3rd Year 5th Semester

National Institute of Technology Raipur													
Course of Study and Scheme of Examination							B. Tech. 5th Semester				Branch:		
S. No.	Subject Code	Subject Name	Periods per Week			TA	Examination Scheme				Total Marks	Credits
			L	T	P		MSE/MTR		ESE/ESVE			
							Theory	Prac.	Theory	Prac.		
1	EC105101EC	Digital Communication	3	1	0	20	30		50		100	4
2	EC105102EC	Microprocessors & Microcontrollers	3	1	0	20	30		50		100	4
3	EC105103EC	Control System Engineering	3	1	0	20	30		50		100	4
4		Program Elective	3	0	0	20	30		50		100	3
5		Open Elective	3	0	0	20	30		50		100	3
6	EC105401EC	Digital Comm. Lab	0	0	2	40		20		40	100	1
7	EC105402EC	Microprocessors and Microcontrollers Lab	0	0	2	40		20		40	100	1
8	EC105701EC	Summer Internship I	-	-	-	40		20		40	100	1
												21

Program Electives		
Subject Code	Name of Subject	
EC105201EC	Operating Systems	
EC105202EC	Statistical Signal Theory	
EC105203EC	Optimization Techniques	

Open Electives		
Subject Code	Name of Subject	
EC105301EC	Digital Image Processing	
EC105302EC	Estimation and Detection Theory	

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: IT101025IT-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.

Statistical Signal Theory

[5th Semester, Third Year]

Course Description

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

[Pre-requisites: EC104102EC-Digital Signal Processing]

Course Objectives

1. To apply the knowledge of the discrete-time stochastic processes & its measures and understand various stochastic models.
2. To develop algorithms for optimum linear filtering and prediction for the given observation processes.
3. To develop steepest descent, Least Mean Square (LMS), and Recursive Least Squares (RLS) adaptive filter algorithms.
4. To formulate parametric spectral estimators based upon autoregressive (AR), moving average (MA), and autoregressive moving average (ARMA) models, and detail their statistical properties.

Course Content

UNIT-I:

Random processes: Stationary processes, wide-sense stationary processes, autocorrelation and auto covariance functions, Spectral representation of random signals, Wiener Khinchin theorem Properties of power spectral density, Gaussian Process and White noise process, Linear System with random input, Spectral factorization theorem and its importance, innovation process and whitening filter, Random signal modeling: MA, AR, ARMA models.

Unit- II:

Optimum Linear Filtering: Linear Minimum Mean-Square Error (LMMSE) Filtering: Wiener Hoff Equation, FIR Wiener filter, Causal IIR Wiener filter, Non causal IIR Wiener filter, Linear Prediction of Signals, Forward and Backward Predictions, Levinson Durbin Algorithm, Lattice filter realization of prediction error filters.

Unit- III:

Adaptive Filtering: Principle and Application, Steepest Descent Algorithm, Convergence characteristics; LMS algorithm, convergence, excess mean square error, Leaky LMS algorithm; Application of Adaptive filters. RLS algorithm: Exponentially weighted RLS algorithm derivation, Matrix inversion Lemma, Initialization.

Unit- IV:

Spectrum Estimation: Principle of estimation and applications, Properties of estimates, unbiased and consistent estimators, Estimated autocorrelation function, periodogram, Averaging the periodogram (Bartlett Method), Welch modification, Blackman and Tukey method of smoothing periodogram, Parametric method, AR spectral estimation.

Frequency Estimation, Eigen decomposition of Autocorrelation matrix, Detection of Harmonic signals: Pisarenko's method, MUSIC algorithm, ESPRIT method, Propagator method.

Course Materials

Required Text: Text books

1. Statistical Digital Signal Processing and Modelling, M.H. Hayes, John Wiley,1996.
2. Spectral Analysis of signals, P. Stroica & R. Moses, Pearson, 2005.
3. Fundamentals of Statistical Signal Processing, S. M. Key, Prentice Hall PTR, 1998.

Optimization Techniques

[5th Semester, Third Year]

Course Description

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

[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).

Digital Image Processing

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-0-0, (3)	ELECTIVE	EC105301EC

[Pre-requisites: EC104102EC- Digital Signal Processing]

Course Objectives

1. To understand the fundamental concepts of a digital image processing system.
2. To choose appropriate technique for image enhancement both in spatial and frequency domains.
3. To interpret image segmentation and representation techniques.
4. To compare the image compression techniques in spatial and frequency domains.

