UNIT 3 PROGRAMMABLE LOGIC CONTROLLERS**9 Hrs.**

Programmable logic controllers: Organization- Hardware details- I/O- Power supply- CPU Standards- Programming aspects- Ladder programming- Sequential function charts- Human-machine interface (HMI) - Case study on Lubrication System.

UNIT 4 LARGE SCALE CONTROL SYSTEM**10 Hrs.**

SCADA: SCADA Architecture, Different Communication Protocols, Common System Components, Supervision and Control- HMI- RTU and Supervisory Stations - DCS: DCS Architecture, Local Control (LCU) architecture- LCU languages, LCU Process interfacing issues - communication facilities- configuration of DCS- displays- redundancy concept - case study on thermal power station.

UNIT 5 VIRTUAL INSTRUMENTATION**8 Hrs.**

Virtual instrumentation - Definition, flexibility - Block diagram and architecture of virtual instruments - Virtual instruments versus traditional instruments -LabVIEW software and interfacing with Hardware, VI programming techniques - VI, sub VI, loops and charts, arrays, clusters and graphs, interfacing LabView with Matlab .-LabVIEW applications in Instrumentation.

Max.45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Ability to utilize experimental, statistical and computational methods and tools necessary for engineering practice.
- CO2 - Explain the fundamental concepts of PLC, SCADA, DCS and VI.
- CO3 - Get an idea of advanced process control blocks and apply suitable software tools for different case studies.
- CO4 - Elucidate the concept of programming to solve various Control System Problems in Industries.
- CO5 - Knowledge and skills in modeling simulation, optimization and design of industrial automation systems.
- CO6 - Understand the main functioning of various instrumentation industries through case studies.

TEXT / REFERENCE BOOKS

- Gordon Clarke, Deon Reynders, "Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems", Newnes Publications, Oxford, UK, 2004.
- John Essick, "Hands-On Introduction to Lab VIEW for Scientists and Engineers", Oxford University Press (November 12, 2008).
- Efim Rosenwasser, Bernhard P. Lampe, "Multivariable Computer-Controlled Systems: A Transfer Function Approach", Springer, 2006.
- Chapman, S J Thomson, "Matlab Programming for Engineers", Bookware Companion Series, 5th edition, 2016.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A:** 10 Questions of 2 marks each - No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SIC1601	INSTRUMENTATION IN AEROSPACE & NAVIGATION (For EIE and E&C)	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT 1 AIR CRAFT AND AEROSPACE VEHICLE INSTRUMENTATION**9 Hrs.**

Air data instruments: altimeter, air speed rate of climb - gyroscopic instruments - turn and back indicator - artificial horizon - directional Gyro Schuler Tuning, Stable Platform - Introduction to Auto pilots - integrated flight instruments - altitude compensation.

UNIT 2 GPS AND SENSORS**7 Hrs.**

GPS - propulsion controls - Sun sensors - Horizon sensors - Star tracker - Stabilization controls

UNIT 3 RADIO NAVIGATION AIDS AND FLIGHT INSTRUMENTATION AND CONTROL**10 Hrs.**

Automatic direction finder - distance measuring equipments - instruments landing system - visual omni range - radar - optical instruments - engine instruments and control - pressure measurements - thermal meter control - tachometer - accelerometer - smoke and fire detection - propeller controls - twin blade control - cabin pressure and temperature.

UNIT 4 AIR CRAFT FLIGHT SIMULATION INSTRUMENTATION**9 Hrs.**

Basic description of a flight simulator - Solution of Aerodynamics equations - simulation of abnormal conditions - Jet engine power plant troubles - Flight controls and auto pilot troubles, Simulation - Simulation of difficult conditions - Weapons system trainer - Need for realism - Instrumentation.

UNIT 5 FAULTS IN AEROSPACE VEHICLE**10 Hrs.**

Hydraulic systems troubles - landing gear troubles - cabin conditioning troubles - indication of unsafe canopy - Boeing condition - Radio troubles - Separate generator - System troubles - Trouble indicator light - Advantages of instrumented flight - Black box and its use.

