Digital Communication

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-1-0, (4)	CORE	EC105101EC

[Pre-requisites: EC104105EC-Analog Communication]

Course Objectives

1. To understand the principles, techniques and applications of digital communication.
2. To perform a detailed treatment of the techniques used in digital communication.

Course Content

UNIT-I

Digital transmission of analog signal, sampling theorem, quantization, companding, PAM, PWM, PPM, PCM, differential PCM (DPCM), delta modulation, adaptive delta modulation, delta sigma modulation, channel bandwidths of PCM, TDM, noises in PCM PWM, PPM, DM. Line coding, signaling formats, baseband transmission, pulse shaping, inter symbol interference, Nyquist theorem for zero ISI, signaling with controlled ISI, raised cosine filters, eye pattern, adaptive equalization.

UNIT II

Introduction to digital modulation techniques, coherent and non-coherent binary modulation techniques: ASK, FSK, PSK, non-coherent differential PSK (DPSK), coherent quadrature modulation techniques: QPSK, MSK, M-array modulation techniques: M-array ASK, FSK, PSK, M- array QAM transmitters, receivers, waveform, bandwidth, constellation diagrams.

UNIT III

Base band signal receiver, correlation receiver, matched filter receiver, probability of error of the matched filter, sampled matched filter, coherent and non-coherent detection of ASK, FSK, PSK.

UNIT IV

Signal space concepts, orthogonality and orthonormality, geometric interpretation of signals, likelihood functions, Schwarz Inequality, Gram-Schmidt orthogonalization procedure, optimum threshold detection, optimum receiver for AWGN channel, decision procedure: maximum aposteriori probability detector, maximum likelihood detector, probability of error analysis of digital modulation techniques.

Course Materials

Required Text: Text books

1. Communication Systems, 4/e, Simon Haykin, John Wiley and Sons.
2. Communication System, A B Carlson, McGraw Hill.

Optional Materials: Reference Books

1. Communication systems, Ziemmer, Tarner, John Wiley and Sons.
2. Modern Digital and Analog Communication Systems, B P Lathi, Oxford University Press.
3. Digital Communications, J. G. Proakis, M. Salehi, McGraw-Hill International.
4. Communication systems, Taub, Schilling, Tata McGraw Hill.

Microprocessors and Microcontrollers

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-1-0, (4)	CORE	EC105102EC

[Pre-requisites: EC103104EC-Digital Logic Design]

Course Objectives

1. To demonstrate an understanding of the fundamental properties of Microprocessor Interface and Programming.
2. To introduce the 16-bit microprocessor instruction set and assembly language programming.
3. To introduce the 8051 processor architecture and instruction set.
4. To introduce the PIC microcontrollers and instruction set.
5. To introduce the enhanced features like Dallas HSM & Atmel Micro-controllers, USART, ADC.

Course Content

UNIT-I

Introduction to 8 bit and 16-bit Microprocessor architecture: Introduction to microprocessor, computer and its organization, Programming system; Address bus, data bus and control bus, Tristate bus; clock generation; Connecting Microprocessor to I/O devices; Data transfer schemes; Architectural advancements of microprocessors. Introductory System design using microprocessors; 8086 – Hardware Architecture; External memory addressing; Bus cycles; some important Companion Chips; Maximum mode bus cycle; 8086 system configurations; Memory Interfacing; Minimum mode system configuration, Interrupt processing.

Unit- II:

16-bit microprocessor instruction set and assembly language programming: Programmer's model of 8086; operand types, operand addressing; assembler directives, instruction Set-Data transfer group, Arithmetic group, Logical group. Microprocessor peripheral interfacing: Introduction; Generation of I/O ports; Programmable Peripheral Interface (PPI)- Intel 8255; Sample-and-Hold Circuit and Multiplexer; Keyboard and Display Interface; Keyboard and Display Controller (8279).

Unit- III:

8051 Processor Architecture and Instruction Set: The CPU, Addressing modes, external addressing, Interrupt handling, Instruction execution, Instruction set – data movement; arithmetic; bit operators; branch, Software development tools like assemblers; simulators; cross-compilers, O/P file formats. Hardware Features: 8051 – Device packaging, Chip technology, Power considerations, Reset, System clock/oscillators,Parallel I/O, Timers, Interrupts, Serial I/O, Control store and External memory devices.

