Scheme of Teaching and Examination for

5 th Semester of 3 Years Diploma in E.C.E.

Duration of Semester : **14 Weeks**

Student Contact Hours : **36 Hrs**

Total Marks : **800**

Effective from: 2017 -18 Session

Sl. No.	Name of Subject	Subject Code	Subject	Teaching Scheme			Examination Scheme					
				L	T	P	Hours of Exam	Full Marks of Subject	Final Exam / committee marks	Internal Assessment	Pass Marks Final / Ext. Exam	Pass Marks in Subjects
1.	Instrumentation System	ECE 503	Theory	3		-	3	100	80	20	26	40
2.	Power Electronics	ECE 504	Theory	3	-	-	3	100	80	20	26	40
3.	Programmable Logic Controller	ECE 505	Theory	3	-	-	3	100	80	20	26	40
4.	Elective I	ECE 506/507/508	Theory	3	-	-	3	100	80	20	26	40
5.	Elective II	ECE 509/510/511	Theory	3	-	-	3	100	80	20	26	40
6.	Instrumentation System Lab	ECE 512	Practical	-	-	2	4	50	40	10	-	20
7.	Power Electronics Lab	ECE 513	Practical	-	-	2	4	50	40	10	-	20
8.	Elective I Lab	ECE 514/515/516	Sessional	-		2	-	50	30	20	-	25
9	Elective II Lab	ECE 517/518/519	Sessional	-	-	2	-	50	30	20	-	25
10	In Plant Training	502	Sessional	-	-	-	-	50	30	20	-	25
11	DLS	501	Sessional	-	-	4	-	50	30	20	-	25
Total Hours of Teaching per week :				**15**		**12**						

Elective I (Embedded System- ECE 506/ VLSI System-ECE 507/ Electronic Waste-ECE 508)

Elective II (Linear Integrated Circuits- ECE509/Digital Communication System-ECE 510/Digital Signal Processing-ECE 511)

Total Marks: Theory : Practical : Sessional :

L : Lecture, T : Tutorial P : Practical

Note: 1. Period of Class hours should be of 1 hrs duration as per AICTE norms.

2. Remaining Hrs every week has been marked for students for Library and Student Centered Activities.

3. Drawing / Graphics / Practical / Sessional examinations will be held at parent institution.

4. Board will depute examiner for Practical examination.

5. Regarding sessional examination the parent institution will form a three member committee and this committee will examine the sessional records and hold viva of the examinee for 60 % marks allotted to the subject. Marks for remaining 40 % will be provided by the Faculty concerned on the basis of evaluation of each job / work throughout the semester.

6. In plant Training of 04 weeks duration to be undertaken after 4th semester Exam and before start of 5th semester classes.

Subject - Instrumentation System
Subject Code – ECE503
Total Hours 42
Full Marks - 80 + 20 = 100

Unit I

Electronic Meters: 6 hrs

Electronic Analog voltmeter: DC voltmeters-Choppers type-DC amplifier, solid state voltmeter, Differential voltmeter, peak responding voltmeter, True RMS voltmeter, calibration of DC voltmeters. Digital Voltmeter:- Introduction, Ramp Techniques, dual slope, integrating type DVM, Successive approximation type DVM, Resolution and sensitivity of digital meters, general specification of a DVM. CRO's study of various stages in brief, measurement of voltage, current phase and frequency, special purpose oscilloscope.

Unit II

Instrumentation for Generation and Analysis of Waveforms: 6 hrs

Signal generators: Fixed and variable AF oscillators, AF sine and square wave generator, Function generator: Square and pulse generator, Sweep generator, wave analyzer, harmonic distortion analyzer, spectrum analyzer, spectrum analysis.

Unit III

Storage and Display Devices: 4 hrs

Necessity of recorders, recording requirements, graphic recorders, strip chart recorders, magnetic tape recorders, digital tape recorders. Electronic indicating instruments, seven segment display, fourteen segmental display Nixie tube.

Unit IV

Transducers and DATA Acquisition Systems: 6 hrs

Strain gauge, LVDT, thermocouple, piezoelectric, crystal and photoelectric transducers and their applications. Data acquisition systems. Unit VII Telemetry: Introduction, method of data transmission, types of telemetry systems and applications.

UNIT V

Instrumentation: 6 hrs

Types of Instrumentation systems, Data acquisition system (DAS) and its uses in intelligent Instrumentation system, Detailed study of each block involved in making of DAS, Signal Conditioners: as DA, IA, Signal Converters (ADC & DAC), Sample and hold, Designing of Pressure, Temperature measuring instrumentation system using DAS, Data logger.

UNIT VI

AUTOMATION 4 hrs

Introduction about Automation system, Concepts of Control Schemes, Types of Controllers, Components involved in implementation of Automation system i.e., DAS, DOS, Converter (I to P) and Actuators:

Pneumatic cylinder, Relay, Solenoid (Final Control Element), Computer Supervisory Control System (SCADA), Direct Digital Control's Structure and Software.