Max. 45 Hours**COURSE OUTCOMES:**

On completion of the course, student will be able to

CO1	Illustrate the working of various aircraft instruments.
CO2	Explain different sensors and GPS.
CO3	Apply the concept of measurement and control in various devices used in flights
CO4	Describe the flight simulation and instrumentation concepts.
CO5	Discuss the diverse faults in aerospace vehicle
CO6	Compare the advantages of Instrumented flight

TEXT / REFERENCE BOOKS

1. Pallett E.G.H., "Aircraft Instrumentation and Integrated Systems", Longman Scientific and Technical, 1992
2. Nagaraja N.S., "Elements of Electronic Navigation", Tata McGraw Hill Publishing Ltd., New Delhi, 1975.
3. Douglas M. Considine and Ross. S.D. Handbook of Applied Instrumentation, McGraw Hill, 1965.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 hrs****Part A:** 10 questions of 2 marks each -No choice**20 Marks****Part B:** 2 questions from each unit with internal choice, each carrying 16 marks**80 Marks**

SICX1010	COMPUTER CONTROL OF PROCESS (Common to E&C & EIE)	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I DIGITAL CONTROL SYSTEM**10 hrs.**

Need for computer in a control system- functional block diagram of a control system- direct digital control- supervisory control-scheduling control- digital control interfacing: process inputs, outputs interface-data loggers-data acquisition system- type of displays, computer – various input/outputs- computer control action- treatment of inputs, outputs, and control strategies.

UNIT II TRANSFORMS AND STABILITY ANALYSIS**10 hrs.**

Mathematical representation of sampling process- Z transform & properties- inverse Z transform-pulse transfer function-data hold sampling frequency consideration-open loop & closed loop response of sampled data control system- modified Z transform- stability of sampled data control system- stability in Z domain- Schur-Cohn stability test, bilinear transformation, Jury's test of stability.

UNIT III CONTROL ALGORITHM**10 hrs.**

Control algorithm- design of control algorithm using Z transform-dead beat algorithm - Dahlin's method-ringing Kalman's approach-PID algorithm position & velocity form- tuning the algorithm- selection of sampling time.

UNIT IV PROGRAMMABLE LOGIC CONTROLLER**10 hrs.**

PLC- configuration- ladder diagrams- relay based PLC- computer based PLC- typical control features- interlocks & alarms.

UNIT V DISTRIBUTED CONTROL SYSTEMS**10 hrs.**

DCS-different architectures - functional elements- remote electronic unit- redundancy- different methods of communication protocol network.

TEXT BOOKS:

1. Deshpande P.B. & Ash R.H, "Elements of Computer Process Control", Instrument Society of America 1981.
2. Michal.P Lucas, "Distributed Control System", Van Nostrand Reinhold & Co 1986.
3. Frank D.Petruzella, "Programmable Logic Controllers", 3rd Edition 2005.

REFERENCE BOOKS:

1. Liptak B.G, "Instrumentation in Process Industries", Vol.I &II Chilton Book Co, 1974
2. George Stephanopoulos.C, "Chemical Process Control", PHI, 2005
3. Curtis D Johnson, "Process Control Instrumentation Technology", John Wiley & Sons, 2006.
4. John.W.Webb, "Programmable Logic Controllers-Principle & Application", PHI 2007.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max.Marks : 80

Exam Duration : 3 hrs

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks

SECX1015	MICROPROCESSORS & MICROCONTROLLERS (Common to E&C & EIE)	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I MICROPROCESSORS**10 hrs.**

Microprocessors evolution and types, general 8 bit microprocessors and its architecture-8085,Z80,6800-8086 microprocessors family overview,8086 internal architecture,introduction to programming of 8086

UNIT II INSTRUCTION SETS AND ASSEMBLY LANGUAGE PROGRAMMING-8085**10 hrs.**

Instruction cycle – timing diagram-machine cycle-instruction format-addressing modes-instruction set of 8085-assembler directives-stack &subroutines-assembly language programs

UNIT III MICROCONTROLLER-8051**10 hrs.**

Microprocessors and microcontrollers-microcontroller evolution-8051 architecture input/output ports, program and data memory, counters and timers, serial data I/O, interrupts-introduction set and assembly language programs