Unit- IV:

PIC Microcontrollers and Instruction Set: PIC Micro-controllers – overview; features, PIC-18 architecture, file selection register, Memory organization, addressing modes, Instruction set, Interrupt handling. PIC-18 – Reset, low power operations, oscillator connections, I/O ports – serial; parallel, Timers, Interrupts, ADC.

Course Materials

Required Text: Text books

1. Microprocessor Architecture, Programming and application with 8085, R.S. Gaonkar, PRI Penram International publishing pvt. ltd., 5th Edition
2. Microprocessors and Interfacing, Programming and Hardware, Douglas V Hall, TMH Publication.
3. Advanced microprocessors and peripherals, Ajoy Ray and K Bhurchandi, 2015, Third edition, New Delhi : McGraw Hill Education (India) Private Limited.
4. The 8051 Microcontroller and Embedded Systems using Assembly and C, Mazidi, Mazidi& McKinlay, PHI.
5. Fundamentals of Microcontrollers and Applications in Embedded Systems (with the PIC18 Microcontroller Family), R A Gaonkar, Penram Publishing India.

Optional Materials: Reference Books

1. Microprocessors and Interfacing, N. Senthil Kumar, M. Saravanan, S. Jeevananthan and S.K. Shah, Oxford University Press.
2. The 8051 Microcontroller & Embedded Systems Using Assembly and C, Kenneth J. Ayala, Dhananjay V. Gadre, Cengage Learning India Publication.
3. Programming and Customizing the 8051 Micro-controller, Myke Predko, Tata McGraw-Hill edition.

Control System Engineering

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-1-0, (4)	CORE	EC105103EC

[Pre-requisites: NA]

Course Objectives

1. To understand Transfer function and system response.
2. To perform and understand stability analysis.
3. To understand the controller basics and their design.
4. To perform state variable analysis of the systems.

Course Content

UNIT-I

Mathematical Model of Physical Systems: Differential Equation of Physical system, Transfer function, Block Diagram Algebra, signal flow graphs. Feedback characteristics of control systems. Feedback & Non feedback systems, reduction of parameter variation, Dynamic Control of the effect of dynamic signal by use of feedback, regeneration feedback.

Unit-II

Time Response Analysis: Design specification and performance Indices. Standard Text signals, Time response of first and second order system, steady state error and error constants, Effect of adding a zero to a system. Design specification of second order system stability concept, Routh- Hurwitz stability criteria relation stability analysis. p, pi and pid controller basics

Unit-III

Root Loci's Technique: Root loci's concept construction for Root loci, Root contours, system with transportation by Polar Plots, Bode Plots. All pass and minimum phase system. Stability in Frequency Domain: Nyquist stability criteria, Assessment of relation stability. Realization of basic compensators, Cascade compensation in time and frequency Domain. Feedback compensation.

Unit-IV

Sate Variable Analysis and Design: Concept of state variables, state variables and state model. State model for linear continuous time systems, Diagonalization, solution of state equation, concept of controllability and observability. Pole placement by state feedback.

Course Materials

Required Text: Text books

1. Control System Engineering, Nagrath and Gopal, New Age International Publication
2. Automatic Control System, B. C. Kuo, PHI

Optional Materials: Reference Books

1.Modern Control Engineering, Ogata, Pearson Education
2.Modern Control Engineering, D Roychoudhury, PHI

Operating Systems

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-0-0, (3)	ELECTIVE	EC105201EC

[Pre-requisites: IT10I025IT-Data Structure]

Course Objectives

1. To explain the objectives and functions of modern operating systems.
2. To understand the underlying principles, techniques and approaches which constitute a coherent body of knowledge in operating systems.
3. To describe how operating systems have evolved over time from primitive batch systems to sophisticated multi-user systems.

Course Content

UNIT-I

INTRODUCTION: Operating System objective and function. The Evolution of Operating Systems, Batch, interactive, time – sharing and real time systems. Protection. Operating System Structure: System COMPONENTS, operating system service, System structure. Distributed Computing, The Key Architecture Trend: Parallel Computation, Input-Output Trends.

