EC 292

BASIC ELECTRONICS LAB

(For Mech., Prod. & CSE)

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

List of Experiments:

1. Characteristics of Semiconductor and Zener diodes
2. CRO Applications
3. Fullwave rectifier with and without filter
4. Zener Voltage Regulator
5. Characteristics of BJT transistor (CB, CE, CC)
6. Characteristics of field effect transistor.
7. Feedback amplifier with and without feedback
8. h-parameters of transistors
9. Phase shift oscillator
10. Hartley oscillator & Colpitts Oscillator.
11. Operational Amplifier and its applications
12. Logic gates and flip flops-verifications
13. Realization of Half and Full adder
14. Comparators

Suggested Reading :

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, *Basic Electronics*, A Text – Lab Manual, 7th Edition, TMH, 1994.
2. Paul B. Zbar, *Industrial Electronics*, A Text – Lab Manual, 3rd Edition, TMH, 1983.

SCHEME OF INSTRUCTION AND EXAMINATION

B.E. IIIrd YEAR

ELECTRONICS & COMMUNICATION ENGINEERING

SEMESTER - I

Sl. No.	Syllabus Ref. No.	Subject	Scheme of Instruction: Periods per Week L	Scheme of Instruction: Periods per Week D/P	Scheme of Examination: Duration in Hrs	Scheme of Examination: Maximum Marks: Univ. Exam	Scheme of Examination: Maximum Marks: Sessionals
		THEORY					
1.	EC 301	Integrated Circuits and Applications	4	-	3	75	25
2.	EC 302	Computer Organisation & Architecture	4	-	3	75	25
3.	EC 303	Analog Communications	4	-	3	75	25
4.	EC 304	Automatic Control Systems	4	-	3	75	25
5.	EC 305	Microprocessors and Interfacing	4	-	3	75	25
		PRACTICALS					
1.	EC 331	Integrated Circuits Lab	-	3	3	50	25
2.	EC 332	Microprocessors and Interfacing Lab	-	3	3	50	25
3.	EC 333	Communication Enginnering Lab.	-	3	3	50	25
		TOTAL	**24**	**9**	**-**	**525**	**200**

EC 301

INTEGRATED CIRCUITS AND APPLICATIONS

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

UNIT –I

CLASSIFICATION OF INTEGRATED CIRCUITS:

Manufacturer's designations for integrated circuits, Development of integrated circuits, Integrated circuit package types, Pin identifications and temperate ranges, package types, pin identification, ordering information, Device identification.

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

Introduction to operational amplifiers, Operational amplifier characteristics, Basic applications of operational amplifiers, Voltage to current and current to voltage Converters, Sample and Hold circuit, NE555 Timer, Functional block Schematic and applications, Monolithic voltage regulators (723), Analog to digital and digital to analog converters.

UNIT-II

DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS

Comparison of various logic families, Digital IC terminology. The TTL logic family, Standard TTL series characteristics, TTL open collector outputs, Tri-state TTL, MOS, CMOS digital IC's and their characteristics, CMOS transmission gate (bilateral switch), Debounced switch.

UNIT-III

COMBINATIONAL CIRCUITS:

Design using TTL-74XX and CMOS 40XX series: code converter, Decoders, Demultiplexers, decoders and driver's for LED and LCD displays, Encoders and priority encoders, Multiplexers and their applications, Parity generators and Checker circuits.

UNIT-IV

ARITHMETIC CIRCUITS:

Parallel and serial, Parallel binary adder/subtractor circuits using 1's and

2's compliment system, Decimal adder / Subtractors, Digital Comparator circuits.

SEQUENCIAL CIRCUITS:

Flip-flops and their conversions, Design of Synchronous and Asynchronous counters, Decade Counters, Cascading of BCD converters, Shift register and applications, familiarity with 74 XX and CMOS 40XX series of IC Counters.

UNIT-V

MEMORIES:

SEMICONDUCTOR: ROM, RAM, Types, Architecture's, operation and applications, Expanding word size and capacity.
Introduction to PLD's, Architectures of PAL, PLL with operation.