UNIT VII

PLC & INTELLIGENT CONTROLLER : 10 Hrs

Introduction of Programmable logic controller, Principles of operation, Architecture of Programmable controllers, Programming the Programmable controller. Introduction to Intelligent Controllers, Model based controllers, Predictive control, Artificial Intelligent Based Systems, Experts Controller, Fuzzy Logic System and Controller, Artificial Neural Networks, Neuro-Fuzzy Controller system.

Subject : Instrumentation System Lab
Subject Code : ECE512

List of Experiments:-

1. To determine output characteristic of a LVDT and determine its sensitivity.
2. Study characteristics of temperature transducer like Thermocouple, Thermistor and RTD with implementation of small project using signal conditioning circuit.
3. Study characteristics of Light transducer like Photovoltaic cell, Phototransistor and Pin Photodiode with implementation of small project using signal conditioning circuit.
4. To study input- output characteristics of a potentiometer and to use two potentiometers as an error detector.
5. To study transmitter- receiver characteristics of a synchro set to use the set as control component.
6. To study the operation of a d-c positional servo system and to investigate the effect of damping and supply voltage on its response.
7. To study the operation of an a.c. position servo-system and to obtain effects of supply voltage and system parameter on its transient response.
8. To study a stepper motor and control its direction speed and number of steps with the help of a microprocessor
9. ADC Converter
10. DAC converters
11. Study of Automation system
12. Intelligent controllers

Suggested Readings / Books:

1 Electrical and Electronic Measurements and Instrumentation, by K. SAWHNEY.
2 Electronic Instrumentation and Measurement Techniques, by D Cooper.
3 Electronic Instrumentation, by H.S. Kalsi, Tata McGraw Hill
4 Applied Electronics Instrumentation and measurement, David Buchla, Wayne Melachlan:
5 Electronics Measurement and Instrumentation, Oliver by B.H and Cag J.M. McGrawHill.
6 Element of Electronic Instrumentation & Measurement, by Carr, Pearson Education.
7 Electronic Measurements & Instrumentation, by Kishore, Pearson Education.
8 Process Control Systems and Instrumentation, Bartelt, Cengage Learning
9 Process Control Instrumentation Technology‖ 6/e, by Curtis D Johnson, Pearson Ed.
10 Computer-Based Industrial Control‖, by Krishna Kant, PHI.

Subject : Power Electronics
Subject Code : ECE504
Total Hours : 42
Full Marks : 80 + 20 = 100

1. Power semiconductor devices PNPN diodes, DIACS Thyristors, TRIACS, G.T.O. devices. Power Transistors, Power MOSFET, Rating, Losses and Cooling. Triggering circuits for SCR's, UJT, Blocking Oscillators, Schmitt trigger circuits – Power MOS gate drive circuits. 10 hrs

2. Uncontrolled and controlled Rectifiers : Single phase and poly phase Bridge rectifiers. Transformer ratings. Inductive load, freewheeling diodes. Converter operation: Overlap, power factor, inversion, regulation, P-pulse converters, power factor control via PWM converters. 6 hrs

3. D.C. line commutation: Series and parallel capacitor turn off, resonant turn off, impulse commutation. D.C. Choppers : Principles, classification, use. 6 hrs

4. Frequency conversion: Cyclo converter single and three phase circuits, blocked group operation, circulating current mode. Single phase and three phase inverters, constant voltage source and constant current source inverters, HF inverters for heating. 12 hrs

5 Application : D.C. and A.C. drives, S.M.P.S., Resonant converters, A.C. Line Filters, ratio, interference suppression. HDVC transmission. 8 hrs

BOOKS :

1. Ramamurthy M – An Introduction to Thysistors and their applications
2. Lauder C W - Power Electronics, 3rd Edn. MHI 1993
3. Sen P C – Power Electronics, TMH
4. Rashid M H – Power Electronics, PHI Pub.
5. Dubey S K – Thysistorised Power Controller; John Wiley & Sons
6. Singh M D & Khanchandni : Power Electronics ; TMH Pub.
7. Dewan S B & Stranghen A – Power Semiconductors circuit
8. Mohan N, Underland T M & Robbins W P : Power Electronics, John Wiley & Sons.
9. Bose B K : Modern Power Electronic ; Jaico Pub. House
10. Dubey G.K.: Thyristorised Power Controllers, New Age International
11. Subramanyam: Power Electronics, New Age International
12. Sugandhi: Thyristors: Theory & Applications, New Age International

Subject : Power Electronics Lab
Subject Code : ECE513

List of Experiments:

1. Study Of V-I Characteristics Of An Scr.
2. Study Of V-I Characteristics Of A Triac.
3. Study Of Different Trigerring Circuits For Thyristor.
4. Study Of Uni- Junction Transistor (Ujt) Trigerring Circuit.
5. Study Of A Firing Circuit Suitable For Single Phase Half Controlled Convertor.
6. Simulation On The Single Phase Ac-Dc Uncontrolled Convertor With & Without The Source Inductance.
7. Simulation Of A Single Phase Ac To Controlled Dc Convertor With & Without The Source Inductance.
8. Single Phase Half Controlled Bridge Convertor With Two Thyristors & Two Diodes.
9. Single Phase Fully Controlled Bridge Convertor Using Four Thyristors.
10. Pspice Simulation Of Dc To Dc Step Down Chopper.
11. Pspice Simulation Of Single Phase Controller With R-L Load.
12. Pspice Simulation Of Pwm Bridge Invertor Of R-L Load Using Mosfet.

Subject : Programmable Logic Controller
Subject Code : ECE505
Total Hours : 42
Full Marks : 80 + 20 = 100

1. PLC Basics : 6 hrs
An Overall Look at Programmable Logic Controllers - Introduction, definition & history of the PLC, manufacturing & assembly process, PLC advantage & disadvantage, overall PLC system, CPU & programmer/monitors, PLC input & output modules, printing PLC information. The PLC: A Look Inside - Introduction, the PLC as a computer, the central processing unit, solid state memory, the processor, I/O modules, power supplies. General PLC Programming Procedures - Introduction, programming equipment, programming formats, proper construction of PLC ladder diagrams, process scanning consideration, PLC operational faults. Devices to Which PLC Input and Output Modules Are Connected - Introduction, input ON/OFF switching device, input analog device, output ON/OFF device, output analog devices
2. PLC Programming : 6 hrs
Programming On/Off Inputs to Produce On-Off Outputs - Introduction, PLC input instruction, output: coils, inductors & others, operational procedures, contact & coil input/output programming examples, a look at fail safe circuit, industrial process examples. Relation of Digital Gate Logic to Contact/Coil Logic - Digital logic gates, Boolean algebra PLC programming, conversion examples. Creating Ladder Diagrams from Process Control Descriptions - Ladder diagram & sequence listing, large process ladder diagram construction, flow charting as programming method
3. PLC Functions : 6 hrs
Register - Introduction, general characteristics of registers, module addressing, holding registers, input registers: single & group, output registers: single & group. PLC Timer Functions - Introduction, PLC timer functions, examples of timer function industrial application, industrial process timing application. PLC Counter Functions - Introduction, PLC counters examples of counter function industrial application
4. Intermediate Functions : 6 hrs
PLC Arithmetic Functions - Introduction, PLC addition & subtraction, the PLC repetitive clock, PLC multiplication, division & square-root: PLC trigonometric & log function, other PLC arithmetic functions. PLC Number Comparison Functions - Introduction, PLC basic comparison function, PLC basic comparison function application, PLC advanced comparison function. Numbering Systems and PLC Number Conversion Functions - Introduction, numbering system: decimal, binary & BCD, PLC conversion between decimal & BCD, OCTAL & HEX DECIMAL numbering system, other numbering & code system
5. Date Handling Functions 6 hrs
The PLC SKIP and MASTER CONTROL RELAY Functions - Introduction, the SKIP function & application, the MASTER CNTROL RELAY function & application. Jump Functions - Introduction, jump with non-return, jump with return. PLC Data Move Systems - Introduction, PLC MOVE function & application, moving large blocks of PLC data, PLC table & registers moves, other PLC MOVE functions. Other PLC Data Handling Functions - Introduction, PLC FIFO functions, the FAL function, the one shot (ONS), clear (CLR) & SWEEP functions
6. Working with Bits 8 hrs
PLC Digital Bit Functions and Applications - Introduction, bit pattern in a register, changing a register bit status, shift register function, shift register application. PLC Sequencer Functions - Introduction, electromechanical sequencing, the basic PLC sequencer function, a basic PLC sequencer application with timing, other PLC sequencer function, cascading sequencer. Controlling a Robot with a PLC - Introduction, basic two axis ROBOT with PLC sequencer

control, industrial three axis ROBOT with PLC control. PLC Matrix Functions - Introduction, applying matrix functions to reduce program length, the PLC AND & OR matrix function, the PLC COMPLEMENT & OMPARE matrix function, combination PLC matrix operation

7. Advanced PLC Functions : 4 hrs

Analog PLC Operation - Introduction, types of PLC, analog modules & systems, PLC analog signal processing, BCD or multi-bit data processing, PLC analog output application examples.

