

**Bachelor of Technology (Electronics and Communication Engg.)**  
**Scheme of Courses/Examination**  
**(7<sup>th</sup> SEMESTER)**

Sl. No.	Course No.	Subject	Teaching Schedule				Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P/D	Tot	Th	Sess	P/VV	Tot	
1	-----	Departmental Elective-I	3	1	-	4	100	50	-	150	3
2	-----	Departmental Elective-II	3	2	-	5	100	50	-	150	3
3	ECE-401E	VLSI Design	3	2	-	5	100	50	-	150	3
4	ECE-403E	Television Engineering	4	1	-	5	100	50	-	150	3
5	ECE-405E	Optical Communication	4	1	-	5	100	50	-	150	3
6	ECE-407E	Microwave Engineering	3	2	-	5	100	50	-	150	3
7	ECE-409E	Digital Signal Processing (Pr)			3	3		50	25	75	3
8	ECE-411E	Minor Project	-	-	3	3	-	75	50	125	3
10	ECE-413E	Practical Training Report	-	-	-		-	75	-	75	-
Total			20	9	6	35	600	500	75	1175	

**DEPARTMENTAL ELECTIVES-I**

1. ECE-415E Micro-controllers
2. ECE-417E Bio-medical Signal Processing
3. ECE-419E Reliability
4. ECE-421E Nanotechnology

**DEPARTMENTAL ELECTIVES-II**

1. ECE-423E Advanced Microprocessors
2. ECE-425E Artificial Intelligence and Expert Systems
3. ECE-427E Power Electronics

**B.TECH VIIth SEMESTER**  
**VLSI DESIGN**  
**(ECE-401E)**

L T P  
3 2 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

**UNIT 1 :**

NMOS & CMOS Fabrication Process Sequence, Basic electrical properties of NMOs & CMOS inverters, MOS Design Process : Stick Diagram & Design rules.

**UNIT 2 :**

Delay in MOS Circuits, Scaling of MOS Circuits, Some design examples, inverter, NAND gates, Multiplexer, Logic Function Block.

Introduction to physical design of IC's Layout rules & circuit abstractor, Cell generation, Layout environments, Layout methodologies, Packaging, Computational Complexity, Algorithmic Paradigms.

**UNIT 3:**

Placement : Partitioning, Floorplanning, Placement.

Routing : Fundamentals, Global Routing, Detailed Routing, Routing in FPGA's.

**UNIT-4:**

Performance issues in Circuit Layout : Delay models, Timing Driven placement, TimingDrivenRouting, Via Minimization, Power Minimization, other issues.

**NOTE:**

The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

**Suggested Books:**

1. Pucknell DA & Eshraghian K, Basic VLSI Design, PHI.
2. Sanfarazdeh M. & Wong C.K , An Introduction to VLSI Physical Design, Mc Graw Hill.
3. John P. Uyemura , Introduction to VLSI circuits and systems, John Wiley.

**B.TECH VII SEMESTER  
TELEVISION ENGINEERING  
(ECT-405E)**

L T P  
4 1 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

**UNIT – I:**

**ELEMENTS OF A TELEVISION SYSTEM :**

Picture transmission, sound transmission, picture reception, sound reception synchronization, receiver controls. Analysis and Synthesis of Television Pictures: Gross structure, image continuity, no. of scanning lines, flicker, fine structure, tonal gradation. Composite Video signal , channel B.W. Vestigial side band transmission and reception, TV standards.

**UNIT – II:**

**THE PICTURE TUBE :** Monochrome picture tube, Beam deflection, screen phosphor, face plate, picture tube characteristics, picture tube circuit controls. Television Camera Tubes: Basic principal, Image orthicon, Vidicon, plumbicon.

**MONOCHROME SIGNAL TRANSMISSION AND RECEPTION :**Block diagram of Monochrome Signal Transmitter and Receiver, Explanation of different sections, Transmitting and receiving antennas.

**UNIT-III**

**ELEMENTS OF COLOUR TV :**Introduction, compatibility considerations, Interleaving process, Three color theory, Chrominance Signal, composite color signal, comparison of NTSC, PAL and SECAM Systems. color television display tubes (Delta gun, PIL, Trinitron).

Color signal transmission, bandwidth for color signal transmission.

**UNIT – III:**

**ADVANCED TOPICS IN TV. ENGINEERING :**Introduction, & working and block diagram of the Projector TV, 3D-TV, HDTV, Digital TV, Camcorders.

**TELEVISION APPLICATIONS:** Cable television, CCTV, picture phone & facsimile, television via satellite, Remote Control ( Electronic control system ), Introduction to Digital TV Technology and their merits.