Unit- II

CONCURRENT PROCESSES: Process concept: - Introduction Definitions of “Process”, Process States, Process State Transitions, the process Control Block, Operations on Processes, Suspend and Resume, Interrupt Processing, The Nucleus of the Operating System. Asynchronous Concurrent Process: - Introduction, Parallel Processing, A Control Structure for Indicating Parallelism, Mutual Exclusion, The Producer / consumer problem, the critical section problem, semaphores, Classical problems in concurrency, Inter process Communication, Process generation, Process Scheduling. CPU Scheduling: Scheduling concepts, Performance criteria, and scheduling algorithms. Algorithm evaluation, Multiprocessor scheduling.

Unit- III

DEAD LOCKS: System model, Deadlock characterization. Prevention, avoidance and detection, Recovery from dead lock Combined approach.

MEMORY MANAGEMENT: Base machine, resident Monitor, Multiprogramming with fixed partitions. Multiprogramming with variable partitions. Multiple Base Registers. Paging, segmentation paged segmentation, Virtual Memory concept, Demand Paging, Performance, Page Replacement algorithms, Allocation of frames, Thrashing, Cache memory organization impact on performance.

Unit- IV

I/O MANAGEMENT & DISK SCHEDULING: I/O Devices and the organization of the I/O function. I/O Buffering, Disk I/O, Operating System Design issues.

File System: File concept- File organization and Access mechanism, File Directories, File sharing. Implementation issues. Case Studies: - Unix System, MVS, OS/2, A Virtual Machine Operating System.

Course Materials

Required Text: Text books

1. Operating System Concepts, A. Silberschatz and J. L. Peterson, Wiley.
2. An Introduction to Operating Systems, H. M. Dietel, Addison-Wesley.

Optional Materials: Reference Books

1. Operating System: Concept & Design, M. Milenkovic, McGraw Hill.
2. Operating System, Stalling, William, Maxwell McMillan International Editions, 1992.

Optimization Techniques

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-0-0, (3)	ELECTIVE	EC105202EC

[Pre-requisites: MA103001MA- Mathematics III]

Course Objectives

1. To understand the basic concept of optimization, definition of optimality condition and the concept of linear programming.
2. To solve different optimization problems by non-linear programming method.
3. To define the constrained optimization problems and essential conditions for its solving
4. To understand the basic concepts of PSO and DE, and their application to solve optimization problems.

Course Content

Unit I

Introduction to Optimization: Engineering application of Optimization – Statement of an Optimization problem - Optimal Problem formulation - Classification of Optimization problem. Optimum design concepts: Definition of Global and Local optima – Optimality criteria - Review of basic calculus concepts – Global optimality.
Linear programming: Fundamental theorem of linear programming, Degenerate solutions, Simplex based methods, Cycling, Duality, Complementary slackness conditions.

Unit II

Non-linear programming: First and second order conditions. Iterative methods and associated issues. Line search methods: Stationarity of limit points of steepest decent, successive step-size reduction algorithms, etc. Hessian based algorithms: Newton, Conjugate directions, and Quasi-Newton methods.

Unit III

Constrained optimization problems: Lagrange variables, Karush-Kuhn-Tucker conditions, Regular points, Sensitivity analysis. Quadratic programming, Convex problems.

Unit IV

Evolutionary Algorithms: Particle Swarm Optimization: Basic Concepts, Local Best, Global Best, Velocity Updation, Position Updation, Variant of PSO, Applications. Differential Evaluation: Basic Concept, Initialization of vectors, Target Vector, Donor Vector, Selection, Mutation, Crossover, Control Parameters, Applications and current topics.

Course Materials

Required Text: Text books

1. Optimization for engineering design-algorithms and examples, Kalyanmoy Deb, PHI, India, (2018).
2.Engineering Optimization: Theory and Practice, S. S. Rao, 4th Edition, John Wiley &Sons (2009).
3.Modern heuristic optimization techniques: theory and applications, Kwang Y. Lee, Mohamed A. El-Sharkawi, Kluwer (2008).

Optional Materials: Reference Books

1. Nonlinear Programming, Theory and Algorithms, Mokhtar S. Bazaaraa, Hanif D. Shirali and M. C. Shetty, John Wiley & Sons, New York (2004).
2. Engineering Optimization: Methods and Applications, G. V. Reklaitis, A. Ravindran, K. M. Ragsdell, Wiley (2006).
3. Nonlinear optimization with engineering applications, Michael C. Bartholomew-Biggs, Springer (2008).