Books :

1. Programmable Logic Controllers : Principles & Applications, John W. Webb and Ronald A.Reis, Prentice Hall India
2. Programmable Logic Controllers by Bolton, Elsever N Publication
3. Programmable Logic Controllers by FD Prestrusela, TMH
4. Programmable Logic Controllers: Programming Methods and Applications by John R. Hackworth and Frederick D. Hackworth Jr, Pearson

Subject : Embedded Systems (Elective-I)
Subject Code: ECE506
Total Hours: 42
Full Marks : 80 + 20 = 100

Unit-I: Arm Processor Architecture 10 hrs

Architecture, Registers, Interrupts & Vector Table, I/O Ports, ARM Processor family, JTAG, I2C bus

Unit-II: Arm Programming Instructions 10 hrs

Instruction Set: Data processing instructions, Addressing modes, Load Store Instructions, PSR (Program Status Register) Instructions, Conditional Instructions, Interrupt Instructions

Unit-III: C Programming 12 hrs

Integrated Development Environment (IDE) for C/C++ Programming, C/C++ Programs using Function Calls, Pointers, Structures, Integers & Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution & Loops

Unit-IV: Interfacing Peripherals 10 hrs

Interfacing: ADC & DAC, Sensors, Memory, LCD Display, Stepper Motor, DC Motor, SD-MMC Card, Biometric & RFID, ZIGBEE, GSM Interfaces, Debugging Tools

References Books:

1. Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, ―ARM System Developer's Guide Designing and Optimizing System Software‖, Elsevier 2008.

2. Brooks, Cole, ―Embedded Microcontroller Systems, Real Time Interfacing‖, Thomson Learning 1999

3. Steve Furber, ―ARM system on Chip Architecture‖, Addision Wesley

4. Trevor Martin, ―The Insider's Guide to The Philips ARM7 - Based Microcontrollers, An Engineer's Introduction To The LPC2100 Series‖ Hitex Ltd.

5. ARM Architecture Reference Manual

6. Website www.arm.com

Subject : Embedded Systems Lab (Elective-I)
Subject Code : ECE514

List of Experiments

1. Study of ARM7 & ARM9 Bit Processor Architecture and Pin Diagram.
2. Study of Interrupt structure in ARM Processors
3. Write ARM Processor program to Flash LED
4. Interfacing of an LCD Display
5. Write a program to interface an ADC
6. Write a program to generate a Ramp waveform using DAC interface
7. Write a program to control a Stepper Motor
8. Write a program to control the speed of DC motor
9. Interface relays and write a program to control them
10. Interface ZIGBEE with ARM to control more external devices
11. Interfacing of Biometric information recorder
12. Interfacing RFID module with ARM Microcontroller

Subject : VLSI DESIGN (Elective-I)
Subject Code : ECE507
Total Hours : 42
Full Marks : 80 + 20 = 100

1. Introduction: 8 hrs
   Introduction to Computer-aided design tools for digital systems. Hardware description languages, Introduction to VHDL, Data objects, Classes and data types, Operators, Overloading, and Logical operators. Types of delays, Entity and Architecture declaration Introduction to behavioral, dataflow and structural models
2. VHDL Statements: 6 hrs
   Assignment statements, Sequential Statements and Process, Conditional Statements, Case Statements, Array and Loops, Resolution Functions, Packages & Libraries, Concurrent Statements.
3. Applications of VHDL: 8 hrs
   Combinational Circuit Design such as such as Multiplexers, Encoders, Decoders, Code Converters, Comparators, and Implementation of Boolean functions etc., Sequential Circuit Design such as Shift registers, Counters etc.
4. Review of MOS Devices: 6 hrs
   MOS Structure, Enhancement & Depletion Transistor, Threshold Voltage, MOS device design equations MOS Transistor Models. NMOS, PMOS, CMOS.
5. Basic Electrical Properties and Circuit Concepts:
   8 hrs
   The NMOS Inverter and Transfer Characteristics pull up and pull down ratios of NMOS, alternative forms of pull up the CMOS Inverter and transfer characteristics. CMOS Inverter Delays. Driving large Capacitive loads, Propagation delays and effect of wiring capacitance.
6. Circuit Characterization and Performance Estimation: 6 hrs
   Estimation of R, C, L, Switching Characteristics-delay models. Power dissipation. Scaling of MOS circuits. Effect of device scaling on circuit performance.

Recommended Text Books:

1. —A VHDL Primmer‖: Bhasker; Prentice Hall 1995.