UNIT IV PERIPHERAL DEVICES & INTERFACING**10 hrs.**

Data transfer schemes-programmable I/O-serial I/O-peripheral IC'S-8251,8255,8259,8279-DMA, interfacing-7 segment LED & LCD Display- stepper motor – water level control-ADC & DAC-applications

UNIT V INTRODUCTION TO OTHER 16 BIT MICROPROCESSOR AND MICROCONTROLLERS**10 hrs**

Intel 80286,80386,80486,80196,PIC ,ARM architecture & features, introduction to embedded systems.

TEXT/REFERENCE BOOKS:

1. Gaonkar, "Microprocessors Architecture, Programming, And Application With 8085", Wiley Eastern Publication.,1997.
2. Kenneth J. Ayala, "The 8051 Microcontroller:Architecture, Programming And Applications", Penram International Publishings, 1996.
3. Dougals .V.Hall, "Microprocessors &Interfacing-Programming and Hardware", Tata McGraw Hill, 1991.
4. Walter A.Trebel & Avtar Singh, "The 8088 and 8086 Microprocessors", PHI, 1985.
5. Barry B. Brey, "The Intel Microprocessor 8086 8088 80186 80286 80386 80486 Pentium And Pentium Pro Processor Architecture, Programming And Interfacing", PHI, 7th Edition (March 23, 2005).
6. Mazidi & Mazidi, "The 8051 Microcontroller And Embedded System", PHI, 2000.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max.Marks : 80

Exam Duration : 3 hrs

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks

SECX4027	INTEGRATED CIRCUITS AND DSP LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

INTEGRATED CIRCUITS LAB**List of Experiments**

1. Characteristics of Op amps and applications: Summer, Integrator, and Differentiator.
2. Design and testing of waveform generators using Op-amps: square, triangular.
3. Design and testing of Precision Rectifier, Active Filters.
4. Design and testing of an Instrumentation amplifier & D/A Converter.

DIGITAL SIGNAL PROCESSING LAB**List of Experiments**

1. Study of DSP Processor.
2. Arithmetic and Logical Operation Using DSP Processor.
3. Multiplication / Division operation Using DSP Processor.
4. Convolution – Linear / Circular Convolution using MATLAB.
5. Cross Correlation / Auto Correlation using MATLAB.
6. Generation of Square / Sine Waveform using MATLAB.
7. Design FIR – Low pass filter / High Pass Filter using MATLAB.
8. Design IIR – Low pass filter / High Pass Filter using MATLAB.

SECX4002	MEASUREMENT AND TRANSDUCER LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

List of experiments

1. Measurement of Medium Resistance Using Wheat stone's Bridge
2. Measurement of Low Resistance Using Kelvin's Double Bridge
3. Measurement of Capacitance Using Schering's Bridge
4. Measurement of Inductance Using Anderson's Bridge
5. Calibration of Ammeter, Voltmeter
6. Design of Current to voltage & Voltage to current converters
7. Displacement versus output characteristics of potentiometer transducer
8. Strain Gauge characteristics
9. Load cell characteristics
10. Characteristics of LVDT
11. Characteristics of Thermocouple
12. Characteristics of Thermistors
13. Step response characteristics of RTD
14. Hall Effect transducers

SECX1048	FUNDAMENTALS OF FUZZY LOGIC AND ARTIFICIAL NEURAL NETWORKS (Common to EIE, ECE, ETCE & EEE)	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I INTRODUCTION TO FUZZY LOGIC**8 hrs.**

Introduction to Fuzzy Set Theory – Basic Concepts of Fuzzy Sets - Classical Set Vs Fuzzy Set – Properties of Fuzzy Set – Fuzzy Logic Operation on Fuzzy Sets – Fuzzy Logic Control Principles – Fuzzy Relations – Fuzzy Rules – Defuzzification.

