**Scheme of Teaching and Examination for**

## 4 th Semester of 3 Years Diploma in Electronics & Communication Engineering

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. | Digital Technology & Microprocessor | ECE 402 | Theory | 3 | | - | 3 | 100 | 80 | 20 | 26 | 40 |
| 2. | Computer Hardware & Peripheral | ECE403 | Theory | 3 | - | - | 3 | 100 | 80 | 20 | 26 | 40 |
| 3. | Communication System | ECE404 | Theory | 3 | - | - | 3 | 100 | 80 | 20 | 26 | 40 |
| 4. | Data Communication and Computer Networking | ECE405 | Theory | 3 | - | - | 3 | 100 | 80 | 20 | 26 | 40 |
| 5. | Control System | ECE406 | Theory | 3 | - | - | 3 | 100 | 80 | 20 | 26 | 40 |
| 6. | Digital & Microprocessor Lab | ECE407 | Practical | - | - | 2 | 4 | 50 | 40 | 10 | - | 20 |
| 7. | Communication System Lab | ECE408 | Practical | - | - | 2 | 4 | 50 | 40 | 10 | - | 40 |
| 8. | Control System Lab | ECE409 | Practical | - | - | 2 | - | 50 | 40 | 10 | - | 20 |
| 9. | Computer Networking Lab | ECE410 | Sessional | - | - | 2 | - | 50 | 30 | 20 | - | 25 |
| 10. | Electronic Workshop | ECE411 | Sessional | - | - | 4 | - | 50 | 30 | 20 | - | 25 |
| 11. | Professional Practice II | 401 | Sessional | - | - | 4 | - | 50 | 30 | 20 | - | 25 |
| **Total Hours of Teaching per week :** | | | | **15** | | **16** | | | | | | |

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.

# Digital Technology and Microprocessor

**Subject Code: ECE402**
**Total Contact Hours: 42**
**Full Marks: 100 (80+20)**

**L T P**
**3 2**

## Theory

1. **BOOLEAN ALGEBRA, BASIC LOGIC GATES AND FAMILIES – 06 hrs**

   Number system, Features of logic algebra, postulates of Boolean algebra, Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vica-versa, Converting logic diagrams to universal logic. Positive, Negative and mixed logic, Logic gate conversion.TTL logic gate characteristics. MOS & CMOS logic families

2. **COMBINATIONAL SYSTEMS & MINIMIZATION TECHNIQUES - 06 hrs**

   Minterm, Combinational logic circuit design, half and full adder, subtract or. Binary serial and parallel adders. BCD adder. Binary multiplier, Binary to Gray decoder, BCD to decimal, BCD to 7- segment decoder. Multiplexer, De multiplexer, Encoder.

   Maxterm, Karnaugh Map, Kmap upto 4 variables, Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form.

3. **SEQUENTIAL SYSTEMS – 06 hrs**

   Latches and Buffers, Flip Flop, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops, Counters: Synchronous & Asynchronous ripple and decade counters, Modulus counter, Skipping state counter, Counter design, State diagrams and state reduction techniques, Ring counter, Counter applications, Registers: Buffer register, Shift register.

4. **8085 MICROPROCESSOR: 08 hrs**

   Architecture, pinout details, interrupts, minimum computing system , interfacing of memories and I/O Devices , addressing modes, .

5. **INSTRUCTIONS: 06 hrs**

   Classification of instructions and its details, program examples of Looping, counting and Indexing, Data Transfer and Arithmetic instructions, Counters and Time Displays, stacks & subroutines, conditional call and return instructions.

6. **8086 MICROPROCESSOR : 04 hrs**

   Architecture, pin out details, memory banking, interrupts, minimum and maximum mode.

7. **General purpose programming peripheral devices: 06 hrs**

   8255 Programmable peripheral interface, Interfacing keyboard and Seven Segment display. The 8254 programmable Interval timer, the 8259 programmable Interrupt controller.8257 DMA controller.