Data Analytics with Python

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-0-0, (3)	ELECTIVE	EC105203EC

[Pre-requisites: None]

Course Objectives

1. Understanding basics of python for performing data analysis.
2. Understanding the data, performing preprocessing, processing and data visualization to get insights from data.
3. Use different python packages for mathematical, scientific applications and for web data analysis.
4. Develop the model for data analysis and evaluate the model performance.

Course Content

UNIT I:

Python Fundamentals for Data Analysis Python data structures, Control statements, Functions, Object Oriented programming concepts using classes, objects and methods, Exception handling, Implementation of user-defined Modules and Package, File handling in python.

UNIT II:

Introduction to Data Understanding and Preprocessing Knowledge domains of Data Analysis, Understanding structured and unstructured data, Data Analysis process, Dataset generation, Importing Dataset: Importing and Exporting Data, Basic Insights from Datasets, Cleaning and Preparing the Data: Identify and Handle Missing Values.

UNIT III:

Data Processing and Visualization Data Formatting, Exploratory Data Analysis, Filtering and hierarchical indexing using Pandas. Data Visualization: Basic Visualization Tools, Specialized Visualization Tools, Seaborn Creating and Plotting Maps.

UNIT IV:

Mathematical and Scientific applications for Data Analysis Numpy and Scipy Package, Understanding and creating N-dimensional arrays, Basic indexing and slicing, Boolean indexing, Fancy indexing, Universal functions, Data processing using arrays, File input and output with arrays, Analyzing web data.

Course Materials

Required Text: Text books

1. David Ascher and Mark Lutz, Learning Python, Publisher O'Reilly Media.
2. Reema Thareja, "Python Programming using Problem Solving approach",Oxford University press.
3. Wes Mckinney "Python for Data Analysis", First edition, Publisher O'Reilly Media.

Optional Materials: Reference Books

1. Allen Downey ,Jeffrey Elkner ,Chris Meyers,: Learning with Python, Dreamtech Press.
2. David Taieb ,"Data Analysis with Python: A Modern Approach " 1st Edition, Packt Publishing.

Semiconductor Devices and IC Technology

[5th Semester, Third Year]

Course Description			
Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-0-0, (3)	OPEN ELECTIVE	EC105204EC

[Pre-requisites: None]

Course Objectives

1. To understand concept of different semiconductor device.
2. To understand IC fabrication, testing and packaging. of different semiconductor device
3. To learn advance semiconductor devices such as HBTs, Solar Cell, HEMT etc.

Course Content

UNIT-I

Historical perspective, processing overview, crystal growth, wafer fabrication and basic properties of Silicon Wafers, Clean Rooms, Wafer Cleaning, Epitaxy, Thermal Oxidation of Silicon, Lithography, Wet and Dry Etching, Thin film deposition, Diffusion, Ion Implantation, Metallization, Process Integration: Passive components, Bipolar Technology, MOSFET Technology, MESFET Technology, MEMS Technology.

UNIT- II

MOSFET: structure and operating principle MOSFET: derivation of I-V, GCA, substrate bias effect, sub-threshold currents, gate oxide breakdown mobility in inversion layer, VT control, MOSFET: Pao-Sah double integral model; Short channel effects, charge sharing, velocity overshoot, channel length modulation, DIBL.

UNIT- III

HBT: need for HBT, gain, current equations, Compound semiconductors. Devices based on III-V, III-nitrides, alloys, epitaxy, heterostructures, Heterojunction FET & HEMT: principle, band diagram, estimation of threshold, 2DEG, Photodetectors: operation, responsivity, QE, bandwidth, noise.

UNIT- IV

Solar cells: principle, efficiency, Fill factor, silicon solar cells, multi-junction solar cell. MOS capacitor, charge/field/energy bands, accumulation, inversion, C-V (high F and low F), deep depletion, Real MOS cap: Flatband & threshold voltage, Si/SiO2 system.

UNIT- V

Electrical Testing, Packaging, Yield, Challenges for integration, system on chip.

Course Materials

Required Text: Text books

1. J. D. Plummer, M. D. Deal and P. B. Griffin, Silicon VLSI Technology, Fundamentals, Practice and Modeling, Pearson education, 2000.
2. S. M. Sze, Semiconductor Devices: Physics and Technology, 2nd Edn., Wiley India, 2011.
3. Semiconductor physics and Devices, Donald Neamen, McGraw-Hill, 4th edition, 2017.
4. CMOS Circuit Design, Layout and simulation: J. Baker, D.E. Boyce., IEEE press, 2011.