UNIT II FUZZY LOGIC CONTROLLER & ITS APPLICATION**10 hrs.**

Fuzzy Logic Controller – Fuzzification Interface – Knowledge Base – Decision Making Logic – Defuzzification Interface – Application of Fuzzy Logic to Water Level Controller - Temperature Controller- Inverted Pendulum Control – Control of Blood Pressure during Anaesthesia.

UNIT III FUNDAMENTALS OF ANN**10 hrs.**

Fundamentals of ANN – Biological Neurons and Their Artificial Models – Types of ANN – Properties – Different Learning Rules – Types of Activation Functions – Training of ANN – Perceptron Model (Both Single & Multi Layer) – Training Algorithm – Problems Solving Using Learning Rules and Algorithms – Linear Separability Limitation and Its Over Comings

UNIT IV DETERMINISTIC & STATISTICAL NETWORKS**12 hrs.**

Back Propagation Training Algorithm – Practical Difficulties – Counter Propagation Network – Structure & Operation – Training of Kohonen and Grossberg Layer – Applications of BPN & CPN - Statistical Method – Training Application – Boltzman Training – Cauchy Training – Hop Field Network and Boltzman Machine – Speed Energy Function – Network Capacity – Applications A / D Converter – Travelling Sales Man Problem – RBF Network

UNIT V BAM, ART & OPTICAL NETWORKS**10 hrs.**

BAM – Structure – Types – Encoding and Retrieving – Adaptive Resonance Theory – Architecture of ART 1 & ART 2 – Implementation – Training – Characteristics – Introduction to Optical Neural Network – Cognitron & Neocognitron

TEXT BOOKS:

1. Timothy Ross, Fuzzy Logic with Engineering Application, McGraw Hill, Edition 1997.
2. James A. Freeman & Skapura, Neural Networks, Pearson Education, 2007.

REFERENCE BOOKS:

1. B.Yegnanarayana, "Artificial Neural Networks" Prentice Hall, September 2007.
2. Simon Haykin, "Artificial Neural Networks", 2nd Edition, Pearson Education.
3. Drainkov, H.Hallendoor and M.Reinfrank, "An Introduction to Fuzzy Control", Edition 2001.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max.Marks : 80

Exam Duration : 3 hrs.

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks

80% theoretical and 10% numerical from Unit I & II, 10% from Unit III,IV, V may be asked

SECX1064	DATA ACQUISITION AND COMMUNICATION SYSTEMS	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I DATA CONVERTERS**10 hrs.**

Definition, Design and need for Data Acquisition Systems -D/A Converters-Implementing a DAC Function-Use of Ladder Networks-Bipolar Coded DACs -A/D Converters-Parallel A/D, Feedback A/D, Ramp type A/D, Dual slope A/D, Successive Approximation A/D-Comparison of A/D Conversion Techniques- Microprocessor/PC based Data Acquisition Systems

UNIT II COMPUTER NETWORKS**10 hrs.**

Topology- TCP/IP-Data Link Control Protocol-BISYNC,SDLC,HLDC,LLA,MA-

Principles of Internet Working-Repeaters, Hubs, Bridges, Switches, Routers, Gateways-Internet Protocol-Encoding-Types of Encoding-Frequency and time-division Multiplexing techniques

UNIT III AMPLITUDE MODULATION**8 hrs.**

Modulation- Need for Modulation- AM-Frequency Spectrum- Power Relation – Different types of Modulators- SSB and VSB Generation-AM Transmitters- Block Diagram- Functions of each block – High level and Low Level Transmitters.

UNIT IV FREQUENCY MODULATION**10 hrs.**

Angle Modulation-Principle of Frequency and Phase Modulation-Relation between FM and PM Waves- Band width of FM-Narrow Band And Wide Band FM Wave- Generation of FM wave- Direct and Indirect Methods –FM Transmitters-Block Diagram- Functions of each block

UNIT V DETECTORS & RECEIVERS**12 hrs.**

Detection and Receivers –Detection of AM Waves-Diode Detectors-Synchronous Detectors-FM Detectors-Phase Discriminators-Ratio Detectors. Receivers-Different types-Superheterodyne receivers-Block Diagram-Choice of IF and Oscillator Frequencies- Tracking-Alignment-AVC,AFC, Receiver Characteristics.