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**Suggested Books:**

1. AM Dhake, Monochrome and Colour TV, TMH.
2. R.R.Gulati, Colour TV.Engg. Wiley Eastern Ltd.
3. SP Bali, Colour TV theory & practice, TMH
4. Merrill I. Skolnik, Introduction to Radar Systems, TMH

**B.TECH VII SEMESTER  
OPTICAL COMMUNICATION  
(ECE-405E)**

L T P  
3 1 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

**UNIT – I:**

INTRODUCTION : Propagation within the fiber, Numerical aperture of fiber, diffraction, step index and graded index fiber, Modes of propagation in the fiber, Single mode and multi mode fibers. Splices and connectors.

**UNIT – II:**

LOSSES IN OPTICAL FIBER : Rayleigh Scattering Losses, Absorption Losses, Leaky modes, mode coupling losses, Bending Losses, Combined Losses in the fiber.

DISPERSION EFFECT : Effect of dispersion on the pulse transmission Intermodal dispersion, Material dispersion, Wave guide dispersion, Total dispersion, Transmission rate.

**UNIT – III:**

LIGHT SOURCES : LEDS, Laser Action in semiconductor Lasers, Semiconductor Lasers for optical communication – Laser modes, Spectral Characteristics, Power Voltage Characteristics, Frequency response.

DETECTORS : P-I-N Photodiode, APD Noise Analysis in detectors, Coherent and non-coherent detection, The fiber-optic Communication System, Infrared sensors(eg: TSOP 1738).

**UNIT – IV:**

OPTICAL NETWORKS: Optical coupler,space switches,linear divider-combiners,wavelength division multiplexer and demultiplexer,optical amplifier,optical link network-single hop ,multi-hop, hybrid and photonic networks.

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**Suggested Books:**

1. John Power, An Introduction to Fiber optic systems, McGraw Hill International.
2. John Gowar , Optical communication Systems.
3. R. Ramaswamy, Optical Networks, Narosa Publication

**B.TECH VII SEMESTER  
MICROWAVE ENGINEERING  
(ECE-407E)**

L T P  
3 2 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

**UNIT – I:**

**MICROWAVE RESONATORS:** Brief description of waveguides, coplanar waveguides, cavity resonators: rectangular, cylindrical, spherical and coaxial, excitation and coupling of cavities, Q factor.

**MICROWAVE MEASUREMENTS:** Measurement of frequency, impedance (using slotted section) attenuation, power, dielectric constant, measurement of V.S. W. R., insertion loss and permeability

**UNIT – II:**

**MICROWAVE GENERATORS:** Construction, characteristics, operating principle and typical applications of Klystron (two cavity, multicavity), Reflex Klystron, magnetron (Cylindrical magnetron and description of  $\Pi$  mode applications) and Traveling Wave Tube (TWT).

**UNIT – III:**

**MATRIX DESCRIPTION OF MICROWAVE CIRCUITS:** Scattering matrix-its properties, measurement of scattering coefficients, scattering matrices for common microwave systems.

**MICROWAVE COMPONENTS:** Waveguide tees- E-plane, H-plane, magic tee, rat race, directional coupler, tuning screws and stubs, isolators and circulators-their constructional features and applications. Microwave filters, Phase shifters, attenuators, Wavemeters.

**UNIT-IV.**

**SOLID STATE MICROWAVE DEVICES:**

Transferred electron devices- GUNN EFFECT; negative differential resistance phenomenon, field domain formation, GUNN diode structure.

Avalanche transit time devices: IMPATT, TRAPATT, BARITT diodes, Parametric amplifiers

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**Suggested Books:**

1. Samuel Y. Liao, Microwave Devices and Circuits, Prentice-Hall of India.
2. David M. Pozar, Microwave Engineering, John Wiley and sons Inc.
3. Das, Annapurna & Sisir K. Das, Microwave Engineering, Tata McGraw-Hill.
4. POZAR DM, Microwave Engg, John Wiley & Sons Inc.

**B.TECH VII SEMESTER  
DIGITAL SIGNAL PROCESSING PRACTICAL  
(ECE-409E)**

L T P  
- - 3

Viva-voce : 25  
Sessional : 50  
Time : 3 hrs.