2. Weste and Eshrighian, —Principle of CMOS VLSI Design‖ Pearson Education, 2001.

3. Pucknell D A and Eshraghian K, —Basic VLSI Design‖, Prentice Hall India, New Delhi (2003).

4. Fundamentals of Digital Logic with VHDL Design: Brown and Vranesic; TMH(2000)

5. S. M. Kang, Y. Lebiebici, —CMOS digital integrated circuits analysis & design‖ TMH, 3rd Edition.

Subject : VLSI LAB (Elective-I)
Subject Code : ECE515

List of Experiments: Combinational Design Exercises

1. Design of basic Gates: AND, OR, NOT.
2. Design of universal gates
3. Design of 2:1 Mux using other basic gates
4. Design of 2 to 4 Decoder
5. Design of Half-Adder, Full Adder, Half Substractor, Full Substractor
6. Design of 3:8 Decoder
7. Design of 8:3 Priority Encoder
8. Design of 4 Bit Binary to Grey code Converter
9. Design of 4 Bit Binary to BCD Converter using sequential statement
10. Design an 8 Bit parity generator (with for loop and Generic statements)

Sequential Design Exercises

11. Design of 2,s Complementary for 8-bit Binary number using Generate statements
12. Design of all type of Flip-Flops using (if-then-else) Sequential Constructs
13. Design of 8-Bit Shift Register with shift Right, Rhisft Left, Load and Synchronous reset.
14. Design of Synchronous 8-bit Johnson Counter.
15. Design of Synchronous 8-Bit universal shift register (parallel-in, parallel-out) with 3- state output (IC 74299)
16. Design of 4 Bit Binary to BCD Converter using sequential statement.
17. Design counters (MOD 3, MOD 5, MOD 8, MOD 16)
18. Design a decimal up/down counter that counts up from 00 to 99 or down from 99 to 00.
19. Design 3-line to 8-line decoder with address latch

Subject : Electronic Waste (Elective-I)
Subject Code : ECE508
Total Hours : 42
Full Marks : 80 + 20 = 100

1. Introduction: Definition and meaning of e waste (WEEE), e waste growth in India, e waste growth in world, e waste generation and mitigation, 4 R concept. 12 hrs
2. E waste toxicity and health perspectives: Introduction, Hazardous, biomedical waste, occupational and environmental health perspective. 10 hrs
3. E Waste regulations: Basel convention, E waste regulation in European Union, Regulating e waste in international and national legal framework, important legislation in India, Extended Producer responsibility, its impact and mechanisms. 10 hrs
4. Recycling Technologies for e waste : Optimal planning for modernization , Computer wastes, e scrap and its recycling, global opportunities, Recovery technologies from e waste for resource generation, guidelines for environmentally sound management of e waste. 10 hrs

Subject : Electronic Waste Lab (Elective-I)
Subject Code : ECE516

List of Experiments

1. Identification of e waste
2. Segregation of e waste
3. Constituent analysis in e waste
4. Constituent regaining from e waste
5. Reuse of simple computers by make ship parts replacement in computer lab
6. Recycling of e waste demonstration
7. Visit of e waste dump yard
8. Assessment of resources from the given e waste
9. Survey of e waste and use and transformation of e waste
10. Health hazard evaluation of constituent analysis in e waste
11. Sample test of underground water near e waste dumping yards and noting the variation
12. Assessment of persons skill and adaptability involved in e waste handling.

Books

1 E waste Rakesh Johri, TERI Publication
2 E Waste Management by Routledge
3 E Waste Management by CPCB
4 E Waste Management by LI and Wang

Subject : Linear Integrated Circuits (Elective-II)
Subject Code : ECE509
Total Hours : 42
Full Marks : 80 + 20 = 100

UNIT I

DIFFERENTIAL AND CASCADE AMPLIFIERS: 10 hrs

Introduction, Differential Amplifier, Differential Amplifier Circuit Configuration, Dual Input-Balanced output Differential Amplifier, Dual Input-Unbalanced output Differential Amplifier, Single Input-Balanced output Differential Amplifier, Single Input-unbalanced output Differential Amplifier with their DC and AC analysis, Differential Amplifier with swamping resistors, Constant current bias, Current Mirror, Cascaded differential Amplifier Stages, Level Translator, CE-CB configuration.

UNIT II

INTRODUCTION TO OPERATIONAL AMPLIFIERS: 12 hrs

Block diagram of a typical Op-Amp, Schematic symbol, integrated circuits and their types, IC package types, Pin Identification and temperature range, Interpretation of data sheets, Overview of typical set of data sheets, Characteristics and performance parameters of and Op-Amp, Ideal Op-Amp, Equivalent circuit of an Op-Amp, Ideal voltage transfer curve, Open loop configurations : Differential, Inverting & Non Inverting. Practical Op-Amp: Input offset voltage, Input bias current, Input offset current, total output offset voltage, Thermal drift, Effcet of variation in power supply voltages on offset voltage, Change in Input offset voltage and Input offset current with time, Temperature and supply voltage sensitive parameters, Noise, Common Mode configuration and common mode rejection Ratio. Feedback configurations.