Suggested Reading:

1. Gaykwad R A, *"OP-Amps and Linear integrated circuits"*, PHI, 4th edition, 1999.
2. Ronald J Tocci, *"Digital Systems Principles and applications"*, PHI, 9th edition, 2001.
3. Morris R L and Miller J R, *"Designing with TTL Integrated Circuits"*, TMH, 1971.
4. Sonde B D, *"Introduction to system Design using IC's"*, Wiley, 2nd edition,1994.
5. Roy Chowdary, *"Linear Integrated Circuits"*, New age Publishers, 2nd edition,2004.

EC 302

COMPUTER ORGANIZATION AND ARCHITECTURE

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

UNIT-I

Data representation : Digital arithmetic algorithms for Addition, subtraction, Multiplication (including Booths algorithm) and Division (restoring and non-restoring) and their comparision. Floating point representation and its arithmetic operations. Register transfer and Micro operations: Register transfer Language, register transfer, Bus and memory transfers, Arithmetic, Logic and shift micro operations and hardware implementation.

UNIT-II

Basic computer organization and Design : Instruction codes, stored program organization, concept of Von-Neuman machine, computer registers and common bus system, computer instructions, timing and control, instruction cycle: Fetch and Decode, Register reference instructions; Memory reference instructions, Control flow chart. Input, output and Interrupt: configuration, instructions, Program interrupt, Interrupt cycle, Microprogrammed Control organization, address sequencing, microinstruction format and microprogram sequencer.

UNIT-III

Central Processing Unit: General register organization, stack organization, instruction formats, addressing modes, Data transfer and manipulation, Program control. Reduced Instruction set computer, CISC characteristics, RISC characteristics. Pipeline and vector Processing: Parallel Processing, Pipelining, Instruction Pipeline, RISC Pipeline, vector processing & Array Processors.

UNIT-IV

Input-output organization: Input output interface. I/O Bus and interface modules, I/O versus Memory bus, Isolated Vs. Memory mapped I/O. Asynchronous data transfer: Strobe control, Handshaking, Asynchronous serial transfer, Asynchronous Communication interface. Modes of Trarsfer: Programmed I/O, Interrupt driven I/O, Priority interrupt; Daisy chaining, Parallel Priority interrupt, Priority encoder. Direct memory Access, DMA controller and transfer. Input output Processor (IOP), CPU-IOP communication, I/O channel, Different printers.

UNIT-V

Memory organization: Memory devices, Semiconductor memory types, memory hierarchy, Auxiliary memory, magnetic disks & tapes. Cache memory, Elements of Cache design, mapping functions, Virtual memory: Address mapping using pages and page replacement algorithms, memory management. Systems Programming: Functional aspects of operating systems (O.S), Compilers, assemblers, Loaders, editors, Language translators and BIOS.

Suggested Reading:

1. Morris Mano, M., *"Computer System Architechture"*, 3rd Edition Pearson Education, 2005.
2. Hamacher, Vranesic, Zaky, *"Computer Organization"*, 5th Edition MGH, 2007.
3. William Stallings, *"Computer Organization and Architecture Designing for performance"* 7th Edition, Pearson Education, 2006.
4. Pal Choudhury P., *"Computer Organization and Design"*, PHI, 2nd Edition, 2003

EC 303

ANALOG COMMUNICATION

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

UNIT-I

Linear Modulation schemes: Need for modulation, Double side band suppressed carrier (DSB-SC) modulation, Conventional Amplitude Modulation(AM), Single side band (SSB) modulation, and Vestigial –side band(VSB)modulation. Generation and demodulation of the above.

UNIT - II

Angle modulation schemes: Frequency Modulation(FM) and Phase modulation(PM), Concept of instantaneous frequency, Types of FM- Narrow band FM and wide band FM, FM spectrum in terms of Bessel function, Direct and indirect (Armstrong's)methods of FM signal generation, Discriminators, Phase locked loop(PLL) FM receiver.

UNIT-III

Transmitters and Receivers: Classification of transmitters, AM and FM radio transmitters.