Course Content

UNIT-I:

Introduction to image processing: Types of image processing, Applications and fields of image processing, Fundamental steps in Digital image processing, Elements of visual perception, Image sensing and acquisition, Basic Concepts in Sampling and Quantization, representing digital images, Some Basic Relationships Between Pixels.

Unit- II:

Image Enhancement in the Spatial Domain: Some basic gray level transformations, Histogram Processing, Histogram modification, Contrast Stretching, Log Transformation, Image subtraction, spatial filtering, Sharpening Spatial filters, use of first and second derivatives for enhancement;

Image Enhancement in the Frequency Domain, Gaussian filters, Homomorphic filtering Pseudo coloring: intensity slicing.

Unit- III:

Image Segmentation: - Some Basic Relationships between pixels, Point, Line and edge detection, Gradient operators, Canny edge detection, pyramid edge detection. Edge linking and boundary detection, Hough transform, Chain codes, boundary segments, skeletons, Boundary descriptors, Fourier descriptors.

Thresholding: The role of illumination, Global thresholding, Adaptive thresholding, Use of boundary characteristics for histogram improvement and local thresholding, Region based segmentation, Region growing, region splitting and merging.

Unit- IV:

Morphological Image Processing: Introductions, Dilation, Erosion, Opening, closing.

Image Compression: Data redundancies Elements of information, variable-length coding, predictive coding, Transform coding, Image compression standards; Color image processing: Color models, Pseudocolor image processing, Color transformations.

Course Materials

Required Text: Text books

1. Digital Image Processing, Gonzalez and Woods, 3rd Edition (DIP/3e), Prentice Hall, 2008
2. Fundamentals of Digital Image Processing, A.K. Jain, PHI, New Delhi, 2001

Optional Materials: Reference Books

1. Image Processing, Analysis and Machine Vision, Milan Sonka, Thomson Learning, 2001
2. Digital Image Processing, Pratt W.K, John Wiley & Sons, 2001

Estimation and Detection Theory

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Electronics & Communication Engineering	3-0-0, (3)	ELECTIVE	EC105302EC

[Pre-requisites: MA104001MA- Mathematics IV, EC103103EC- Signal & Systems]

Course Objectives

1. To understand the basics of detection and estimation.
2. To perform detection and estimation in a Gaussian noise environment.
3. To express random process as integral equations and eigen functions.
4. To understand linear and nonlinear estimation process.
5. To understand and analyze some of the common linear estimation techniques like Wiener and Kalman-Bucy filters.

Course Content

UNIT-I:

Basics of detection and estimation theory: Binary hypothesis tests, M hypothesis, Composite hypothesis, Bayes estimation, General Gaussian problem.

UNIT II:

Representation of Random Processes: Conventional representations, Series representations, Homogeneous integral equations and eigen functions, Spectral decompositions.

UNIT III:

Detection of Signals and Estimation of Signal Parameters: Detection in AWGN, Linear and nonlinear estimation, Detection and estimation in nonwhite Gaussian noise.

UNIT IV:

Linear Estimation: Properties of optimum filters, Wiener filters, Kalman-Bucy filters.

Course Materials

Required Text: Text books

1. Detection Estimation and Modulation Theory, Part I, Harry L. Van Trees.
2. Detection, Estimation, and Filtering Theory, Harry L. Van Trees, Kristine L. Bell with Zhi Tian, John Wiley & Sons, Inc., 2013.

Optional Materials: Reference Books

1. Principles of Signal Detection and Parameter Estimation, Bernard C. Levy, Springer Science+Business, LLC, 2008.
2. Statistical Signal Processing; Detection, Estimation and time Series Analysis, Louis L. Scharf, Addison-Wesley, 1990.
3. Lessons in Estimation Theory for Signal Processing, Communications, and Control, Jerry M. Mendel, Prentice Hall, PTR, 1995.
4. Fundamentals of Statistical Signal Processing, Vol 1: Estimation Theory, Steven M. Kay, Prentice Hall, 1993.
5. Fundamentals of Statistical Signal Processing, Vol 2: Detection Theory, Steven M. Kay, Prentice Hall, 1998.

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 Experiments List 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.