UNIT III

APLICATIONS OF OP-AMP: 10 hrs

DC and AC amplifiers, Peaking Amp, Summing, Scaling and Averaging Amp, Instrumentation Amplifier, V to I and I and to V converter, Log and Antilog Amp, Integrator, Differentiator. Active filters: First order LP Butterworth filter, Second order LP Butterworth filter, First order HP Butterworth filter, Second order HP Butterworth filter, Higher order filters, Band pass filter, Band reject filters, All pass filter, Phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, Square wave generator, Triangular wave generator, Sawtooth wave generator, Voltage controlled oscillator, Basic comparator, Zero crossing detector, Schmitt trigger, window detector, V to F and F to V converters, A to D and D to A converters, Peak Detector, Sample and Hold Circuit.

UNIT IV

SPECIALIZED IC APPLICATIONS: 10 hrs

IC 555 Timer: Pin configuration, Block diagram, application of IC 555 as Monostable and Astable Multivibrator., Phase Lock Loops: Operating principles & applications of IC 565, Voltage Regulators: Fixed voltage regulators, Adjustable voltage regulators, Switching Regulators.

Subject : Linear Integrated Circuits Lab (Elective-II)
Subject Code : ECE517

List of Experiments:

1. To study differential amplifier configurations.
2. To measure the performance parameters of an Op amp.
3. Application of Op amp as Inverting and Non Inverting amplifier.
4. To study frequency response of an Op Amp
5. To use the Op-Amp as summing, scaling & averaging amplifier.
6. To use the Op-Amp as Instrumentation amplifier
7. Design differentiator and Integrator using Op-Amp.
8. Application of Op Amp as Log and Antilog amplifier. Design Low pass, High pass and Band pass 1st order butter worth active filters using Op Amp.
9. Design Phase shift oscillator using Op-Amp.
10. Design Wein Bridge oscillator using Op-Amp.
11. Application of Op Amp as Saw tooth wave generator.
12. Application of Op Amp as Zero Crossing detector and window detector.
13. Application of Op Amp as Schmitt Trigger.
14. Design a series regulators with an error amplifier to provide an output voltage of 5 volt at a load current of 1.5 Amp. Use a 741 Op-Amp and specify the Zener voltage necessary transistor gain and the maximum power dissipation of the transistor.
15. Design a delay circuit using 555.
16. To examine the operation of a PLL and to determine the free running frequency, the capture range and the lock in range of PLL.
17. Verification of hardware results obtained using SPICE.

Recommended Text Book:

1. Op Amps & Linear Integrated circuits by Ramakant Gayakwad.

Recommended Reference Books

1. Op Amps & Linear Integrated circuits by Coughlin

2. Op Amps & Linear Integrated circuits by RaviRaj Dudeja.

Subject : Digital Communication System (Elective-II)
Subject Code : ECE510
Total Hours : 42
Full Marks : 80 + 20 = 100

UNIT I: -

Elements of Digital Communication System:- 10 hrs

Block diagram of Digital Communication system, Digital representation of Analog signals, Advantages and Disadvantages of Digital Communication system, Bandwidth –S/N trade off, Hartley Shannon Law, Sampling theorem . Concept of amount of Information and entropy, Shannon Fano Source Coding, Huffman source coding and Lampel-Ziv Source coding algorithm.

UNIT-II: -

Pulse Code Modulation:- 10 hrs

Sampling, Sampling Rate, Aliasing, quantization error, Uniform and Non uniform quantization, Dynamic Range, Coding efficiency, A law & μ law companding, Bandwidth of PCM, Block diagram of PCM system, Delta Modulation, Continuously variable Slope Delta Modulator (CVSDM) or Adaptive Delta Modulation, Differential Pulse Code Modulation, Intersymbol Interference, Eye Patterns, Signal power in binary digital signals.

UNIT-III

Line Coding & Multiplexing Techniques: 10 hrs

Line Coding & its properties. NRZ & RZ types, signaling format for unipolar, Polar, bipolar (AMI) & Manchester coding and their power spectra (No derivation), HDB and B8ZS signaling, Nyquist's criterions for pulse shaping, Fundamentals of time division multiplexing, Bit versus word interleaving, Statistical TDM, Codecs & Combo Chips. Basics of TDMA, FDMA and CDMA

UNIT-IV

Digital Carrier Modulation & Demodulation Techniques: 12 hrs

Introduction, Amplitude Shift Keying (ASK), ASK Spectrum, ASK Modulator, Coherent ASK Detector, Noncoherent ASK Detector, Frequency Shift Keying (FSK), FSK Bit Rate and Baud, Bandwidth and Frequency Spectrum of FSK, FSK Transmitter, Non-coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL, Binary Phase Shift Keying, Binary PSK Spectrum, BPSK Transmitter, Coherent PSK Detection, Quadrature Phase Shift Keying (QPSK), QPSK Demodulator, Offset QPSK, π/4 QPSK, Comparison of conventional QPSK, Offset QPSK and π/4 QPSK, M-Ary BPSK, Quadrature Amplitude Modulation (QAM); MQAM transmitters and receivers, Band Width efficiency, Carrier Recovery; Squaring Loop & Costas Loop, Differential PSK, DBPSK transmitter and receiver, Constant Envelop Modulation; Minimum Shift Keying (MSK) & Gaussian Minimum Shift Keying (GMSK), matched filter receivers, bandwidth consideration and probability of error calculations for ASK, PSK, FSK schemes.