Principle of Tuned radio frequency (TRF) and super heterodyne receivers, Choice of Intermediate frequency, Image frequency. Tracking and alignment. Automatic Gain Control, Receiver characteristics & measurements. Communication Receivers.

UNIT-IV

Sources of noise, thermal noise and shot noise, noise in linear systems, equivalent noise, bandwidth, noise temperature and noise figure. S/N ratio calculations in AM, DSB-SC, SSB, FM & PM systems.

UNIT-V

Analog pulse modulation schemes: Sampling of continuous-time signals, low pass and band pass sampling, practical aspects of sampling and reconstruction of signals. Pulse Amplitude Modulation (PAM), Pulse time modulation schemes - PWM and PPM-generation and demodulation. S/N ratio calculations in PAM, PWM and PPM.

Suggested Reading:

1. Simon Haykin, *Communication Systems,* 3rd Edition, Wiley International, 1995.
2. Taub and Shilling, *Principles of Communication Systems*, 2nd edition, TMH, 2003
3. Singh, R.P. and Sapre, S.D. *Communication Systems*, TMH, 2007
4. Kennedy, *Electronic Communication Systems.* 4th edition TMH, 1993.
5. Roddy &Collen, *Electronic Communications,* 4th edition, PHI, 2002.

EC 304

AUTOMATIC CONTROL SYSTEMS

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

UNIT-I

Control System fundamentals and Components: Classification of control systems, Open and closed loop systems, Control system components. Error sensing devices - potentiometers, syncros, AC & DC servo motors – Mathematical modeling of mechanical systems and their conversion into electrical systems. Block diagram representation. Signal flow graphs.

UNIT-II

Time response: Transfer function and Impulse response, types of input. Transient response of second order system for step input. Time domain specifications. Types of systems, static error coefficients, error series, Routh - Hurwitz criterion for stability.

Root locus techniques: Analysis of typical systems using root locus techniques. Effect of location of roots on system response.

UNIT-III

Frequency response plots: Bode plots, frequency domain specifications. Gain margin and Phase Margin. Principle of argument, Nyquist criterion for stability.

Compensation: Cascade and feedback compensation using Bode plots. Phase lag, lead, lag-lead compensators. PID controller.

UNIT - IV

Discrete Control Analysis: Digital control, advantages and disadvantages and digital control system architecture. The discrete transfer function. Sampled data system. Transfer function of sample data systems.

UNIT-V

State Space Representation : Concept of state & state variables. State models of linear time invariant systems, State transition matrix, solution of state equations. Design of digital control systems using state-space concepts. Controllability and observability.

Suggested Reading:

1. J.Nagrath & M.Gopal, *Control System Engineering*, Wiley Eastern, 1993.
2. K. Ogata, *Modern Control Engineering*, EEE, PHI, India, 2003.
3. Gopal M, *Digital Control Engg.*, Tata McGraw Hill, 1997.
4. B.C.Kuo, *Automatic Control Systems*, 7th edition PHI, 2003.

EC 305

MICROPROCESSORS AND INTERFACING

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

UNIT-I

Overview of Intel, Motorola and Zilog CPU and their features; 8086/8088 Architecture and Instruction set – Minimum and Maximum mode operations, 8086 control signal interfacing under Minimum mode system, control signal interfacing under Maximum mode using multiprocessing systems. Addressing modes, Interrupt structure, Instruction formats, Instruction Execution Timings.

UNIT-II

Assembly Language Programming: Assembler directives and operators, Use of 8086 Instruction set, simple program loops using Data transfer, arithmetic, logical, Branching, and ASCII instructions. String processing, Procedures, Macros and stack, simple programs using DOS functions. Introduction to assemblers and brief ideas on debugging tools.

UNIT-III

8086 Interfacing: Memory interfacing using standard RAM, EPROM, IC chips. Review of programmable Interface Device concepts; Intel 8255 Programmable peripheral interface (PPI) chip. Intel 8253/8254 Programmable Interval Timer chip. Interfacing of ADCs, DACs and their programming. Interfacing & programming with peripheral chips: Matrix keyboard, seven segment LEDs & LCD display modules.