**LIST OF EXPERIMENTS:**

1. Define a function to compute DTFT of a finite length signal. Plot the magnitude and phase plots using subplots. Use this function to obtain DTFT of a 21 point triangular pulse over the domain  $-10 < n < 10$ . Plot the results over  $-\pi < \omega < \pi$ .
2. Write a program to plot the following functions : a) impulse function b) unit step c) unit ramp d) exponential e) sinusoidal
3. Verify the Symmetry, time shifting and modulating properties of DTFT with a rectangular pulse of length 21.
4. Study the aliasing effect by using a Sinusoidal Signal. Show the plots of continuous time Signal. Sampled Signal and reconstructed signals by using subplot.
5. Study different window functions available in signal processing toolbox and their controlling parameters.
6. Write a program to plot real, imaginary phase and magnitude of exponential function.
7. Verify the properties of Discrete Fourier Transform (DFT).
8. Write a program to find the convolution of two sequences using in built convolution function
9. Study of Digital Signal Processing Kit (TMS/ADSP)
10. Implementation of FIR/digital filter using DSP Kit.

**NOTE:** At least 10 experiments are to be performed with atleast 7 from above list, remaining 3 may either be performed from the above list or designed & set by concerned institution as per the scope

## DEPARTMENTAL ELECTIVES-I

### B.TECH VIIth SEMESTER MICROCONTROLLERS (ECE-415E)

L T P  
3 1 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

#### UNIT 1:

INTRODUCTION :Comparing Microprocessors and Microcontrollers. Technological trends in Microcontrollers development. Survey of microcontrollers- 4 bit, 8 bit, 16 bit, 32 bit microcontrollers. Applications of microcontrollers.

#### UNIT 2:

8051 ARCHITECTURE :Block diagram, pin. Diagram of 8051. Functional descriptions of internal units, registers, PSW, internal RAM, ROM, Stack, Oscillator and Clock. I/O Pins, Ports and Circuits Connecting external memory. Counters and timers. Serial data interrupt. Serial data transmission /reception and transmission modes. Timer flag interrupt. External interrupt, software generated interrupts. External memory and memory space decoding, expanding I/Os, memory mapped I/O Reset & CLK Circuits.

#### UNIT 3:

8051 INSTRUCTION SET AND PROGRAMMING :8051 Instruction syntax, addressing modes, Data transfer instructions, logical instructions, arithmetic instructions, Jump and Call instructions. Interrupts and interrupt handler subroutines. Writing assembly Language programs. Time delays. Pure S/W time delays. S/W polled timer. Pure H/W delay. Lookup tables. Serial data transmission using time delays and polling. Interrupt driven serial transmission and reception.

#### UNIT 4:

8051 APPLICATIONS: Interfacing Keyboards Programs for small keyboards and matrix keyboards. Interfacing multiplexed displays, numeric displays and LCD displays. Measuring frequency and pulse width. Interfacing ADCs & DACs. Hardware circuits for handling multiple interrupts. 8051 Serial data communication modes- Mode 0, Mode 1, Mode 2 and Mode 3.

#### NOTE:

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#### Suggested Books:

1. K.J.Ayala, The 8051 Microcontroller – 2<sup>nd</sup> ed. Penram International.
2. Intel’s manual on “ Embedded Microcontrollers”

**DEPARTMENTAL ELECTIVE-I**  
**B.TECH VIIth SEMESTER**  
**BIOMEDICAL SIGNAL PROCESSING**  
**(ECE-417E)**

L T P  
3 1 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

**UNIT-I :**

Introduction: Importance of Computers in Signal Processing, Basic Electrocardiography ECG lead System, ECG Signal Characteristics, Signal Sampling. Signal conversion.

Digital Filters : Z- transform, elements of digital filters, Types of digital filters, Transfer function of a difference equation Z-plane pole-zero plot.

FIR Filters : Characteristics, Smoothing Filters, Notch Filters, Derivatives, Window Design, Frequency Sampling, Minimax Design.

IIR Filters : Generic Equations, One pole and two pole filters Integrators.

**UNIT-II:**

Integer Filters: Basic Design Concept, Low Pass, High Pass, Band Pass, Band reject filters, Effect of cascading of filters, fast operating design techniques.

Adaptive Filters : Principal noise canceller model, GO Hz. Adaptive Canceling, Applications.

**UNIT-III:**

Signal Averaging : Signal averaging as a digital filter, a typical averager, Software for signal averaging, limitations, Data Reduction Techniques – Turning Point Algorithm, AZTEC Algorithm, Fan Algorithm, Huffman Coding. Fourier Transform, Correlation, convolution, Power Spectrum Estimation.

**UNIT-IV:**

ECG QRS Detection: Power Spectrum of ECG, Band Pass Filtering Techniques, Differentiation Techniques, Template Matching, QRS Detection Algorithm.

ECG Analysis System : ECG Interpretation, ST Segment Analyzer, Portable Arrhythmia Monitor.