TEXT BOOKS:

1. G.B.Kennedy, "Electronic Communication Systems", 4th Edition, Tata McGraw Hill, 1993.
2. Anokh Singh, "Principles of Communication Engineering" S.Chand & CO.
3. A.S.Tanenbaum, Computer Networks ,3rd Edition, Prentice Hall of India, 1996

REFERENCE BOOKS:

1. G.B.Clayton, "Data Converters", The Macmillan Press Ltd., 1982
2. Roddy D.Coolen.J, "Electronic Communications", 4th Edition, PHI, 2007.
3. Taub and Schilling, "Principles of communication systems", Tata McGraw Hill, New Delhi, 1995.
4. Behrouz A Forouzan, "Data Communication and Networking".
5. Simon Haykin, "Communication System, John Wiley & Sons, 4th Edition, 2001
6. Bruce Carlson et al., "Communication Systems", Tata McGraw Hill, 4th Edition, 2002.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max.Marks : 80

Exam Duration : 3 hrs

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks

SECX1021	FUNDAMENTALS OF VLSI DESIGN (Common to E&C & EIE)	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I MOS TRANSISTOR THEORY**10 hrs.**

The MOS transistor-Current Voltage Relations-Threshold Voltage-Second order effects-MOS models-Design of Logic gates-Stick diagrams – DC characteristics – Small signal AC characteristics of CMOS inverter – Dynamic behavior – Power consumption – Scaling of MOS circuits.

UNIT II COMBINATIONAL LOGIC DESIGN**10 hrs.**

Static CMOS design – Determination of Pull-up and Pull-down ratio-Sizing of transistors – Ratioed logic-Pass transistor logic – Dynamic CMOS design – Noise consideration – Domino logic, np CMOS logic – Power consumption in CMOS gates – Multiplexers – Transmission gates design.

UNIT III SEQUENTIAL LOGIC DESIGN**10 hrs.**

Introduction – Static sequential circuits- CMOS static flip-flop – Dynamic sequential circuits – Pseudo static latch - Dynamic two phase flip-flop – clocked CMOS logic – C² MOS latch- Pipelining – NORA CMOS logic – True single phase clocked logic – Realization of DFF in TSPC logic.

UNIT IV SUBSYSTEM DESIGN**10 hrs.**

Introduction-Designing Static and Dynamic Adder circuits – The Array Multiplier – Multiplier structures- Baugh-Wooly – Booth Multiplier – Barrel shifter – Memory structures – SRAM and DRAM design – Design approach of Programmable logic devices – PLA, PAL and FPGA.

UNIT V INTRODUCTION TO VHDL**10 hrs.**

Digital system design process – Language elements of VHDL- Operators-Data Types – Signal assignments – Concurrent and Sequential assignments-Process statement – Wait statement – If statement - Loop statement - Assertion statement – Data flow modeling - Structural modeling – Behavioral Modeling- Examples

Total Hours: 50**TEXT BOOKS**

1. Jan M.Rabaey, "Digital Integrated Circuits", 2nd Edition, September 2000, PHI Ltd.
2. M.J.S.Smith, "Application Specific Integrated Circuits", 1st Edition 1997, Pearson Education.

REFERENCE BOOKS

1. Douglas A.Pucknell, "Basic VLSI design", PHI Limited 1998.
2. E.Fabricious, "Introduction to VLSI design", Mc Graw Hill Limited 1990.
3. Neil Weste, "Principles of CMOS VLSI design", Addison Wesley 1998.
4. Wayne Wolf, "Modern VLSI design", 2nd Edition 2003, Pearson Education.
5. Sung-Mo Kang & Yusuf "CMOS Digital Integrated Circuits- Analysis & Design", 2nd Edition, MGH.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max. Marks : 80

Exam Duration : 3 hrs.

Part A : 6 Questions of 5 marks each – No choice

30 marks

Part B : 5 Questions from each of the five units of internal choice, each carrying 10 marks each

50 marks

SICX1004	SENSORS AND TRANSDUCERS	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I SENSORS**10 hrs**

Difference between Sensors and Transducers – Sensors for Motion and Position Measurement , GPS, INS, Doppler, SONAR.