UNIT-IV

Dedicated Peripheral Interfacing: Need for DMA and Interfacing with DMA controller chips. (Intel 8257/8237 ICs), Keyboard & display controller (Intel 8279) interfacing, Programmable Communication interface – serial and parallel data transmission formats, UART/USART interfacing, Intel 8251 IC, Interfacing Numeric, data Processor (Intel 8087 NDP).

UNIT-V

Intel X86 series Microprocessor: Introduction and brief overview of 80286 and its Architectural features. Introduction to 80386 Microprocessor – Special registers, memory management, Protected and virtual modes. Brief overview of 80486 and Pentium Processors – (elementary treatment only)

Suggested Reading:

1. Ray A.K. and Bhurchandi, K.M., *Advanced Microprocessor and peripherals* 2nd Edition, TMH – 2007.
2. Douglas V Hall, *Microprocessors and interfacing, Programming and Hardware*, revised 2nd , Edition TMH – 2006.
3. Barry B. Brey, *The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro, Pentium II, III, IV.* – Pearson Education – 2006.
4. Yu-Cheng Liu and Gibson G.A., *Microcomputer systems: The 8086/8088 family Architecture, Programming and Design*, 2nd Edition, PHI, 2005.

EC 331

INTEGRATED CIRCUITS LAB

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

I. Regular Lab Experiments:

a) **Linear ICs Using LM 741 & MC1530, NE 531, OpAmps & Other ICs:**

1. Clipping and Clamping Circuits
2. Measurement of Parameters of OpAmp
3. OpAmp: Voltage follower, Inverting & Non Inverting Amplifiers, level translators.
4. OpAmp: Arithmetic Circuits: Summer, Integrator Differentiator
5. OpAmp Active filters: HP, LP, BP – Butterworth, Chebyschev.
6. OpAmp Oscillators: RC phase shift, wien bridge.
7. OpAmp Oscillators: Regenerative: Astable, Monostable.
8. OpAmp: Triangle and Square wave Generators.
9. Voltage Controlled Oscillators Using LM 566.
10. Phase locked loop and applications Using LM565.
11. IC Regulators and current boosting.

b) **Digital ICs Using standard TTL and CMOS IC building blocks:**

12. Measurement of propagation delay, fanout, Noise margin and Transfer characteristics of TTL and CMOS IC gates and open collector/drain gates.
13. Designing Code converters using Logic gates and standard code converters.
14. Flip – Flop Conversions and latches using ICs
15. Designing Synchronous, Asynchronous Up/Down counters and shift registers; & ring counters using IC Flip-Flops & standard IC counters.

16. Full adder subtractor using logic gates and multiple bit IC Adder/ subtractors and Arithmetic Circuits.
17. Mux – Demux applications
18. D/A Conversion
19. TTL Characteristics
20. 555 Timer applications

II. Mini Project cum Design Exercise(s):

To realize and design at least two mini projects using either Liner or digital or Combination of Liner and digital ICs (giving specifications for each project)

General Note:

i) There should not be more than 2 students per batch while performing any of the lab experiments.

ii) Mini Project cum design exercise(s):

a) The student must design, rig-up, and test the circuits by carrying out the experiments soldering the components on bread boards having group/lug boards.

b) This exercises carry Sessional marks of 10 out of 25 while the remaining 15 marks are for the regular Lab experiments.

EC 332

MICROPROCESSORS AND INTERFACING LAB

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

Special note:

i) Sessional marks are to be awarded as per the following break up:

a) 15 marks for the regular Lab. Exercise.

b) 10 marks for the Mini Project cum-design exercise(s).

ii) A total of not less than 15 experiments must be carried out during the Semester (wherever possible more than 1 Lab. Experiment should be carried out in one lab session of 3 periods per week).

I. Experiments on Assembly language programming for 8086 using Assembler:

1, 2, 3. Use of 8086 trainer Kit- Instruction set for simple programs (using 4 to 15 lines of instruction code) under different addressing modes for data transfer, manipulation, Arithmetic operations, Branching Operations, Logical operations and string operations in a given data.

