With effect from academic year 2016-2017

SCHEME OF INSTRUCTION AND EXAMINATION
BE III YEAR
(ELECTRONCIS AND COMMUNICATION ENGINEERING)

SEMESTER – II

S.No.	Code No.	Subject	Scheme of Instruction		Scheme of Examination		
					Duration in Hours	Max. Marks	
		THEORY	L/T	D/P		Univ. Exams	Sessionals
1	EC 351	Digital Communication	4	-	3	75	25
2	EC 352	Digital Signal Processing	4	-	3	75	25
3	EC 353	Antenna and Wave Propagation	4	-	3	75	25
4	EC 354	Microprocessor and Microcontroller	4	-	3	75	25
5	CM 371	Managerial Economics and Accountancy	4	-	3	75	25
		PRACTICALS					
1	EC 381	Communication Lab	-	3	3	50	25
2	EC 382	Systems and Signal Processing Lab	-	3	3	50	25
2	EC 383	MPMC Lab	-	3	3	50	25
3		Mini Project					25
		TOTAL	**20**	**9**		**525**	**225**

EC351 ***With effect from academic year 2016-2017***

DIGITAL COMMUNICATION

Instructions	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Unit-I

Elements of Digital Communication System, Comparison of Digital and Analog Communication Systems. Analog to Digital Conversion, Quantization and Encoding techniques, PCM. Companding in PCM systems: μ-law and A-law. Applications of PCM: PCM-TDM. Introduction to Linear Prediction Theory. Modulation and demodulation of DPCM and DM. Quantization noise and Slope overload error in DM. Modulation and demodulation of ADM. Comparison of PCM, DPCM, DM and ADM. SNR of PCM and DM.

Definition of Inter Symbol Interference (ISI) and eye pattern.

Unit-II

Uncertainty, Information and entropy. Source coding, Shannon – Fano algorithm and Huffman coding. Discrete memoryless channels, Probability relations in a channel, priori & posteriori entropies, cascaded channels, mutual information, Channel capacity, information rate and information capacity.

Unit-III

Types of transmission errors, need for error control coding, Linear Block Codes (LBC): description of LBC, generation, Syndrome and error detection, minimum distance of a block code, error correcting and error detecting capabilities, Standard array and syndrome decoding, Hamming codes. Binary cyclic codes (BCC): description of cyclic codes, encoding, decoding and error correction of cyclic codes using shift registers, BCH codes. Convolution codes: description, encoding and decoding.

Unit-IV

Base band digital data transmission, Gaussian error probability, matched filter, correlation receiver, coherent and non-coherent ASK, FSK, PSK, DPSK and M-ary QPSK, and Gaussian error probability. Need for MSK Modulation, Comparison of digital carrier modulation schemes. Synchronization methods

Unit -V Need for spreading a code, generation and characteristics of PN sequences. Direct Sequence Spread Spectrum and Frequency hopping spread spectrum systems and their applications. Acquisition schemes for spread spectrum receivers, Tracking of FH and DS signals.

Suggested Reading:

1. P. Ramakrishna Rao, "*Digital Communication*," 1/e, TMH, 2011.
2. B.P. Lathi, Zhi Ding, "*Modern Digital and Analog Communication Systems*", 4/e, Oxford University Press, 2016
3. Simon Haykin, "*Communication Systems*," 4/e, Wiley India, 2011.
4. Herbert Taub, Donald L. Shilling & Goutam Saha, "*Principles of Communication Systems*," 3/e, TMH, 2008.

EC352 ***With effect from academic year 2016-2017***

DIGITAL SIGNAL PROCESSING

Instructions	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Unit-I

Fast Fourier Transform: Discrete Fourier Transform (DFT), Computation of DFT- Circular Convolution, FFT algorithms – Radix-2 case, Decimation time & Decimation in Frequency algorithms – in place computation – bit reversal Use of FFT algorithms in linear Filtering and Correlation.

Unit-II

Digital Filters (IIR) Design: Butterworth and Chebychev approximations-IIR digital filter design techniques- Impulse Invariant technique – Bilinear transformation technique – Digital Butterworth-Chebyshev filters.

Unit-III

Digital Filters (FIR) Design: Amplitude and phase responses for FIR filters – Linear phase filters – Windowing techniques for design of Linear phase FIR filters – Rectangular, Bartlett, hamming, Blackman, Kaiser windows– realization of filters - finite word length effects comparisons between FIR and IIR filters

Unit-IV

Multirate Digital Signal Processing: Introduction –Decimation by Factor D- interpolation by a Factor I- Sampling Rate Conversion by a Rational Factor I/D- Implementation of sampling Rate Conversion-Multistage implementation of Sampling Rate Conversion – Sampling Conversion by an Arbitrary factor – Application of Multirate Signal Processing.

