



C.U.SHAH UNIVERSITY – WADHWANCITY

FACULTY OF: - Technology & Engineering

DEPARTMENT OF: - Electronics & Communication Engineering

SEMESTER: - V **CODE:** - 4TE05MCA1

NAME – Microcontrollers & Its Applications (MCA)

Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Schemes (Hours)				Credits	Evaluation Schemes							
		Th	Tu	Pr	To		Theory				Practical (Marks)		Total	
							Sessional Exam		University Exam		Internal			University
							Marks	Hours	Marks	Hours	Pr	TW		Pr
4TE05MCA1	Microcontrollers & Its Applications (MCA)	03	00	04	07	05	30	1.5	70	3.0	---	20	30	150

Objectives:-

- In this course, we will study about Micro controller's Architecture, Instruction modes, instruction set and interfacing of micro controller with devices.

Prerequisite:- Students should have Basic knowledge about assembly language and C programming.

Course Outline:-

Sr. No.	Course Content	Hours
1	8051 Microcontrollers: Microprocessors and microcontrollers: Microprocessors, Microcontrollers, Comparing Microprocessors and Microcontrollers, A Microcontroller Survey, Microcontrollers and embedded processors, Overview of the 8051 family	3
2	The 8051 Architecture: Introduction, 8051 Microcontroller hardware, Input/output pins, ports and circuits, External memory, counter and timers, serial data input/output, interrupt	6
3	Moving Data: Introduction, Addressing mode, external data movement, code memory read only data moves, Push and Pop opcodes, data exchange, Example programs	4
4	Logical operation: byte level logical operation, bit level logical operation, rotate and swap operations, example programs	3
5	Arithmetic operation: flags, incrementing and decrementing, addition, subtraction, multiplication and division, decimal arithmetic example programs	3
6	Jump and call opcodes: jump call program range, jumps, calls and subroutines, interrupts and returns, example programs	3
7	8051 Programming in C: Data types and time delay in 8051 C, I/O programming in 8051 C, Logic operations in 8051 C, Data conversion programs in 8051 C, Accessing code ROM space in 8051 C, Data serialization using 8051 C.	4



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8	8051 Hardware Connection and Intel Hex File: Pin description of the 8051, Design and test of 8051 Minimum Module, Explaining the Intel hex file.	2
9	8051 Timer Programming in Assembly and C: Programming 8051 timers, Counter programming, Programming timers 0 and 1 in 8051 C.	4
10	8051 Serial Port Programming in Assembly and C: Basics of serial communication, 8051 connection to RS232, 8051 serial port programming in Assembly, Programming the second serial port, Serial port programming in C.	4
11	Interrupts Programming in Assembly and C: 8051 interrupts programming, Timer interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in the 8051, Interrupt programming in C.	4
12	LCD and Keyboard Interfacing: LCD interfacing, Keyboard interfacing.	4
13	ADC, DAC Interfacing: Parallel and serial ADC, DAC interfacing.	4

Learning Outcomes:-

After successful completion of the course, students should:

- be able to understand Architecture of 8051 and Instruction set.
- be able to interface different devices and memories with 8051.

Books Recommended:-

1. The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2/e by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay (Second Edition , Pearson Education).
2. The 8051 Microcontroller & Embedded Systems using Assembly and C By K. J. Ayala, D. V. Gadre (Cengage Learning , India Edition).
3. 8051 Microcontrollers: MCS51 family and its variants by Satish Shah, Oxford University Press.
4. 8051 Microcontroller: Internals, Instructions, Programming and Interfacing by Subrata Ghoshal, Pearson Education.
5. The 8051 Microcontrollers: Architecture, Programming and Applications by K Uma Rao, Andhe Pallavi, Pearson Education.

E-Resources:

1. <http://nptel.ac.in/downloads/117101054/>



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FACULTY OF: - Technology & Engineering

DEPARTMENT OF: - Electronics & Communication Engineering

SEMESTER: - V **CODE:** - 4TE05EMS1

NAME – Electromagnetics (EMS)

Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Schemes (Hours)				Credits	Evaluation Schemes							
		Th	Tu	Pr	To		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hours	Marks	Hours	Pr	TW	Pr	
4TE05EMS1	Electromagnetics (EMS)	03	00	00	03	03	30	1.5	70	3.0	---	---	---	100

Objectives:-

- To expose the students to the basics of electromagnetic waves and it's characteristics
- To develop knowledge about electric field and intensity
- To know about energy, potential and flux density
- To learn about conductor, dielectric and insulator properties
- To study about magnetic force and uniform plane waves

Prerequisite:-

- Students should have a firm grasp of elementary engineering mathematics and the different concepts electric current and magnetic field.