Thermal Sensors – Gas Thermometric Sensors, Acoustic Temperature Sensor, Thermoemf Sensors, NQR Thermometry, Heat Flux Sensor.

Biosensors – Types - Calorimetric Biosensors, Potentiometric Biosensors, Amperometric Biosensors, Optical Biosensors, Immunosensors

UNIT II MEASUREMENTS**9 hrs.**

Functional Elements of measurement system- Examples - Characteristics of instruments: Static characteristics - Dynamic characteristics - Types of errors -sources of errors- methods of elimination-Analysis of data - Limiting errors-Relative limiting error-Combination of Quantities with limiting errors – Statistical treatment of data: Histogram, Mean, Measure of dispersion from the mean, Range, Deviation, Average deviation, Standard Deviation, Variance.

UNIT III RESISTIVE TRANSDUCER**10 hrs.**

Transducers –Classification of Transducers, Characteristics - Basic Requirements of a Transducer - Mechanical Devices as Primary Detectors -Mechanical Springs, Proving Rings, Potentiometer, Strain Gauges -Theory, Types (includes Rossette), Temperature Compensation, Calibration – Resistance Hygrometer, Photoconductive cell, Hot wire anemometer.

UNIT IV INDUCTIVE & CAPACITIVE TRANSDUCER**11 hrs.**

Self inductive transducers, Mutual inductive transducer, Linear variable Differential transformer - Eddy current gauge, Proximity sensors, Microsyn, Induction potentiometer, Capacitive displacement transducers, Single ended capacitive displacement transducers - Desirable features of capacitive transducers -Practical capacitive pickups - Equibar differential pressure transducer -Feedback type capacitance proximity pickup – Capacitor microphone - Application in level measurement

UNIT V SPECIAL TRANSDUCER & SENSORS**10 hrs.**

Piezoelectric, Photovoltaic, Hall Effect, Magnetostrictive, Radio-Active Absorption, Ionic Conduction Transducers, Digital Transducers - Digital Displacement Transducer, Shaft Angle Encoder, Optical Encoders, Magnetic Encoders -Digital Speed Transducers -Variable Reluctance Type, Smart Sensors - SQUID Sensors - Film Sensors – MEMS., Sensors for angular measurement using non contact type (wireless)

TEXT BOOKS:

1. Sawhney A.K., "Electrical & Electronic Measurements and Instrumentation", Dhanpat Rai Publications, 2001
2. D. Patranabis, 'Sensors and Transducers', Prentice Hall of India, 1999.
3. Doebelin E.O. "Measurement System Applications and Design", TMH, 5th Edition, 2004.

REFERENCE BOOKS:

1. Rangan C.S. Mani V.S.V: and Sharma G.R., "Instrumentation Devices and Systems" Tata McGraw Hill.
2. D. Patranabis, "Principles of Industrial Instrumentation", TMH, 2nd Edition.
3. Dr. S. Renganathan, "Transducer Engineering" -Allied Publishers Limited.D.V.S Murthy –"Transducer and Instrumentation", PHI, 1st Edition

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max.Marks: 80

Exam Duration :3 hrs.

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks

SICX1013	INDUSTRIAL AND CHEMICAL PROCESSES (Common to EIE & E&C)	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I INTRODUCTION TO UNIT OPERATIONS**10 hrs.**

Introduction to Industrial & chemical processes, unit operations-Transport of liquids, solids and gases- Adjusting of particle size of bulk solids- Mixing processes- Separation processes.

UNIT II DISTILLATION, CHEMICAL REACTORS, STEAM BOILERS**10 hrs.**

Qualitative study of unit operations with an understanding of operating variables; Distillation, chemical reactors, steam boilers.

UNIT III DRYERS, CRYSTALLIZATION, EVAPORATORS**10 hrs.**

Qualitative study of unit operations with an understanding of Operating variables, Dryers, Crystallization, Evaporators.