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**Suggested Books:**

1. WJ.Tompkin, Biomedical Signal Processing edition , PHI
2. JG Proakis, Digital Signal Processing , PHI
3. Salivahanan, Digital Signal Processing, Tata Mc-Graw Hill.



## DEPARTMENTAL ELECTIVES-I

### B.TECH VIIth SEMESTER

#### RELIABILITY

#### (ECE-419E)

L T P  
3 1 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

##### UNIT 1:

INTRODUCTION: Definition of reliability, failure data analysis, mean failure ratio, MTTF, MTBF, graphical plot, MTTF in terms of failure density, generalization, reliability in terms of failure density (integral form), reliability in other situation.

HAZARD MODELS: Introduction, constant hazard linearly increasing hazard, Weibull model, on density function and distribution function, and reliability analysis, important distribution and its choice, expected value, standard deviation and variance, theorem concerning expectation and variance.

##### UNIT 2:

SYSTEM RELIABILITY: Introduction, series system with identical component, reliability bounds-classical approach Bayesian approach application of specification hazard models, an r-out-of-an structure methods for solving complex system, systems not reducible to mixed configuration, mean time to failure system, logic diagrams, Markov model and graph.

RELIABILITY IMPROVEMENT AND FAULT TREE ANALYSIS: Introduction, improvement by component, redundancy, element redundancy, unit redundancy, optimization, stand by redundancy, reliability-cost trade off, fault tree construction, calculation of reliability from fault tree.

##### UNIT 3:

MAINTAINABILITY, AVAILABILITY AND REPAIRABLE SYSTEM: Introduction, maintainability, availability, system down time, reliability and maintainability trade off, instantaneous repair rate MTTR, reliability and availability function.

BAYESIAN APPROXIMATION AND RELIABILITY ESTIMATION: Introduction, Lindley's expansion, reliability estimation, normal, Weibull, inverse gaussian and Rayleigh.

##### UNIT 4:

RELIABILITY ALLOCATION AND APPLICATION: Reliability allocation for a series system, approximation of reliability in a computer system and nuclear power plant, failure models and effects analysis (FMEA)

##### NOTE:

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##### Suggested Books:

1. S. K. Sinha, Reliability and life testing, (WEL New Delhi).
2. L. A. Srinath, Reliability engineering, (EWP New Delhi).
3. Bal Guru Swami, Quality control and Reliability, (Khanna publisher New Delhi).

**DEPARTMENTAL ELECTIVES-I**

**B.TECH VII SEMESTER  
NANOTECHNOLOGY  
(ECE- 421E)**

L T P  
3 1 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

**UNIT 1**

Introduction to Nanotechnology, review of various techniques and tools, future prospects of nanotechnology, applications.

**UNIT 2**

Synthesis techniques of clusters, nanoparticles : classical nucleation theory for cluster formation, sputtering and thermal evaporation and laser methods for nanoparticles' synthesis, particle synthesis by chemical routes.

Synthesis of semiconductor nanoclusters.

**UNIT 3**

Properties of nanostructured materials :

Magnetic properties, electrical transport properties, non-linear optical properties.

Special nanomaterials

Porous silicon nanostructures – formation, optical properties; Fullerenes – synthesis, properties and application.

**UNIT 4.**

Nano electronics – Nanodevices, nanotransistors, nanoelectro optics, Nano structures in electronics.

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**Suggested Books:**

1. Camarata, R.C, Nanomaterials synthesis, properties and application . Institute of Physics Publication.
2. Madou, Fundamentals of microfabrication, Mcgraw Hill.
3. Sibelia, J.P , A Guide to material characterization, Prentice Hall.

**DEPARTMENTAL ELECTIVES-II**

**B.TECH VIIth SEMESTER  
ADVANCED MICROPROCESSORS  
(ECE-423E)**

L T P  
3 2 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

**UNIT-I**

INTEL'S X86 FAMILY :Introduction, Register set, data formats, addressing modes, interrupts, memory hierarchy, pipelining, segmentation, paging, real and virtual mode execution, protection mechanism, task management.

**UNIT-II**

ARCHITECTURE OF INTEL X86 FAMILY :CPU block diagrams, Pin diagrams and internal descriptions of 80286,386,486 and Pentium. Instruction formats. Intel X86 Instruction set. Assembler directives.

**UNIT-III**

ARITHMETIC CO-PROCESSORS : Data formats; 80287 architecture – Pin diagram, internal architecture, status register, control register; tag register. Instruction set – data transfer, arithmetic, comparison, transcendental operations, constant operations and control instructions. Interfacing 80287 with 80286 Programming examples.

**UNIT-IV**

HIGHER- CO-PROCESSORS :Introduction to 80387,80487.