4 & 5: Code conversion, sorting and searching.

6. Single byte, Multibyte Binary and BCD addition, subtraction, Multiplication and Division.

7. Generation of waveforms and gating applications using 8253/8254 Timers with 8086.

8. Interfacing traffic signal control using 8086.

9 & 10. Interfacing applications using 8086 for LCD (2x40, 4x 20) modules and A/D applications.

11. Generation of waveforms using DAC interface using 8086.

12 & 13. Interfacing 7-segment LED (Common Cathode/Common Anode) displays & stepper motor control.

14. Key board interfacing using 8086.

15. Interfacing Elevator simulator control using 8086.

16. Simple Programs using monitor utilities of mp kit for keyboard/ displaying the results of a program and interrupting using the keyboard interface.

17. Real time clock using 8086 for 12 hours.

II. Mini Project cum Design Exercise(s).

The students should design and realize at least one mini project using 8086 microcomputer kit and interface modules/add on modules and its assembly language for given specifications. A report of the case study of the project is recommended.

Example 1: Program to synthesize a sine wave using lookup table with 360 digital samples and to be able to vary its frequency in a given range. A DAC interface and a CRO may be used to observe the waveform and verify the results.

Example 2: Program for generation of musical NOTES and to play it using an audio amplifier and speaker.

EC 333

COMMUNICATION ENGINEERING LAB

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

1. AM Generation & Detection (Using Linear Ics)
2. Balanced Modulator
3. FM Generation & Detection (using Function Generator & PLL chips)
4. Pre emphasis & De-emphasis circuits (active)
5. Radio Receiver Measurements : Sensitivity, Selectivity and Fidelity
6. Sampling PAM & reconstruction – using digital IC's
7. PWM & PPM generation & Detection – using IC's
8. Time Division Multiplexing and De-multiplexing
9. Frequency Division Multiplexing and De-multiplexing
10. PLL Characteristics
11. Spectrum Analysis by Spectrum analyzer of Video signal generated by
    a) TV demonstrator Kit
    b) Pattern Generator
12. Active Band-pass and Band-elimination Filters (using IC's)
13. AGC and AFC Circuits
14. Mixer Circuit

Note: Some Mini Projects can be designed for 10 Marks

SCHEME OF INSTRUCTION AND EXAMINATION

B.E. IIIrd YEAR

ELECTRONICS & COMMUNICATION ENGINEERING

SEMESTER - II

Sl. No.	Syllabus Ref. No.	Subject	Scheme of Instruction: Periods per Week L	Scheme of Instruction: Periods per Week D/P	Scheme of Examination: Duration in Hrs	Scheme of Examination: Maximum Marks: Univ. Exam	Scheme of Examination: Maximum Marks: Sessionals
		THEORY					
1.	EC 351	Digital Communications	4	-	3	75	25
2.	EC 352	Digital Signal Processing	4	-	3	75	25
3.	EC 353	Antennas and Propagation	4	-	3	75	25
4.	EC 354	Microcontrollers and Applications	4	-	3	75	25
5.	CM 371	Managerial Economics & Accountancy	4	-	3	75	25
		PRACTICALS					
1.	EC 381	Digital Communications Lab	-	3	3	50	25
2.	EC 382	Digital Signal Processing Lab	-	3	3	50	25
3.	EC 383	Microcontroller Lab	-	3	3	50	25
4.	EC 384	Industrial Visits / Tour / Study	-	-	-	-	*Gr
		TOTAL	**24**	**9**	-	**525**	**200**

WITH EFFECT FROM THE ACADEMIC YEAR 2008-2009

EC 351

DIGITAL COMMUNICATION SYSTEMS

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

UNIT-I

Elements of Digital Communication System, Advantages and Disadvantages of Digital Communication Systems over Analog Communication Systems, Analog to Digital Conversion, Quantization and Encoding techniques, application of PCM, Companding in PCM systems - μ law and A law, TDM, example of PCM system, modulation and demodulation of DM and DPCM. Quantization noise and Slope overload error in DM, Comparison of DM and PCM. Introduction to Linear Prediction Theory with applications in DM, modulation and demodulation of ADM. SNR of PCM and DM. Vocoders.