## Reference Books :


M. Morris Mano, “Digital Design”, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / John F.Wakerly, “Digital Design”, Fourth Edition, Pearson/PHI, 2008

John.M Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006.

Charles H.Roth. “Fundamentals of Logic Design”, 6th Edition, Thomson Learning, 2013.

Donald P.Leach and Albert Paul Malvino, “Digital Principles and Applications”, 6th 6.

Thomas L. Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011

Donald D.Givone, “Digital Principles and Design”, TMH, 2003.

Digital Computer System by Malvino

Microprocessor & Application by Ramesh C Gaonkar

Yu-Cheng Liu, Glenn A.Gibson, “Microcomputer Systems: The 8086 / 8088 Family - Doughlas V.Hall, “Microprocessors and Interfacing, Programming and Hardware”,TMH,2012

Microprocessor & Microcontroller by B Ram

# Digital Technology and Microprocessor Lab

## Subject Code : ECE407

# List of Practical's

1. Verification of truth table of basic Logic gates
2. Verification of Universal logic gates and realization of basic gates
3. Design and implementation of code converters using logic gates
4. (i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa
5. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483
6. Design and implementation of Multiplexer and De-multiplexer using logic gates
7. Design and implementation of encoder and decoder using logic gates
8. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters
9. Design and implementation of 3-bit synchronous up/down counter
10. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.

**LIST OF EXPERIMENTS:**

**Microprocessor kit / assembler Programs using kits and asembler**

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion, decimal arithmetic and Matrix operations.
4. Floating point operations, string manipulations, sorting and searching
5. Password checking, Print RAM size and system date
6. Counters and Time Delay

**Peripherals and Interfacing Experiments**

1. Traffic light control
2. Stepper motor control
3. Digital clock
4. Key board and Display
5. Printer status
6. Serial interface and Parallel interface
7. A/D and D/A interface and Waveform Generation

# Computer Hardware and Peripherals

**Subject Code : ECE403**

**Total Contact Hours : 42**

**Full Marks : 100 (80+20)**

**L T P**

**3 0 0**

1. **Introduction :** **04 hrs**
   Digital computer concepts, concept of Hardware & Software, structure & functions of a computer system, Role of operating system , Introduction to finite state machine.

2. **Memory Unit :** **08 hrs**
   Memory classification , characteristics, Organization of RAM , address decoding ROM/PROM/EEPROM ; Magnetic memories , recording formats & methods , Disk & tape units, Concept of memory map , memory hierarchy , Associative memory organization ; Cache introduction , techniques to reduce cache misses , concept of virtual memory & paging.

3. **CPU Design:** **10 hrs**
   The ALU – ALU organization , Integer representation , 1s and 2s complement arithmetic ; Serial & Parallel Address; implementation of high speed Address Carry Look Ahead & carry Save Address; Multiplication of signed binary numbers-Booth's algorithm ; Divide algorithms- Restoring & Non-Restoring ; Floating point number arithmetic; Overflow detection , status flags.

4. **Instruction Set Architecture-** **06 hrs**
   Choice of instruction set ; Instruction word formats, Addressing modes.

5. **Control Design –** **10 hrs**
   Timing diagrams; T-States, Controlling arithmetic & logic instruction , control structures; Hardwired & Micro programmed, CISC & RISC characteristics.
   Pipelining-general concept , speed up , instruction & arithmetic pipeline; Examples of some pipeline in modern processors , pipeline hazards; Flynn's classification –SISD ,SIMD , MISD , MIMD architectures-Vector and Array processors & their comparison , Concept of Multiprocessor; Centralized & distributed architectures.

6. **Input/output Organization :** **04 hrs**
   Introduction to Bus architecture, effect of bus widths, Programmed & Interrupt I/O, DMA.