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**Suggested Books:**

1. Daniel Tabak, Advanced Microprocessors (2<sup>nd</sup> ed) Mc Graw Hill Pub.
2. Barry B.Brey, The Intel Microprocessors (4<sup>th</sup> ed) PHI Pub.
3. DV-Hall , Microprocessors & Interfacing (2<sup>nd</sup> ed) Mc Graw Hill Pub.

## DEPARTMENTAL ELECTIVES-II

### B.TECH VII SEMESTER

#### ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (ECE- 425E)

L T P  
3 2 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

##### UNIT-I

Introduction: - Definition of AI, evolution of Computing, History of AI, Classical, Romantic and Modern period, subject area, Architecture of AI machines, logic family, conclusion.

Production System: - Production rules, the working memory, Recognize-act cycle, conflict resolution strategies, refractoriness, Regency, specificity, alternative approach for conflict resolution, Architecture of production system, conclusion.

##### UNIT-II

Propositional Logic: - Proposition, tautologies, Theorem proving in propositional logic, Semantic method of theorem proving, forward chaining, backward chaining, standard theorems in propositional logic, method of substitution, theorem proving using Wang's algorithm, conclusion.

Predicate Logic: - Alphabet of First order logic (FOL), predicate, well formed formula, clause form, algorithm for writing sentence into clause form, inflict of predicates, unification algorithm, resolution Robinson's inference rule, conclusion.

##### UNIT-III

Logic Programming and Prolog: - Logic program, Horn clause, program for scene interpretation, unification of goals, definite perform clause, SLD resolution, SLD tree, controlling back tracking, common use of cut, implementation of backtracking using stack, risk of using cuts, fail predicate, application of cut-fail combination, replace cut-fail by not, conclusion.

Default & Non monotonic reasoning: - Axiomatic theory, non-atomic reasoning using NML-I, problems with NML-I, reasoning with NML-II, truth maintenance system with example, conclusion.

##### UNIT-IV

Imprecision & Uncertainty: - Definition, Probabilistic technicians, Fuzzy reasoning, certainty factor based reasoning conditional probability, Baye's Theorem and its limitations, Bayesian belief network, propagation of belief, Dempster-Shafer theory of uncertainty management, belief interval, Fuzzy ration, inverse Fuzzy relations, Fuzzy post inverse, Fuzzy Inversion scope of neural network, EX-OR classifier, clustering by neural network, function approximation by neural net, retrieval of content, Fuzzy association memory, cognitive reasoning using fuzzy neural net, Hebbian learning, stability analysis.

Intelligent Search Technique: - Heuristic function, AND-OR graph, Heuristic search, A\* algorithm and examples.

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##### Suggested Book:

1. E.Charniak & D. McDermott , Introduction to Artificial Intelligence , Addison Wesley Longman.

## DEPARTMENTAL ELECTIVES-II

### B.TECH VIIth SEMESTER POWER ELECTRONICS

(ECE-427E)

L T P  
3 2 -

Theory : 100  
Sessional : 50  
Time : 3Hrs

#### UNIT-1.

INTRODUCTION :Role of power electronics, review of construction and characteristics of power diode, Schottky diode, power transistor, power MOSFET, SCR, DIAC, Triac, GTO, IGBT & SIT.

SCR: Ratings and protections, series and parallel connections, R, RC and UJT firing circuit and other firing circuits based on ICs and microprocessors

#### UNIT-2.

CONVERTERS :One, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms, output voltage equation, continuous and discontinuous modes of operation, input power factor of converter, reactive power demand, effect of source inductance, introduction to four quadrant / dual converter, power factor improvement techniques, forced commutated converter, MOSFET and transistor based converters.

#### UNIT-3

INVERTERS :Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray half bridge and full bridge inverters, McMurray -Bedford half bridge and bridge inverters, brief description of parallel and series inverters, current source inverter (CSI), transistor and MOSFET based inverters.

#### UNIT-4.

CHOPPERS : Basic scheme, output voltage control techniques, one, two, and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

CYCLOCONVERTERS : Basic principle of frequency conversion, types of cycloconverter, non-circulating and circulating types of cycloconverters.

#### TEXT BOOK:

1. Power Electronics : MH Rashid; PHI

#### REFERENCE BOOKS :

1. Power Electronics : PC Sen; TMH
2. Power Electronics : HC Rai; Galgotia
3. Thyristorised Power Controllers : GK Dubey, PHI
4. Power Electronics and Introduction to Drives : A.K.Gupta and L.P.Singh;Dhanpat Rai
5. Power Electronics: P.S Bhimra.

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