UNIT-II

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

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, and Convolution codes: description, encoding, decoding.

UNIT–IV :

Base band digital data transmission, error probability, matched filter, correlation receiver, coherent and non-coherent ASK and FSK, DPSK,

QPSK, error probability. Comparison of carrier modulated and base band transmissions. M-ary signaling 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. Simon Haykin., *Communication Systems*, 3rd Edition, Wiley International, 1995.
2. Singh, R.P. and Sapre, S.D., *Communication Systems*, Tata McGraw-Hill,1995.
3. Taub and Schilling, *Principles of Communication Systems*, 2nd Edition, McGraw-Hill International,1986.
4. John G. Proakis, *Digital Communications*, 4th edition, Mc-Graw Hill International edition.
5. Lathi.B.P, *Modern Digital & Analog Communication Systems*, 3rd edition, B.S. Publications
6. Sam Shanmugham.K., *Digital and Analog Communication Systems*, Wiley International, 1979.

Additional Reading:

7. Marvin K Simontal, *Digital Communication Techniques*, Prentice Hall of India, 1995.
8. S.G.Wilson, *"Digital modulation and coding"*, Printice Hall, Inc, 1996.
9. Bruce Carlson, Rutlidze, Crilly, *"Communication Systems"*, Mc-Graw Hill.

EC 352

DIGITAL SIGNAL PROCESSING

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

UNIT-I

Discrete time signals and systems: Linear and shift-invariant system, stability and causality. Frequency domain representation of discrete time systems and signals. Sampling of analog signals.

UNIT-II

Discrete Fourier transform and its properties, Linear convolution using DFT. Decimation in time and decimation in frequency. FFT algorithms for radix-2 case, in place computation, bit reversal.

UNIT-III

FIR digital filter design techniques, properties of FIR digital filters, design of FIR filters using windows (Rectangular, Bartlet, Hamming and Blackman), realization and finite word length effects.

UNIT-IV

Butterworth and Chebychev approximation. IIR digital filter design techniques, Impulse invariant technique. Bilinear transform technique. Digital Butterworth, Chebychev filters, comparison of FIR and IIR filters.

UNIT-V

Introduction to DSP processors: Differences between DSP and other microprocessor architectures, their comparison and need for ASP, RISC and CISC CPU. General purpose DSP processors , TMS 320C 54xx processor, architecture, addressing modes – instruction set.

Suggested Reading:

1. Proakis John G, *Digital Signal Processing*, 3rd edition, Prentice Hall of India, 1998.
2. Sanjit, K.Mitra., *Digital Signal Processing*, 1st edition, Tata McGraw Hill, 1998;
3. A.V. Oppenheim and RW. Schaffer, *Discrete Time Signal Processing*, Prentice Hall India, 1994.
4. Johnny R. Johnson, *Introduction to Digital Signal Processing*, Prentice Hall of India, 1997.
5. K.K. Parhi, *"VLSI DSP Systems"*, John Wiley, 1999.

EC 353

ANTENNAS AND PROPAGATION

Instruction	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, Basic antenna parameters: patterns, radiation intensity, far field, near field, Gain and directivity, Antenna Polarization, effective aperture, aperture efficiency. Friis transmission formula. point sources, Current distribution, Hertzian dipole, monopole,

UNIT-II

Half-wave dipole, quarter wave monopole, Loop antenna, Effect of earth on vertical patterns, Far field pattern of circular loop with uniform current, Helical Antennas, Axial mode pattern, wideband characteristics of Helical Antenna, radiation efficiency, Q, Bandwidth, S/N ratio.

UNIT-III

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

UNIT-IV

VHF,UHF turnstile antennas, Rhombic Antenna, Yagi - Uda Array, Log periodic Antenna, Parabolic Reflector, Lens and Horn Antennas, (Working principle and characteristics only).