## Reference Books :


1. Hayes-- Computer Architecture & Organization,3/e ,MH
2. Carter—Computer Architecture (Schaum Series), TMH
3. Mano M.M—"Computer System Architecture"
4. Chaudhury P. Pal—" Computer Organization & Design" , PHI
5. Hamacher—Computer Organization, 5/e, MH
6. Stallings W—" Computer Organization & Architecture" ,

# Communication System

## Subject Code : ECE404

## Total Contact Hours : 42

## Full Marks – 100 (80+20)

**L T P**

**3 2**

1. **NOISE EFFECTS IN COMMUNICATION SYSTEMS**: **6 hrs**
   Representation of Band Limited and Band Pass Process, Noise Sources and Classification, Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature, Noise figure. Noise figure & equivalent noise temperature in cascaded circuits. Narrow band Noise Representation.

2. **AMPLITUDE MODULATION**: **10 hrs**
   Frequency translation, Single Tone Modulation, Recovery of base band signal, Spectrum & power relations in AM systems. Methods of Modulation & Demodulation of AM-DSB, DSB-SC and SSB signals. AM Broadcast Transmitters & Receivers, Single Sideband Transmission and Reception, Super heterodyne receivers, Vestigial Sideband Modulation.

3. **FREQUENCY MODULATION:** **8 hrs**
   Phase & freq. modulation & their relationship, Spectrum & band width of a Sinusoidal modulated FM signal, Phasor diagram, Narrow band & wide band FM. Generation & demodulation of FM signals. Effect of Channel Non-Linearity, Comparison of AM, FM & PM, Threshold in FM, PLL demodulator. FM Broadcasting transmitters & Receivers.

4. **NOISE IN AM AND FM**: **4 hrs**
   Noise in CW modulation systems, SNR calculations for synchronous detection of DSB and SSB and envelope detection of AM, SNR calculations for angle modulation system, Pre-emphasis and de-emphasis, Threshold effect, Noise in Communication subsystems - Internal and external noise. Introduction to FSK, PSK and DPSK.

5. **PULSE ANALOG MODULATION**: **14 hrs**
   Practical aspects of sampling: Natural and flat top sampling. Reconstruction, PCM, PAM, PWM, PPM modulation and demodulation methods, Noise Performance of Pulse Analog Modulation Systems, RZ and NRZ .

# Communication System Lab

## Subject Code: ECE408

## List of Experiments

**OBJECTIVES:**

## The student should be made to:

To visualize the effects of sampling and TDM
To Implement AM & FM modulation and demodulation
To implement PCM & DM
To implement FSK, PSK and DPSK schemes
To implement Equalization algorithms
To implement Error control coding schemes

**LIST OF EXPERIMENTS:**

1. Signal Sampling and reconstruction
2. Time Division Multiplexing
3. AM Modulator and Demodulator
4. FM Modulator and Demodulator
5. Pulse Code Modulation and Demodulation
6. Delta Modulation and Demodulation
7. Observation (simulation) of signal of BPSK, QPSK and QAM
8. Line coding schemes
9. FSK, PSK and DPSK schemes (Simulation)
10. Error control coding schemes - Linear Block Codes (Simulation)
11. Communication link simulation
12. Equalization – Zero Forcing & LMS algorithms (simulation)

# Reference Books:


1 Electronic Communication Systems-, Kennedy George, TMH 1999
2 Communication System Rodry Coolin
3 Communication System Sanjay Sharma
4 Communication System by B P Lathi
5 An Introduction To Analog & Digital Communications, Haykins, Wiley 2009
6 Analog and Digital Communication, Schaum Series, TMH 2006
7 Digital & Analog Communication Systems, Leon W. Couch, Pearson 2013
8 Digital And Analog Communication Systems, Shanmugam, Wiley 1994

# DATA COMUNICATION AND COMPUTER NETWORKING

**Subject Code : ECE405**
**Full Marks : 100 (80+20)**
**Total Contact Hours : 42**

| L | T | P |
|---|---|---|
| 3 | | |

1. **Introduction to data communication:** **08 hrs**
   Data Communication, Analog and Digital, Periodic and Aperiodic Signals, Analog Signals, Time and Frequency Domains, Composite Signals , Digital Signals. Digital to Digital Conversion, Analog to Digital Conversion, Digital to Analog conversion and Analog to Analog Conversion

2. **Multiplexing & Access Techniques :** **08 hrs**
   Many to one/one to Many, Frequency division Multiplexing, Wave division Multiplexing, Time division Multiplexing, Multiplexing applications, different access techniques ( FDMA, TDMA, CDMA, WCDMA,LTE) Demultiplexing concept and circuit , packet and message switching techniques.