UNIT IV FURNACES, CENTRIFUGES, HEAT EXCHANGERS**10 hrs.**

Qualitative study of unit operations with an understanding of operating variables. Furnaces, Centrifuges, Heat exchangers.

UNIT V PUMPS, COMPRESSORS, EXTRUDERS**10 hrs.**

Qualitative study of Unit operations with an understanding of operating variables. Pumps, Compressors, Extruders.

TEXT / REFERENCE BOOKS:

1. Warren L.McCabe, Julian C.Smith, Peter Harriot, "Unit operations of chemical Engineering", 7th Edition, McGraw Hill, 2005.
2. George.T. Austin, Shreve's, "Chemical Process Industries", 5th Edition, McGraw Hill.
3. Balchan J.G and Mumme K.I, 'Process Control Structures and Applications', Van Nostrand Reinhold Company, 1988.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max.Marks : 80

Exam Duration : 3 hrs.

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks

SICX1008	INDUSTRIAL INSTRUMENTATION (Common to EIE & E&C)	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I MEASUREMENT OF SPEED, FORCE, TORQUE, ACCELERATION 10 hrs.

Measurement of speed- Revolution counter, Dragcup tachometer, AC and DC tachogenerators, photo electric pickup. Measurement of force - Load cell, pneumatic load cell, hydraulic load cell. Measurement of Torque using strain gauges and magneto elastic principle, Measurement of acceleration - Elementary accelerometers, seismic accelerometers, practical accelerometers, calibration.

UNIT II MEASUREMENT OF PRESSURE 10 hrs.

Manometers – different types of manometers, Elastic pressure transducers, Dead weight Tester, Electrical types, Vacuum gauges - McLeod gauge, Knudsen gauge, thermocouple gauge, ionization gauge, Differential pressure transmitter - electrical & pneumatic types

UNIT III MEASUREMENT OF TEMPERATURE 10 hrs.

Temperature scales, Bimetallic thermometer, filled- in Thermometers, Vapour pressure thermometers, Resistance thermometers, Thermistors, Thermostat, Thermocouples - types and ranges, characteristics, laws of thermocouples, cold junction compensation, IC temperature sensors AD 590, Pyrometers - radiation and optical pyrometers.

UNIT IV MEASUREMENT OF FLOW, LEVEL 10 hrs.

Orifice, Venturi, Pitot tube, flow nozzle rotameter, Positive displacement meter, turbine flowmeter, electromagnetic flow meter, ultrasonic flow meter, open channel flow measurement, solid flow measurement. Sight glass, float gauge, displacer, torque tube, bubbler tube, diaphragm box, Differential Pressure methods, electrical methods- resistance type, capacitance type, ultrasonic level gauging

UNIT V MEASUREMENT OF DENSITY, VISCOSITY, HUMIDITY 10 hrs.

Hydrometer – continuous weight measurement, liquid densitometer – float principle, air pressure balanced method, using gamma rays – gas density measurements – gas specific gravity measurements – Viscosity terms, saybolt viscometer, rotometer type viscometer, Industrial consistency meters. Humidity terms – dry & wet bulb psychrometers – hot wire electrode type hygrometer, electrolytic hygrometer, Dew point hygrometer

TEXT BOOKS:

1. D. Patranabis, "Principles of Industrial Instrumentation", Tata McGraw Hill, 2nd Edition, New Delhi, Reprint 2009.
2. S. K. Singh, "Industrial Instrumentation & Control " 3rd Edition, Tata McGraw Hill, Reprint 2009.
3. K.Krishnaswamy & S.Vijayachitra, "Industrial Instrumentation" New age International, Reprint 2008.

REFERENCE BOOKS:

1. Ernest O. Doebelin, Dhanish. N. Manik, "Measurement Systems Application & Design", TMH, 5th Edition, 2004.
2. R.K.Jain, "Mechanical & Industrial Measurements", Khanna Publishers, 11th Edition, 2004.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max.Marks : 80

Exam Duration : 3 hrs.

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks

SICX1006	MODERN CONTROL SYSTEM (Common to E&C & EIE)	L	T	P	Credits	Total Marks
		3	1	0	4	100

UNIT I REVIEW OF MATRICES**10 hrs.**

Review of matrices-co-ordinate transformation- Eigen values and Eigen vectors- diagonalization – Cayley Hamilton theorem- state transition matrix.