Antenna Measurements, Antenna Test Site, Impedance pattern and gain measurement techniques, Antenna temperature.

UNIT-V

Ground wave propagation, space and surface waves, Tropospheric refraction and reflection, Duct propagation, sky wave propagation, regular and irregular variations in ionosphere, Line of sight propagation. Microwave links.

Suggested Reading:

1. Balanis C A *"Antenna Theory Analysis and Design"* , 2nd Edn., John Wiley, 1997.
2. Jordan E C and Balmain K.G.,*"Electromagnetic Waves and Radiating Systems"*, 2nd Edn., PHI, 2001.
3. Krauss J D, Marhefka R J,and Ahmad S Khan, *"Antennas for all Applications"*, 3rd Edn. TMH 2006.

EC 354

MICROCONTROLLERS AND APPLICATIONS

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

UNIT-I

Microcontroller: Introduction to Microcontroller, RISC Vs CISC, Internal Architecture of 8051, Pin description, Memory organization and expansion. 8051 Instruction set: Addressing modes and Bit addressable features, Data transfer, Arithmetic, Logical & Branching Groups. Interrupt & I/o port structures and their operations. Assembly language Programming with 8051. 8051 Timer and counter, 8051 serial data communication and Interrupt Programming.

UNIT-II

Introduction to PIC Microcontroller: Architecture of PIC 16C6X/7X, Pin diagram, PIC reset actions, PIC oscillator connections, PIC memory organization. PIC 16C6X/7X instruction set, Addressing modes, I/O ports, interrupts in PIC 16C61/71, PIC 16C61/71 Timers, PIC 16C71 Analog to Digital converter & its Programming.

UNIT-III

Introduction to PIC16F8XX Flash microcontrollers: Pin diagram of 16F8XX, Architectural features, I/o Ports, & Timers, Interrupts in 16F877. Special features of 16F877; Capture/Compare/PWM modules, master synchronous serial port module (MSSP); SPI and I^2C buses, Universal Synchronous asynchronous receiver transmitter (USART), AD converter module.

UNIT-IV

Interfacing and Applications of Microcontrollers: Intel 8051/8031 interfacing with external memory, expansion of I/o ports.

Digital to Analog converter, Analog to Digital converter, 7-segment Display, LCD module, Stepper Motor, and Keyboard interfacing with 8051.

Brief ideas on Assembly Language Programming development systems & Tools, Real Time Clock.

UNIT-V

Industrial Applications of Microcontrollers: Measurement Applications using sensors, Linear variable Differential Transformer (LVDT), Angular speed measurement (RPM meter), Digital Thermometer, Digital PID controller, RTOS with 8051.

Suggested Reading:

1. Mazidi M.A, Mazidi JG, & Rolin D. Mckinlay *The 8051 Microcontroller & Embedded Systems, using Assembly and C* 2nd Edition, Pearson Education, 2007.
2. A.V.Deshmukh, *Microcontrollers Theory and applications* TMH 2007.
3. Ayala, K.J., *The 8051 Microcontroller Architecture, Programming and Applications,* Penram International, 2007.
4. Rajkamal, *Microcontrollers Architecture, Programming Interfacing and system Design,* Pearson Education 2007.
5. Peatman, J.N., *Design with PIC Microcontrollers,* Pearson Education, 2007.

CM 371

MANAGERIAL ECONOMICS AND ACCOUNTANCY

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

UNIT-I

Introduction to Economics and its evolution - Managerial Economics its scope, importance and relation to other sciences, its usefulness to engineers - Basic concept of Managerial economics.

UNIT-II

Demands Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting - Markets Competitive structures, price-output determination under perfect competition and Monopoly. (theory questions and small numerical problems can be asked).

UNIT-III

Theory of Production - Firm and Industry - Production function - input-out relations - laws of returns - internal and external economics of scale. Cost Analysis: Cost concepts - fixed and variable costs - explicit and implicit costs - out of pocket costs and imputed costs - Opportunity cost - Cost output relationship - Break-even analysis. (theory and problems).