Course Outline:-

Sr. No.	Course Content	Hours
1	Reviews of vector analysis: Scalars & Vectors, Vector Algebra, Rectangular Coordinate System, Vector Components And Unit Vectors, The Vector Field, Dot And Cross Products, Circular, Spherical & Cylindrical Coordinate Systems and Conversions..	6
2	Coulomb's law and Electrical field intensity: Coulomb's law, Electric Field Intensity, Field Arising from a Continuous Volume Charge Distribution, Field of a Line Charge, Field of a Sheet of Charge.	5
3	Electric Flux Density, Gauss's Law and Divergence: Electric Flux Density, Gauss's law and its applications: differential volume element, divergence, Divergence and Maxwell's First Equation, The Vector Operator ∇ and the Divergence.	6
4	Energy and potential: Energy expended in moving a point charge in electrical field, line integral, definition of potential difference and potential, potential field of a point charge and system of charges: Conservative Property, potential gradient, The Electric dipole, energy density in electrostatic field.	7
5	Conductors, dielectrics and capacitance: Definition of currents and current density, Continuity of Current, metallic conductors and their properties, semiconductors, dielectric materials, characteristics, boundary conditions, capacitance of a parallel plate capacitor, Coaxial cable and spherical capacitors.	6



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6	Poisson's and Laplace equation: Poisson's and Laplace equation, Uniqueness theorem, examples of solution of Laplace and Poisson's eqns.	6
7	Steady magnetic field: Biot-Savart's law, Ampere's circuital law, Curl, Stokes' Theorem, Magnetic Flux and Magnetic Flux Density, The Scalar and Vector Magnetic Potentials, Derivation of the Steady-Magnetic-Field Laws.	6
8	Magnetic forces, materials and inductance: Force on a moving charge, force on a differential current element, force and torque on a close circuit, magnetization and permeability, magnetic boundary conditions, Magnetic circuit, Potential Energy and Forces on Magnetic Materials, Self-inductance and Mutual inductance	8
9	Time varying field and Maxwell's eqns.: Faraday's law, displacement current, Maxwell's equations in point and integral forms for time varying field, The Retarded Potentials.	5
10	The uniform plane waves: Wave Propagation in Dielectrics, Poynting's Theorem and Wave Power, Propagation in Good Conductors: Skin Effect, Wave Polarization	5

Learning Outcomes:

After the successful completion of the course, students will be able to

- Recognize and classify the movement and transfer of electric ions.
- Brief knowledge of conductor, die-electric and insulator properties.
- Analyse various effects on electric waves and magnetic waves.
- Discuss the principles and theorems of electric and magnetic field.
- Familiar with the propagation of electromagnetic waves.

Books Recommended:

1. W H.Hayt & J A Buck : "Engineering Electromagnetics" TATA McGraw-Hill, 8th Edition 2011
2. Elements of Electromagnetics by Matthew Sadiku, 4th Edition, Oxford University Press
3. Electromagnetics with applications by J.D.Krauss and Daniel Fleisch 5th edition, Mcgraw Hill
4. Jordan & Balmain - Electromagnetic wave & radiating systems, PHI Publication

E-Resources:

1. <http://www.mhhe.com/engcs/electrical/keiser/weblinks.mhtml>
2. <http://nptel.ac.in/downloads/117101054/>



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FACULTY OF: - Technology & Engineering

DEPARTMENT OF: - Electronics & Communication Engineering

SEMESTER: - V **CODE:** - 4TE05DCM1

NAME – Digital Communication (DCM)

Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Schemes (Hours)				Credits	Evaluation Schemes							
		Th	Tu	Pr	To		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hours	Marks	Hours	Pr	TW	Pr	
4TE05DCM1	Digital Communication (DCM)	04	00	02	06	05	30	1.5	70	3.0	---	20	30	150

Objectives:-

- The objective of the subject is to provide detailed knowledge on Base band modulation system and Digital carrier system, Interface standard, and Modem.

Prerequisite: -

- Students should have a firm grasp elementary engineering mathematics and Physics.