Optoelectronic Components and Devices

[5th Semester, Third Year]

Course Description Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-0-0, (3)	Open Elective	EC105205EC

[Pre-requisites: EC103102EC - Microelectronics Devices and Circuits, EC104101EC - Electro Magnetic Field Theory]

Course Objectives

1. To understand mechanism of propagation of light through optical medium.
2. To understand mechanism of generation of light using semiconductor devices.
3. To understand, analyze and evaluate various techniques of optical detectors, optical components.
4. To understand, analyze the optical display devises and organic optoelectronics devises.

Course Content

UNIT-I

Wave Nature of Light – Conceptual Overview, Wave Equation, Refractive index, group and phase velocity, Pointing vector, Snell's law, Fresnel's equations, Optical Resonators, Optical Tunneling, Coherence, Diffraction, Optical communication systems and devices needs, Optical fiber, Optical waveguides, Optical amplifiers, Optical sources, Optical detectors.

UNIT- II

Light Emitting Diodes (LED), Science and engineering of light emitting diodes, Stimulated Emission Devices
Laser Diodes, Vertical Cavity Surface Emitting Lasers (VCSELs), Quantum well devices, Semiconducting Laser Amplifiers.

UNIT- III

Photo detectors: pn junction, avalanche and hetero junction photodiodes, phototransistors, photoconductive gain, CCD. Polarization and Modulation of light, Polarization, propagation in anisotropic media, birefringent devices, integrated optical modulators, acousto-optic modulators, magneto-optic modulators, nonlinear effects. Fiber optic couplers, splicer, polarizer, optical amplifiers.

UNIT- IV

Display devices: LCD and LED display devices, three-dimensional and light-field displays, MOEMS and MEMS displays. Organic optoelectronic devices, Use of organic thin films in active organic devices including organic LEDs, solar cells, photo detectors, transistors, chemical sensors, memory cells and organic non-linear optics.

Course Materials

Required Text: Text books

1. S. O. Kasap, Optoelectronics and Photonics: Principles and Practices, Prentice Hall, 2001.
2. R.P.Khare: Fibre Optics & Optoelectronics, Oxford University Press, New Delhi, 2010.

Optional Materials: Reference Books

1. Shun Lien Chuang , Physics of optoelectronic devices, Wiley, 1995.
2. John Wilson and John Hawkes, Optoelectronics, an introduction - 3rd Edition, Prentice Hall 199.
3. J. Singh, Optoelectronics: An introduction to materials and devices, McGraw-Hill, 1996.
4. P. N. Prasad, Nanophotonics, John Wiley & Sons, 2004.
5. G. P. Agrawal, Fiber optics communication system, John Wiley & Sons, 2011.
6. Saleh and Teich, Fundamentals of Photonics, 2nd ed. Wiley Interscience, 2007.
7. S. L. Chuang, Physics of Photonic Devices, 2nd ed. Wiley, 2009.
8. A. Yariv and P. Yeh, Photonics: Optical electronics in Modern Communications, 6th ed. Oxford University Press, 2007.
9. D. Birtalan and W. Nunley, Optoelectronics: Infrared-Visible-Ultraviolet Devices and Applications, 2nd ed., CRC Press, 2009.

Digital Communication Lab

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	0-0-2, (1)	CORE	EC105401EC

Course Objectives

1. To Understand the principles, techniques, and applications of digital communication.
2. To Perform a detailed treatment of the techniques used in digital communication.

List of Experiments

1. Study of different types of sampling techniques (Impulse, Natural & Flat-Top) and its reconstruction.
2.Study of different types of pulse modulation techniques (PAM, PPM, PWM) and its demodulation
3.Study of Pulse code modulation (PCM) and its demodulation.
4.Study of Delta Modulation (DM) and its demodulation.
5.Study of binary carrier modulation techniques (BASK, BPSK, BFSK) and its demodulation.
6.Study of Quadrature Phase Shift Keying (QPSK) modulation and its demodulation.
7.Study of Quadrature Amplitude Modulation (QAM) modulation and its demodulation.
8.Study of differential phase shift keying (DPSK) and its demodulation.
9.Study of bit error rate (BER) analysis of various types of binary carrier modulation techniques (BASK, BPSK, BFSK).
10.Study of bit error rate (BER) analysis of QPSK.
11.Study of bit error rate (BER) analysis of QAM.
12.Study of bit error rate (BER) analysis of differential pulse shift keying (DPSK).