UNIT-IV

Capital Management, its significance, determination and estimation of fixed and working capital requirements, sources of capital - Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.

(Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT-V

Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts Trial Balance concept and preparation of Final Accounts with simple adjustments - Analysis and interpretation of Financial Statements through Ratios.

(theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

Suggested Reading:

1. Varshney RL and KL Maheswari, *Managerial Economics*, Sultan Chand.
2. JC Pappas and EF Brigham, *Managerial Economics*.
3. Grawal TS. *Introduction to Accontancy*.
4. Maheswari S.N. *Introduction to Accountancy*.
5. Panday I.M. *Financial Management*.

EC 381

DIGITAL COMMUNICATIONS LAB

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

1. PCM generation & detection
2. Error control coding
3. Data formats / channel encoding and decoding
4. Linear Delta Modulation, Demodulation and errors.
5. Adaptive Delta Modulation, demodulation
6. FSK & ASK generation & Detection using digital IC's
7. PSK – binary, quadrature generation & detection
8. Minimum Shift Keying generation & detection
9. Optical Fibre measurements:
   Numerical aperture, Attenuation, E-O and O-E characteristics
10. Digital Fibre Optic Multiplexed Link (Voice & Data)
11. Study of Modem.
12. ARQ protocols
13. Wavelength Division Multiplexing
14. Study of Blocking type Digital switch(space division)

Note: Time division switches will be used in TDM

EC 382

DIGITAL SIGNAL PROCESSING LAB

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

(A) Experiments on DSK and CCS

1. Solution of difference equations
2. Impulse response
3. To verify linear convolution.
4. To verify circular convolution.
5. Study of procedure to work in real time.
6. Design of FIR (LP/HP) using windows a) Rectangular window b) Triangular window c) Hamming window
7. Design of IIR (HP/LP) filter.
8. Noise cancellation using adaptive filters.
9. To find FFT of a given 1-D signal and plot.

(B) Experiments on signal processing.

1. Laplace transforms
2. Fourier transforms
3. Z- Transforms
4. Discrete – time Fourier transform
5. Discrete fourier transform
6. Linear Convolution
7. Circular Convolution
8. Fast Fourier transform Algorithms : (Decimation in time and Decimation in Frequency)
9. FIR filter Design and Windowing

10.&11 IIR Filters : Butterworth, Chebysheve Type-1 & Chebyshev Type- 2 Filter

12. Sampling of Continuous time Signals
13. Power Spectrum estimation
14. System modeling

Note: MATLAB with different toolboxes' / 'MATHEMATICA'/ any popular software can be used for experiments of Section 'B'. Minimum 4 experiments from Part - A & Minimum 8 experiments from Part - B

EC 383

MICROCONTROLLER LAB

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

Note:

1. This Lab. Course will make use of:
   a) 8051 family of microcontroller.
   b) Assembly Language and C along with any suitable IDE for Embedded Systems (KIEL,RITES etc) & appropriate hardware.
2. Preliminary explanation of the features and use of the tools must be made in 2/3 theory periods with a small handout provided.

I. List of Experiments:

1,2,3. Familiarity and use of 8051 Microcontroller trainer – Instruction set for simple program (using 4 to 15 lines of instruction Code) for data transfer, manipulation, Arithmetic operations, Branching operations, logical operations and testing of "byte/bit patterns" in a given data.

4. Timer and Counter operations & Programming using 8051.

5&6. Interface applications using 8051 for D/A application, LCD (2x40, 4x20) modules.

7. Interfacing real time clock using 8051.
8. Interfacing Elevator simulator control using 8051.
9. Interfacing traffic signal control using 8051.
10. Pattern generation using LEDs.
11 Program to control stepper motor using 8051.
12. Switch input detection program using C and Assembly Language with and without the use of 8255 (PPI).
13. General purpose digital input/output module that covers switches, lamps and terminals using C.
14. Interfacing A/D using 8051.
15. 7-Segment display interfacing using 8051.

Suggested Reading:

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