Course Outline:-

Sr. No.	Course Content	Hours
1	Introduction to Digital communication Introduction, Advantages of digital communication, Bandwidth, Bandwidth and channel capacity, Bandwidth and digital computer data.	05
2	Multiplexing Basic and need of multiplexing, types of multiplexing: SDM, TDM, FDM, combined multiplexing system, CDMA	08
3	Sampling and Pulse Code Modulation The Sampling Theorem: Sampling and interpolation functions, Practical difficulties in signal reconstruction, Under sampling, Aliasing. Application of Sampling theorem: PWM, PPM, PAM. PCM, DPCM, ADPCM, Uniform and Non-uniform Quantization, Delta Modulation, Adaptive Delta Modulations.	10
4	Principle of Digital Data Transmission Digital Communication System, line coding: PSD on /off signalling, Bipolar signalling. Pulse shaping: Nyquist first and second criterion for zero ISI and Controlled ISI, Duo binary signal, Detection of Duobinary Signaling and Differential Encoding. Scrambling, Regenerative repeaters, Detection error Probability, Eye Diagram.	10
5	Digital Modulation Techniques: Binary Phase Shift Keying(BPSK), Differential Phase Shift Keying(DPSK), DEPSK, QPSK, M-ary PSK, QASK, BFSK, M-ary FSK, MSK, Amplitude Shift Keying(ASK), QAM.	10



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6	RS-232 Interface standard Introduction, RS-232 voltage, Data bits, RS-232 signals, RS-232 examples, RS-232 interconnection: Bits and Band, connectors & pin out, Handshaking, Limitations, Multi drop communication, other FIA standards Rs-423, RS-422, RS-485.	10
7	Digital MODEM Role of modem, Modem functions, operation, originate and answer, connecting modem to the line. Types of MODEM: Bell 103, Bell 212, Bell 202, Ic's for integral modems, multiplexer and concentrator modem.	07

Learning Outcomes:

After the successful completion of the course, students will be able to

- Explain clearly analysis of Digital base band modulation.
- Explain clearly digital data transmission.
- Clear Basic concept about spread spectrum communication
- Detailed understanding of Digital interface standard.

Books Recommended:

5. Modern Digital & Analog Comm. Systems – B.P.Lathi (Oxford Uni.Press).
6. Principles-of-communication-systems-by-herbert-taub-and-donald-l-schilling-2nd-edition (MH).
7. Data Communication, New York, MGH 1988, William L. Schweber
8. Simon Haykin, 'Communication Systems' Wiley India, New Delhi, 4Ed., 2008



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FACULTY OF: - Technology & Engineering

DEPARTMENT OF: - Electronics & Communication Engineering

SEMESTER: - V **CODE:** - 4TE05OCM1

NAME – Optical Communication (OCM)

Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Schemes (Hours)				Credits	Evaluation Schemes							
		Th	Tu	Pr	To		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hours	Marks	Hours	Pr	TW	Pr	
4TE05OCM1	Optical Communication (OCM)	03	00	02	05	04	30	1.5	70	3.0	---	20	30	150

Objectives:-

- To expose the students to the basics of signal propagation through optical fibers
- To develop knowledge about structures of optical fibers
- To know about different degradation in fibers
- To learn about different optical sources and receivers
- To study about different optical networks

Prerequisite:-

- Students should have a firm grasp of elementary engineering electromagnetics and the different concepts of communication theory.

Course Outline:-

Sr. No.	Course Content	Hours
1	Overview of Optical fiber Communications : Motivations for Lightwave Communications, Optical Spectrum Bands, WDM Concepts, Key Elements of Optical Fiber Systems, Standard for Optical Fiber Communications.	3
2	Optical fibers Waveguides: Introduction, Ray theory transmission- Total Internal Reflection, Acceptance Angle, Numerical Aperture, Introduction to Skew rays, Electromagnetic mode theory for optical propagation- Modes in planar guide, Phase and group velocity, Cylindrical Fiber- Modes, Mode Coupling, Step Index fibers, Graded Index fibers, Single Mode Fibers- Cutoff Wavelength, Mode-field diameter and spot size.	8
3	Signal Degradation in Optical Fibers : Attenuation- Attenuation units, Absorption, Scattering Losses, Bending Losses, Core and Cladding Losses, Signal distortion in optical fibers- Overview of distortion origins, Modal delay, Group delay, Material dispersion, Waveguide dispersion, Polarization-mode dispersion, Characteristics of Single Mode Fibers- Refractive Index profiles.	8
4	Optical Sources : Semiconductor Physics- Energy bands, Intrinsic and Extrinsic Material, The pn junctions, Direct and Indirect band gaps, Light emitting diode (LEDs)-structures, Light source materials, Quantum Efficiency and LED Power, Modulation of LED. Laser Diodes -Modes & threshold conditions, Diode Rate equations, resonant frequencies, structures and radiation patterns, single mode lasers, Modulation of laser diodes, temperature effects.	8