UNIT II STATE SPACE ANALYSIS**10 hrs.**

State space analysis – state space formulation- state space representation of control systems described by scalar differential equation – state variable- transformation of state space equation , physical ,phase & canonical variable, state space models-state space representation for discrete time system.

UNIT III CONTROLLABILITY AND OBSERVABILITY**10 hrs.**

Jordan and canonical forms, controllability and observability – condition for controllability and observability, Gilbert method and Kalman decomposition- design of state feedback by pole placement.

UNIT IV PHASE VARIABLE MATRIX**10 hrs.**

Controllable phase variable form, observable phase variable form, reduced order observer – full order observer-reducibility, irreducibility, transfer function matrix, impulse response functions.

UNIT V NON – LINEAR SYSTEM ANALYSIS**10 hrs.**

Non – linear systems – properties of non linear system – describing function for simple non linearity's like ON-OFF, dead zone and saturation- describing function analysis of non linear systems – phase plane method – basis concept- singular points – constructing phase plane trajectory for linear and nonlinear second order systems.

TEXT / REFERENCE BOOKS:

1. Gopal.M, "Modern Control Theory", 2nd Edition ,Wiley Eastern Publishers, 1993.
2. Tou.T.J. "Modern Control Theory", McGraw Hill publications, 1964.
3. Ogata.K.H, "State Space Analysis Of Control Systems ", Prentice Hall Publications, 1967.
4. Nagrath I.J. & Gopal.M, "Control Systems Engineering", 2nd Edition, Wiley & Sons, 1985.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max.Marks : 80

Exam Duration : 3 hrs

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks

SICX1028	POWER PLANT INSTRUMENTATION (Common to EIE, E&C & EEE)	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I OVERVIEW OF POWER GENERATION**10 hrs.**

Brief survey of methods of power generation – Hydro, thermal, nuclear, solar wind and wave power – Importance of instrumentation in power generation – Thermal power plants – Block diagram – Details of boiler processes - P&I diagram of boiler – Cogeneration.

UNIT II MEASUREMENTS IN POWER PLANTS**10 hrs.**

Electrical measurements – Current, voltage, power, frequency, power factor reactive power.

Non electrical parameters – Flow of feed water, fuel, air and steam with correction factor for temperature and pressure – Drum level measurement – Radiation detector – Smoke density measurement – Dust monitor.

UNIT III ANALYSERS IN POWER PLANTS**10 hrs.**

Flue gas oxygen analyser – Analysis of impurities in feed water and steam -

Dissolved oxygen analyser – Chromatography – pH meter – Conductivity cell -

Fuel analyser – Pollution monitoring instruments. Spectrum analyser

UNIT IV CONTROL LOOPS IN BOILER**10 hrs.**

Combustion control – Air/fuel ratio control – Furnace draft control – Drum level control – Main steam and reheat steam temperature control – Super heater control – Air temperature – Deaerator control – Distributed control system in power plants – Interlocks in boiler operation.

UNIT V TURBINE – MONITORING AND CONTROL**10 hrs.**

Speed, vibration, shell temperature monitoring and control – Steam pressure control – Lubricant oil temperature control – Cooling system.

TEXT BOOKS:

1. Sam G. Dukelow, 'The Control of Boilers', Instrument Society of America, 1991.
2. P.K. Nag, 'Power Plant Engineering', Tata McGraw Hill, 2001.

REFERENCE BOOKS:

1. S.M. Elonka and A.L. Kohal, 'Standard Boiler Operations', Tata McGraw Hill, New Delhi, 1994.
2. R.K.Jain, 'Mechanical and Industrial Measurements', Khanna Publishers, New Delhi, 1995.
3. E.Al. Wakil, 'Power Plant Engineering', Tata McGraw Hill, 1984.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max Marks : 80

Exam Duration : 3 hrs.

PART A : 2 Questions from each unit, each carrying 2 marks

20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks

60 marks