Subject : Digital Communication System Lab (Elective-II)
Subject Code : ECE518

LIST OF EXPERIMENTS

1. Study of Time Division Multiplexing system.

2. Study of pulse code modulation and demodulation.

3. Study of delta modulation and demodulation and observe effect of slope overload.

4. Study pulse data coding techniques for various formats.

5. Data decoding techniques for various formats.

6. Study of amplitude shift keying modulator and demodulator.

7. Study of frequency shift keying modulator and demodulator.

8. Study of phase shift keying modulator and demodulator.

9. Error Detection & Correction using Hamming Code

10. Digital link simulation; error introduction & error estimation in a digital link using MATLAB (SIMULINK)/ communication simulation packages.

TEXT BOOK RECOMMENDED

1. Electronic Communication System Fundamentals through Advance Wayne Tomasi 5th 2009 Pearson Education.

2. Communication Systems, Fourth Edition, Simon Haykin, Wiley publication.

BOOKS RECOMMENDED

1. Modern Electronic Communication, (6th edition), by Gary M. Miller, published by Prentice-Hall, 1999 2. Introduction to Communication Systems, third edition, by F. G. Stremler, Addison- Wesley, 1990.

3. Digital Communication, E.A. Lee and D.G. Messerschmitt, , Kluwer Academic Publishers,1994

4. Digital Communication Receivers, H. Meyr, M. Moeneclaey, S.A. Fechtel, Wiley, 1998

5. Modulation and Coding Techniques in Wireless Communications by EVGENII KROUK, SERGEI SEMENOV, WILEY, 2011.

Subject : Digital Signal Processing (Elective-II)
Subject Code : ECE511
Total Hours : 42
Full Marks : 80 + 20 = 100

UNIT I Introduction: 14 Hrs

Limitations of analog signal processing, Advantages of digital signal processing and its applications; Some elementary discrete time sequences and systems; Basic elements of digital signal processing such as convolution, correlation and autocorrelation, Concepts of stability, causality, linearity, difference equations. DFT and its properties; Linear Periodic and Circular convolution; Linear Filtering Methods based on DFT; Fast Fourier Transform algorithm using decimation in time and decimation frequency techniques; Goertzel algorithm.

UNIT II The Z Transform: 8 hrs

Introduction, Z-Transform, Region of convergence; Inverse Z Transform methods, properties of Z transform.

UNIT III Design of Digital Filters: 14 hrs

Structures of realization of discrete time system, direct form, Cascade form, parallel form and lattice structure of FIR and IIR systems. Linear Phase FIR filters; Design methods for FIR filters; IIR filter design by Impulse Invariance, Bilinear Transformation, Matched Z-Transformation, Analog and Digital Transformation in the Frequency Domain. Finite Precision Effects: Fixed point and Floating point representations, Effects of coefficient unitization, Effect of round off noise in digital filters, Limit cycles.

UNIT IV DSP Processors: 6 hrs

Architectures of ADSP and TMS series of processor.

RECOMMENDED TEXT BOOK

1. Digital Signal Processing Principles, Algorithms and Application John G Proakis, Dimtris G Manolakis 4th 2009.

Books Recommended

1. Discrete-Time Signal Processing Alan V Oppenheim, Ronald W Schafer, John R Back 2nd 2008, Prentice Hall.

2. Digital Signal Processing S. Salivahan, A Vallavaraj, Gnanpiya 1st 2008 Tata McGraw Hill.

3. Digital Signal Processing-A computer based approach S. K. Mitra 1st 2006 Tata McGraw Hill

4. Jervis, —Digital Signal Processing‖, Pearson Education India.

5. Introduction to Digital Signal Processing Johny R.Johnson 1st 2006, Prentice Hall.

Subject : Digital Signal Processing Lab (Elective-II)
Subject Code : ECE519

List of Experiments:

Perform the following exercises using MATLAB

1. To develop elementary signal function modules (m-files) for unit sample, unit step, exponential and unit ramp sequences.
2. Write a program in MATLAB to generate standard sequences.
3. Write a program in MATLAB to compute power density spectrum of a sequence.
4. To develop program modules based on operation on sequences like signal shifting, signal folding, signal addition and signal multiplication.
5. Write a program in MATLAB to verify linear convolution.
6. Write a program in MATLAB to verify the circular convolution.
7. To develop program for finding magnitude and phase response of LTI system Described by system function H(z).
8. To develop program for finding response of the LTI system described by the difference equation.
9. To develop program for computing inverse Z-transform.
10. To develop program for computing DFT and IDFT.
11. To develop program for conversion of direct form realization to cascade form realization.
12. To develop program for cascade realization of IIR and FIR filters.
13. To develop program for designing FIR filter.
14. To develop program for designing IIR filter.
15. To write a MATLAB program for noise reduction using correlation and autocorrelation methods.
16. To write a MATLAB programs for pole-zero plot, amplitude, phase response and impulse response from the given transfer function of a discrete-time causal system.
17. Write a program in MATLAB to find frequency response of different types of analog filters.
18. Write a program in MATLAB to design FIR filter (LP/HP) through Window technique a. Using rectangular window b. Using triangular window

Subject Title : Development of Life Skills (Common Paper)
Subject Code : 501
Full Marks : 50

Rationale:

In today's competitive world, the nature of individual and organizations is changing at very rapid speed. In this situation the responsibility of diploma holder is not unique. After completing his course work he has to face the world and seek meaningful employment also. Merely having knowledge is not sufficient these days. He has to show his communicative skill also. As such the individual skills with capability to show his strength and communicate his willingness new skills for further advancement with to impart his ability and acquiring has to be displayed and learned.

This subject will develop the student as an effective individual to grab the available situation and be member of the unseen team in which he may be put in . It will develop the abilities and skills to perform at highest degree of quality as an individual as well as a member of core group or team. Such skills will enhance his capabilities in the field of searching, assimilating information, managing the given task, handling people effectively, solving challenging problems.

Objectives: The students will be able to:

1. Develop acumen to face interview.
2. Lead in the group discussion and set goals and targets for others
3. Develop team spirit i.e. concept of working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Follow moral and ethics
11. Convince people to avoid frustration

CONTENTS:

SOCIAL SKILLS

1. Social understanding for group discussion, imaginative thinking and develop free ideas .
2. SWOT Analysis – Concept, and know himself in details. Learn how to make use of SWOT.
3. **Inter personal Relation:-** How to effectively counter arguments of others without hearting their feeling Sources of conflict and conflict resolution, Ways to enhance interpersonal dependence and relations.

4. **Problem Solving**

I) **STEPS IN PROBLEM SOLVING,**

1) Identify and clarify the problem,
2) Information gathering related to problem,
3) Evaluate the evidence,
4) Consider alternative solutions and their implications,
5) Choose and implement the best alternative,
6) Review

II) **Problem solving technique**.(any one technique may be considered)

1) Trial and error
2) 2) Brain storming
3) 3) Lateral thinking

5. **Presentation Skills**

Body language --
Dress like the audience, Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,
Voice and language – Volume, Pitch, Inflection, Speed, Pause, Pronunciation, Articulation, Language, Practice of speech. Use of presentation aids, Summarizing the facts

6. **Group discussion** –

Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making

7. **INTERVIEW TECHNIQUE**

Necessity, Techniques to influence interviews and giving directions, Tips for handling common questions.

8. **Working in Teams**

Understand and work within the dynamics of a groups.
Tips to work effectively in teams,
Establish good rapport, interest with others and work effectively with them to meet common objectives,
Tips to provide and accept feedback in a constructive and considerate way ,
Leadership in teams, Handling frustrations in group.

9. **Task Management**

Introduction, Task identification, Task planning ,organizing and execution, Closing the task

BOOKS:

Sr. No	Title of the book	Author	Publisher
1	Adams Time management	Marshall Cooks	Viva Books
2	Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India
3	Body Language	Allen Pease	Sudha Publications Pvt.
4	Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
5	Decision making & Problem Solving	by Adair, J	Orient Longman
6	Develop Your Assertiveness	Bishop , Sue	Kogan Page India
7	Make Every Minute Count	Marion E Haynes	Kogan page India
8	Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
9	Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
10	Presentation Skills	Michael Hatton (Canada – India Project)	ISTE New Delhi
11	Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd
12	Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
13	Time management	Chakravarty, Ajanta	Rupa and Company
14	Working in Teams	Harding ham .A	Orient Longman

INTERNET ASSISTANCE

1. http://www.mindtools.com
2. http://www.stress.org
3. http://www.ethics.com
4. http://www.coopcomm.org/workbook.htm
5. http://www.mapfornonprofits.org/
6. http://www.learningmeditition.com http://bbc.co.uk/learning/courses/
7. http://eqi.org/
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9. http://www.mapnp.org/library/ethics/ethxgde.htm
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11. http://members.aol.com/nonverbal2/diction1.htm
12. http://www.thomasarmstron.com/multiple_intelligences.htm
13. http://snow.utoronto.ca/Learn2/modules.html
14. http://www.quickmba.com/strategy/swot/