3. **Computer Network :** **06 hrs**
   Networks, Protocols and Standards, Standards Organizations. Line Configuration, Topology, Transmission Modes, Categories of Networks Internet works. Introduction to OSI and TCP/IP protocol suit.'

4. **Transmission & Network Devices :** **08 hrs**
   Guided Media, Unguided Media, Transmission Impairments, Performance Wavelength , Shannon Capacity , Media Comparison, PSTN , Switching. Digital data transmission, DTE-DCE Interface, Modems, 56K Modems , Cable Modems, Network classes, Repeaters, Hub, Bridges , Switches, Routers, Gateways , Routing Algorithms, Distance Vector Routing , Link State Routing

5. **Computer Networking :** **06 hrs**
   Concepts , Types , Common tools and devices used, protocols.

6. **Error Detection and Correction:** **06 hrs**
   Types of Errors, Detection, Parity Check, Vertical Redundancy Check Longitudinal Redundancy Check, Cyclic Redundancy Check, Checksum, Error Correction

**Books:**


1. Data communication & Networking by Bahrouz Forouzan.
2. Computer Networks by Andrew S. Tanenbaum
3. Data and Computer Communications by William Stallings

# CONTROL SYSTEM

**Subject Code : ECE406**
**Total Contact Hours : 42**
**Full Marks : 100 (80+20)**

| L | T | P |
|---|---|---|
| 3 | | 2 |

1. **Introduction:** **04 hrs**
   Elements of control systems, concept of open loop and closed loop systems, Examples and application of open loop and closed loop systems, brief idea of multivariable control systems.

2. **Mathematical Modeling of Physical Systems**: **06 hrs**
   Representation of physical system (Electro Mechanical) by differential equations, Determination of transfer function by block diagram reduction techniques and signal flow method, Laplace transformation function, inverse Laplace transformation

3. **Time Response Analysis of First Order and Second Order System:** **08 hrs**
   Characteristic Equations, response to step, pulse , impulse, ramp and parabolic inputs. Transient response analysis, steady state errors and error constants, Transient & steady state analysis of LTI systems

4. **Frequency Response Analysis:** **06 hrs**
   Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots

5. **Control System Components:** **04 hrs**
   Constructional and working concept of ac servomotor, synchronous and stepper motor

6. **Stability and Algebraic Criteria:** **04 hrs**
   concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations. Root Locus Technique: The root locus
   concepts, construction of root loci.

7. **Stability in Frequency Domain:** **04 hrs**
   Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, M and N Loci, Nichols chart.

8. Study of preliminary considerations of lead, lag and lead-lag networks, closed loop systems using compensation techniques in time domain and frequency domain. **04 hrs**

9. **Controllers :** **02 hrs**
   Brief idea of proportional, derivative and integral controllers.

# Control System Lab

## Subject Lab : ECE409

**L T P**
**2**

1. Transfer function of first and second order system
2. Sensors system control system study
3. AC position servo system study
4. DC position servo system study
5. Control through magnetic amplifier
6. Measurement of passive elements R , L and C using Bridge Networks
7. Study of transducers and characterization
8. Digital simulation of linear systems
9. Stability Analysis of Linear system using MATLAB or equivalent Software
10. Study the effect of P, PI, PID controllers using MATLAB or equivalent Software or with conventional methods.
11. Study of Lead and Lag compensator

**BOOKS:**


1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2. Benjamin. C. Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition,1995.
3. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.
4. Schaum's Outline Series, "Feedback and Control Systems" Tata Mc Graw-Hill, 2007.
5. John J.D'Azzo & Constantine H.Houpis, "Linear Control System Analysis and Design'", Tata Mc Graw-Hill, Inc., 1995.
6. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Addison – Wesley, 1999.