Unit-V

Introduction to DSP Processors: Difference between DSP and other microprocessors architectures- their comparison and need for ASP, RISC and CPU- General Purpose DSP processors – TMS 320C 54XX processors, architecture, addressing modes- instruction set.

Suggested Reading:

1. Alan V. Oppenheim & Ronald W. Schafer, "Digital Signal Processing", PHI, 2/e, 2010.
2. John G. Praokis & Dimtris G. Manolakis, "Digital Signal Processing", Principles, Algorithms and Application, 4th edition, PHI, 2007.
3. Tarun Kumar Rawat, "Digital Signal Processing", 1/e, Oxford University Press, 2015
4. A. Nagoor Kani, "*Digital Signal processing," second edition,* McGraw Hill, 2012.

5. B. Venkataramani & M. Bhaskar, “Digital Signal Processing”, Architecture, Programpming and Application, TMH, 2002.
6. Avathar Singh and S. Srinivasan, “*Digital Signal Processing using DSP Microprocessor,”* 2nd edition, Thomson Books, 2004.

EC353 ***With effect from academic year 2016-2017***

ANTENNAS AND WAVE PROPAGATION

Instructions	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Unit-I

Principles of radiation retarded potential and isotropic radiator, Antenna parameters: Radiation pattern, radiation intensity, Antenna temperature. far field, near field, Gain, directivity, Antenna Polarization, effective aperture and aperture efficiency Point sources, Current distribution, infinitesimal dipole.

Unit-II

Half-wave dipole, quarter wave monopole, Effect of earth on Vertical patterns, Loop antenna, far field pattern of circular loop with uniform current. Helical antennas: Axial mode pattern, wideband characteristics, radiation efficiency.

Unit-III

VHF, UHF turnstile antennas, Rhombic Antenna, Yagi – Uda Antenna, Log periodic Antenna, Horn Antenna, Parabolic Reflector, Lens antenna, Microstrip antennas: different types, advantages and disadvantages of Microstrip antennas (Working principle and characteristics only). Antenna Measurements: Antenna test site, impedance, radiation pattern and gain measurement techniques.

Unit-IV

Arrays of point sources, two element array with equal and unequal amplitudes, different phases. Linear n- element array with uniform distribution, Broadside and End fire arrays, Binomial array, principle of pattern multiplication. Effect of inter element phase shift on beam scanning.

Unit-V

Ground wave propagation, Space and Surface waves, Troposphere refraction and reflection, Duct propagation, sky wave propagation, Regular and irregular variations in ionosphere. Friis transmission formula, Line of sight propagation.

Suggested Reading:

1. John D. Krauss, Ronald J. Marhefka & Ahmad S. Khan, "Antennas and wave Propagation", 4/e TMH, 2010.
2. Constantine A. Balanis, Antenna Theory: "Analysis and Design, "3/e, John Wiley, 2005.
3. Edward C. Jordan and Kenneth G. Balmain, "Electromagnetic waves and Radiating Systems", 2/e PHI 2001.

4. A.R. Harish, M. Sachidananda, “Antennas and Wave Propagation”, 2/e, Oxford University Press, 2016.
5. Chatterjee, R., “Antenna Theory and Practice“, New Age Publishers, 2008

EC354 ***With effect from academic year 2016-2017***

MICROPROCESSORS AND MICROCONTROLLERS

UNIT-I:

Instructions	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Intel 8086/8088 architecture , Segmented memory, Minimum and Maximum modes of operation, Timing diagram, addressing modes, Instruction set, Assembler directives, macros, procedures, assembly language programming using data transfer, arithmetic, logical, branching and string manipulation instructions

UNIT-II:

8086 Interrupt structure, IO and Memory Interfacing concepts using 8086, IC Chip Peripherals-8255 PPI, 8254 Programmable timer, 8257 DMA controller, 8251 USART

UNIT-III:

8051 Microcontroller – Internal architecture and pin configuration, 8051 addressing modes, instruction set, Bit addressable features. I/O Port structures, assembly language programming using data transfer, arithmetic, logical and branch instructions.

UNIT-IV:

8051 Timers/Counters, Serial data communication and its programming, 8051 interrupts, Interrupt vector table, Interrupt programming.

UNIT-V:

Real world interfacing of 8051 with external memory, expansion of I/O ports, LCD, ADC, DAC, stepper motor interfacing.