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5	Power Launching and Coupling: Source to fiber power launching, Lensing schemes, Fiber splicing, Optical fiber connectors- Connector types, Single Mode fiber connectors.	4
6	Photo detectors: Physical Principles of photodiodes- pin photodetector, avalanche photodetector, Detector response time, Structure for InGaAs APDs, Temperature effects on gain, Comparison of photodetectors.	6
7	Optical Receiver Operation : Fundamental Receiver operation- Digital Signal Transmission and Frontend amplifier, Digital receiver performance-sensitivity and quantum limit, Eye diagrams, Coherent detection- Fundamental concepts, Homodyne and Heterodyne detection.	6
8	Digital Links : Point -to-point link -System considerations, Link power budget and rise time budget	4
9	Optical Amplifiers : Basic Applications and Types of Optical Amplifiers, EDFA- Amplification Mechanism and EDFA architecture, Raman Amplifier, Wideband Optical Amplifiers	4
10	WDM Concepts and Components : Overview of WDM- Operational Principles of WDM, WDM standards, Passive Optical couplers- 2x2 fiber coupler, Mach-Zender Interferometer Multiplexers, Isolators and Circulators, Fiber grating Filters- Grating Basics, Active Optical Components- Variable Optical Attenuator, Dynamic Gain Equalizer, Optical Add/Drop Multiplexer.	6
11	Performance Measurement and Monitoring : Basic Test Equipment, Eye Diagram Tests, Optical Time Domain Reflectometer - OTDR Trace, OTDR Dead zone	3

Learning Outcomes:

After the successful completion of the course, students will be able to

- Recognize and classify the structures of Optical fiber and types.
- Discuss the channel impairments like losses and dispersion.
- Analyze various coupling losses.
- Classify the Optical sources and detectors and to discuss their principle.
- Familiar with Design considerations of fiber optic systems.

Books Recommended:

1. Optical Fiber Communications by Gerd Keiser, 4th Edition (Mc Graw Hill)
2. Optical Fiber Communication by John M. Senior (PHI/Pearson)
3. Fiber optic Communication Systems by G. Agrawal (John Wiley and sons)
4. Fiber optical communication Technology by Djafar Mymbaev & Lowell L, Scheiner. (Pearson)
5. Optical Fiber Communication by Joseph C. Palais

E-Resources:

1. <http://www.mhhe.com/engcs/electrical/keiser/weblinks.mhtml>
2. <http://nptel.ac.in/downloads/117101054/>



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FACULTY OF: - Technology & Engineering

DEPARTMENT OF: - Electronics & Communication Engineering

SEMESTER: - V **CODE:** - 4TE05DSP1

NAME – Digital Signal Processing (DSP)

Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Schemes (Hours)				Credits	Evaluation Schemes							
		Th	Tu	Pr	To		Theory				Practical (Marks)		Total	
							Sessional Exam		University Exam		Internal			University
							Marks	Hours	Marks	Hours	Pr	TW		Pr
4TE05DSP1	Digital Signal Processing (DSP)	04	00	02	06	05	30	1.5	70	3.0	---	20	30	150

Objectives:-

- To represent continuous time & discrete Time signal
- To solve Linear time invariant system(LTI) Systems
- To design Filter design Techniques like FIR, IIR etc.
- To learn representation of sequences by Discrete Time Fourier Transform (DTFT) and DFT.
- To study Multirate DSP, Basic Architectures for DSPs

Prerequisite: -

- Students should have a firm grasp elementary engineering mathematics offered in first second and third semesters. The basic concepts of Fourier and algebra must be clear.