# Computer Communication & Networking Lab

**Subject Code : ECE410**

**Full marks : 50**

**L T P**

**2**

## OBJECTIVES:

### The student should be made to:

Learn to communicate between two desktop computers.

Learn to implement the different protocols

Be familiar with socket programming.

Be familiar with the various routing algorithms

Be familiar with simulation tools.

**LIST OF EXPERIMENTS:**

1. Study of Network Components.
2. Study of Analog and Digital Signals.
3. Study of Network Topologies.
4. To connect two pc's using peer to peer communication.
5. Implementation of small network using hub and switch.
6. To study Error Detection methods.
7. To study Error Correction methods.
8. To study the different line coding schemes.
9. Basic study of Network classes.
10. Study of DTE- DCE.

11. Study of Networks.
12. Overview of Boson Simulator.
13. Implementation of Error Detection / Error Correction Techniques
14. Implementation of Stop and Wait Protocol and sliding window
15. Implementation and study of Goback-N and selective repeat protocols
16. Implementation of High Level Data Link Control
17. Study of Socket Programming and Client – Server model
19. Write a socket Program for Echo/Ping/Talk commands.
20. To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
21. Network Topology - Star, Bus, Ring
22. Implementation of distance vector routing algorithm.

# Electronic Workshop

## Subject Code: ECE411

## Full Marks: 50

1. Identification, Study & Testing of various electronic components : (a) Resistances-Various types, Colour coding (b) Capacitors-Various types, Coding, (c) Inductors (d)Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR (l) Potentiometers.
2. Study of symbols for various Electrical & Electronic Components, Devices, Circuit Functions etc.
3. To study and perform experiment on CRO demonstration kit.
4. Soldering & De soldering practice.
5. To Design & fabricate a PCB for a Regulated power supply. Assemble the Regulated power supply using PCB and test it.
6. Study and plot the characteristics of following Opto-Electronic devices –(a) LED (b) LDR (C) Photovoltaic cell (d) Opto-coupler (e) Photo diode (f) Photo transistor (g) Solar Cell.
7. Study the specifications and working of a Transistor radio (AM & FM) kit and Perform measurements on it.
8. Study the specifications and working of a Public address System.
9. To prepare design layout of PCBs using software tools.
10. To fabricate PCB and testing of electronics circuit on PCB.
11. To design and test Switch Mode Power Supply using ICs
12. To study the specifications and working of a DVD Player.
13. To study the specifications and working of LCD TV.
14. To study the specifications and working of LED TV.

**Professional Practices-II**

**Subject Code : 401**

**Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and their attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

**Objectives:**

Student will be able to:

1. Acquire information from different sources
2. Prepare notes for given topic
3. Present given topic in a seminar
4. Interact with peers to share thoughts
5. Prepare a report on industrial visit, expert lecture

| Sl. No. | Activity Heads | Activities | Suggested Hrs |
|---|---|---|---|
| 1. | Acquire information from different sources | Topic related to the branch and current area of interest i.e. articles in internet on which research or review is undergoing may be decided for the students group. The group may be restricted to maximum 5 students. Literature survey from Internet , print media and nearby practices may be undertaken. Minimum of 10 to 15 papers may be suggested for reading to get an overview and idea of matters. | 12 |
| 2. | Prepare notes for given topic | Making review or concept to be penned down in form of a article .( the article or review may be of 8 – 10 pages length in digital form of 12 font size in Times New Roman font) | 4 |
| 3. | Present given topic in a seminar | A seminar or conference or work shop on branch related topic is to be decided and all students in group of 5-6 students may be asked to present their views. | 4 |
| 4. | Interact with peers to share thoughts | A power point presentation of the article prepared in stage 2 may be presented before the classmates and faculty members. | 4 |
| 5. | Prepare a report on industrial visit, expert lecture | A topic on best practices and product / software development may be assigned to the student group. The group may be asked to prepare a survey, come to opinion making and list out the activities to develop the activities with SWOT analysis. | 12 |