Suggested Reading:

1. Ray A.K & Bhurchandi K.M, "Advanced Microprocessor and Peripherals", 2/e TMH, 2012
2. Muhammad Ali Mazidi, J.G. Mazidi and R.D McKinlay," The 8051 Microcontroller and Embedded systems using Assembly and C", 2nd Edition, Pearson education, 2009.
3. Douglas V. Hall, "Microprocessors and Interfacing Programming and Hardware", 2nd Edition TMGH, 1994.
4. Manish K. Patel, "The 8051 Microcontroller Based Embedded Systems", McGraw Hill, 2014

EC381 ***With effect from academic year 2016-2017***

COMMUNICATIONS LAB

Instructions	4 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

Lab Experiments:

Part-A

1. AM generation and detection
2. FM generation and detection
3. Pre emphasis and De-emphasis circuits
4. Multiplexing Techniques (FDM and TDM)
5. Mixer Characteristics
6. Sampling , PAM, PWM, and PPM generation and detection
7. Generation and Detection of Analog and Pulse modulation techniques by using MATLAB/Simulink/Labview

Part-B

1. PCM generation and detection
2. Data formats / channel encoding and decoding.
3. Linear and Adaptive Delta Modulation and Demodulation
4. Modem characteristics.
5. ASK generation and Detection.
6. FSK and Minimum Shift Keying generation and Detection.
7. Phase shift keying methods (BPSK, QPSK) generation and Detection.
8. Generation and Detection of PCM, Delta modulation and Digital modulation Schemes (ASK. FSK, BPSK,QPSK) by using MATLAB/Simulink/Lab-view.

General Note: At least 12 experiments are to be conducted.

EC382 ***With effect from academic year 2016-2017***

SYSTEMS AND SIGNAL PROCESSING LAB

Instructions	4 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

Part-A (Experiments on DSK and CCS)

1. Solutions of difference equations.
2. Impulse Response.
3. Linear Convolution.
4. Circular Convolution.
5. Study of procedure to work in real –time.
6. Fast Fourier Transform Algorithms :(DIT, DIF).
7. Design of FIR (LP/HP) using windows, (a) Rectangular, (b) Triangular (c) Hamming window.
8. Design of IIR (HP/LP) filters.

PART-B (Experiments on Signal Processing)

1. DFT and FFT algorithm.
2. Linear Convolutions.
3. Circular Convolutions.
4. FIR filter design using different data windows.
5. IIR filter design: Butterworth and Chebyshev.
6. Interpolation and Decimation.
7. Implementation of multi-rate systems.
8. Time response of non-linear system.
9. Design of P, PI, PD and PID controllers (any two)

NOTE:

1. Minimum of 5 from Part A and 5 from Part B is mandatory.
2. For section `B` MATLAB with different toolboxes like signal processing, Signal Processing Block set, and SIMULINK/ MATHEMATICA/ any popular software can be used.

EC383 ***With effect from academic year 2016-2017***

MICROPROCESSORS AND MICROCONTROLLERS LAB

Instructions	4 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

Course Objectives:

1. Write and execute Assembly language programs using 8086 trainer kit in standalone/serial mode
2. Write and execute assembly language programs on interface modules with 8086
3. To develop and execute the assembly/ embedded C programming concepts of 8051 microcontroller
4. Design and develop 8051 based embedded C programs for various interface modules

PART –A

[Experiments on assembly language programming for 8086 using Assembler]

1. Use of 8086 trainer kit and execution of programs.
2. Instruction set for simple Programs (using 4 to 5 lines of instruction code) under different addressing modes for data transfer, manipulation, Arithmetic operations, Branching operations and logical operations in a given data.
3. Multiplication and division.
4. Single byte, multi byte Binary and BCD addition and subtraction
5. Code conversions.
6. String Searching and Sorting.
7. Generation of waveforms and gating applications using 8253/8254 timers.
8. Monitor utilities of 8086 kit for keyboard/displaying results.

PART –B

[**Experiments on assembly language programming/C for 8051 using Kiel Compiler (or equivalent) & appropriate hardware**]

9. Familiarity and use of 8051/8031 Microcontroller trainer, and execution of programs.
10. Instruction set for simple Programs (using 4 to 5 lines of instruction code) for different

addressing mode.

11. Timer and counter operations & programming using 8051.
12. Interfacing 8051 with DAC to generate waveforms.
13. LEDs and switches interfacing with 8051.
14. Interfacing traffic signal control using 8051.
15. Program to control stepper motor using 8051.
16. 7-Segment display interfacing with 8051.
17. ADC interfacing with 8051

Note:

1. Preliminary explanation of the features and use of the tools must be made in 2/3 theory periods.
2. A total of not less than 12 experiments must be carried out during the semester with at least 6 from each part.

Suggested Reading:

1. Myke Predko – *Programming and Customizing the 8051 Microcontroller,* TMH, 2005