Course Outline:-

Sr. No.	Course Content	Hours
1	Introduction : Classification of signals, signal operation, frequency domain representation, time domain representation, energy and power theorems, Continuous time & Discrete Time signal, Amplitude & phase spectra , period of sum or product of signal, system and signal processing, Digital signal Processing Application. Sampling theorem, signal reconstruction, Analog to digital (A/D) conversion, Dual of time sampling: spectral sampling.	6
2	Discrete-Time Signals and Systems : Discrete-Time Signals, Discrete-Time Systems, LTI Systems, Properties of LTI Systems, linear convolution and its properties, Linear Constant Coefficient Difference equations,. Frequency domain representation of Discrete-Time Signals & Systems, Representation of sequences by discrete time Fourier Transform, (DTFT), Properties of discrete time Fourier Transform, and correlation of signals, Fourier Transform Theorems.	6
3	Transform Analysis of Linear Time-Invariant System: Frequency response of LTI system, System functions for systems with linear constant-coefficient Difference equations, Freq. response of rational system functions relationship between magnitude & phase, All pass systems, Minimum/Maximum phase systems, Linear system with generalized.	7



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4	The Z- Transform: Z-Transform, Properties of ROC for Z-transform, the inverse Z-transform, Z-transform properties, Analysis using Z-transform.	6
5	Structures for Discrete Time Systems: Block Diagram representation of Linear Constant-Coefficient Difference equations, Basic Structures of IIR Systems, Transposed forms Basic Structures for FIR Systems, Overview of finite-precision Numerical effects, Effects of Co-efficient quantization, Effect of round off noise in digital filters, Zero input limit cycles in Fixed-point realizations of IIR filters, Lattice structures.	7
6	Filter Design Techniques Magnitude & Phase response of Digital filter ,Frequency Response of Liner Phase FIR Filter & its Design Technique, Design of Discrete-Time IIR filters from Continuous-Time filters- Approximation by derivatives, Impulse invariance and Bilinear Transformation methods, Butterworth filter, Chebyshev & Inverse Chebyshev Filter, Advantages & Disadvantages of FIR & IIR Filter	6
7	Discrete-Fourier Transform Representation of Periodic sequences: The discrete Fourier Series, Properties of discrete Fourier Series, Fourier Transform of Periodic Signals, Sampling the Fourier Transform, The Discrete-Fourier Transform, Properties of DFT, Linear Convolution using DFT.	7
8	Fast Fourier Transform: FFT-Efficient Computation of DFT, Goertzel Algorithm, radix2 and radix 4 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms.	5
9	Multirate digital signal processing Introduction, sampling and its rate conversion, signal flow graph, filter structure, poly phase decomposition, digital filter design, multistage decimators and interpolators, digital filter banks, two channel quadrature mirror and multilevel filter banks.	5
10	Architectures for DSPs DSP processor Memory Architecture, Pipelining, RISC, CISC, Basic DSP processor memory architecture, TMS320 Family DSP processor series, MAC, Applications of DSPs.	5

Learning Outcomes:

After the successful completion of the course, students will be able to

- To study basic signal representation, linear time invariant system and DSP processor and its applications.
- To represent structure of discrete time system and analysis it.
- To design digital FIR and IIR filter.
- To solve Discrete time and fast time fourier transform.



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Books Recommended:

- 1 “Digital Signal Processing”, Salivahanan, Vallavaraj and Gnanapriya, TMH, 2011.
- 2 “Discrete Time Signal Processing”, Oppenheim, Schaffer, Buck Pearson education publication, second edition, 2011.
- 3 “Digital Signal Processing: Principles, Algorithm & Application”, Proakis, Manolakis, PHI, third Edition, 2011.
- 4 “Signal & System”, A. Anand Kumar, PHI, 2011.
- 5 “Theory & Application of digital signal processing”, Rabiner, Bernard gold, PHI
- 6 “Fundamentals of digital Signal Processing”, Lonnie C. Ludeman, Wiley
- 7 “Digital Signal Processing”, A. Nagoor kani, Tata Mcgraw Hill education private Ltd.
- 8 “Digital Signal Processors, Architecture, programming and applications”, B. Venkatramani, M Bhaskar, Mc-Graw Hill.
- 9 “Principal of linear system & signal”, B. P. Lathi, Oxford, second edition.
- 10 “Digital Signal processing”, Mitra, second edition, TMH.

E-Resources:

1. www.benetech.org/
2. www.dspguide.com/
3. www.freebookcentre.net > Electronics Engineering Books