Course Materials

Required Text: Textbooks

1. Communication Systems, 4/e, Simon Haykin, John Wiley and Sons.
2. Communication System, A B Carlson, McGraw Hill.

Microprocessors and Microcontrollers Lab

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	0-0-2, (1)	CORE	EC105402EC

Course Objectives

1. To get familiar with the programming of 8086 microprocessor and 8051 microcontroller.
2. To get hands-on experience on Embedded systems.
3. To empower students to build projects in Embedded systems.
4. To enhance the creativity.

List of ExperimentsList of experiments

1. Write an assembly language program to add and subtract two 16 bits numbers using 8086 microprocessor.
2. Write an assembly language program to perform the multiplication and division two 16 bits numbers using 8086 microprocessor.
3. Write an assembly language program to add the array of n numbers using 8086 microprocessor.
4. Write an assembly language program to determine the largest number in an array of n numbers using 8086 microprocessor.
5. Write an assembly language program to find average of n numbers using 8086 microprocessor.
6. Design 8051 Microcontroller motherboard and Implement blinking of an LED.
7. Interface 8 LEDs with 8051 Microcontroller and implement “Running LEDs” pattern.
8. Implement Traffic light controller.
9. Display “HI” message on seven segment displays using multiplexing of displays.
10. Display a random number (0-9) on seven segment display whenever a switch pressed.
11. Write an assembly language program to control (ON/OFF) the blinking of an LED by a pushup switch using 8051 Microcontroller.
12. Implement a simple irrigation system in which a pump will be turned ON from 7AM to 8AM every day.
13. Interface a 2-Terminal 5V-DC motor with 8051 Microcontroller and write an assembly language program to control the speed of motor such that the motor should rotate with high speed for 2sec then motor should rotate with low speed for 1sec.
14. Interface RGB LED with 8051Microcontroller and one by one generate all the standard 7 colors with the duration of 1sec.
15. Scroll the message “INDIA” on 16*2 LCD panel from left to right and right to left continuously.
16. Interface 4*4matrix keypad and 16*2 LCD panel with 8051 Microcontroller and display the pressed character on LCD.
17. Implement a digital thermometer.
18. Interface 8*8 LED MATRIX display with 8051 microcontroller. Write an assembly language program generate following display pattern continuously: Initially, center 4 LEDs will be ON for 1sec then center 16 LEDs will be ON for 1sec then center 36 LEDs will be ON for 1sec then all the LEDs will be ON for 1sec.
19. Design an ELECTRONICS VOTING MACHINE using pushup switches, LEDs, a buzzer and a LCD display. The numbers of candidates are 2 i.e A & B and number of voters are 200. The controlling officer has 2 switches i.e. NEXT & LOCK. For every voter, he has to press NEXT switch to activate the EVM. Normally LCD displays “PE” (Please Elect). When a voter presses any key to vote, corresponding LED and a buzzer switched ON and LCD Displays “SR” (Successfully Recorded) for 1sec then it will be go back to its normal state displaying “PE”. When the voting completes, controlling officer will press LOCK switch to freeze the EVM and finally when RESULT switch pressed, LCD will display result.
20. Implement a Digital Clock using seven segment displays. [Eg. 2300 means 11PM]

Course Materials

Required Text: Text books

1. Microprocessor Architecture, Programming and application with 8085, R.S. Gaonkar, PRI Penram International publishing pvt. ltd., 5th Edition

2. Microprocessors and Interfacing, Programming and Hardware, Douglas V Hall, TMH Publication.

3. Advanced microprocessors and peripherals, Ajoy Ray and K Bhurchandi, 2015, Third edition, New Delhi : McGraw Hill Education (India) Private Limited.

4. The 8051 Microcontroller and Embedded Systems using Assembly and C, Mazidi, Mazidi& McKinlay, PHI.

5. Fundamentals of Microcontrollers and Applications in Embedded Systems (with the PIC18 Microcontroller Family), R A Gaonkar, Penram Publishing India.