Sixth Semester

S. No.	Code	Subject	Periods			Evaluation	
			L	T	P	S	ESE
1	IEC-601	Digital Signal Processing	3	1	0	50	100
2	IEC-602	Digital Communication	3	1	0	50	100
3	IEC-603	Microprocessor & Application	3	1	0	50	100
4	IEC-604	Microelectronics Technology	3	1	0	50	100
5	IEC-605	Wireless Communication	3	1	0	50	100
6	Elective I	Nano Electronics/ Embedded Systems/Analog Signal Processing/Speech Processing	2	1	0	25	75
7	IEC-651	DSP+Digital Communication Lab	0	0	3	20	30
8	IEC-652	Industrial Automation Lab	0	0	3	20	30
9	IEC-653	Microprocessor Lab	0	0	3	20	30
10	IEC-654	Seminar	0	0	3	50	-
11	IGP-601	General Proficiency	-	-	-	50	--
		Total	17	6	12	435	665

IEC-601 : DIGITAL SIGNAL PROCESSING

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3 1 0

UNIT-I

DISCRETE TIME SIGNALS & SYSTEMS

Discrete time signals, Sequences, Sampling and reconstruction of continuous time signals. Discrete time systems. Time domain characterization of discrete time systems, discrete random signals, mean, Variance, Covariance and power spectral density.

8

UNIT-II

FREQUENCY DOMAIN ANALYSIS

Review of DFT algorithm, Frequency response of LTI systems, Frequency selective LTI systems. All pass systems, Minimum, Maximum and Mixed Phase systems.

8

UNIT-III

DESIGN OF IIR FILTERS

IIR filters design by impulse invariance, bilinear transformation, Matched Z Transform, Butterworth filter, Chebyshev filters and Elliptic filters..

8

UNIT-IV

DESIGN OF FIR FILTERS:

Symmetric and Antisymmetric FIR filters. Window function and their characteristics. Design of linear phase FIR filters using windows and frequency sampling method. Realization of IIR and FIR system..

8

UNIT-V

MULTIRATE DIGITAL SIGNAL PROCESSING

Introduction, Decimation, Interpolation, Sampling rate conversion, Design and Implementation of Direct Form, FIR Filter structure and poly phase filter structure.

8

TEXT BOOKS:

1. G. Prokis & D.G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4th Edition, Prentice Hall of India Print.
2. S. Salivahanan & C. Gnanapriya, Digital Signal Processing, 2nd Edition, Tata McGraw-Hill Publication, India.
3. S. K. Mitra, Digital Signal Processing,, 3nd Edition, Tata McGraw-Hill Publication, India

REFERENCE:

1. Lawrence R. Rabiner & Bernard Gold, Theory and application of digital signal processing, 2009 India Print, Pearson Education, India
2. Alan V. Oppenheim & Ronald W. Schafer, Discrete Time Signal Processing, Prentice Hall of India.

IEC-602 : DIGITAL COMMUNICATION

L T P
3 1 0

UNIT-I

ELEMENT OF DIGITAL COMMUNICATION AND INFORMATION THEORY

Model of a Digital Communication System, Uncertainty, Information, Entropy, Source Coding theorem, Prefix coding, Shannon-Fanno, Huffman Coding, Channel Coding Theorem, Discrete memory less channel, Channel Capacity Theorem

8

UNIT-II

WAVEFROM CODING TECHNIQUES

Pulse Code modulation, Quantization noise and signal to noise ratio, Robust quantization: non uniform quantizer, A-law, μ-law companding, differential pulse code modulation (DPCM), adaptive DPCM, delta modulation(DM): idling noise and slope overload, adaptive delta modulation(ADM), Discrete PAM signals : Line Coding and Its Properties, and their Power Spectra (No Derivation)
Inter symbol interference, Nyquist Criterion for distortion-less baseband binary transmission, Raised Cosine Spectrum,
Correlation receiver, Matched Filter Receiver, maximum likelyhood estimation.

8

UNIT-III

DIGITAL MODUALTION TECHNIQUE

Coherent Binary modulation techniques: BASK, BPSK, BFSK
Coherent quadrature-modulation techniques: QPSK, MSK
Non-coherent Binary modulation techniques: BASK, BFSK, DFSK
Comparison of Binary and Quaternary Digital Modulation Techniques

8

UNIT-IV

ERROR CONROL CODING

Rationale for coding and types of Codes, Error Free Communication Over Noise Channel, Hamming sphere, Linear Block Codes: syndrome decoding, Hamming and Hamming bound distance, Cyclic codes: generator polynomial, parity check polynomial, Encoder and syndrome calculation, Convolution codes:, code tree, trellis and state diagram, Viterbi Algorithm.

8

UNIT-V

SPREAD SPECTRUM MODULATION

Pseudo noise sequence, Spread spectrum, Direct sequence spread coherent BPSK Frequency hopping spread spectrum

Applications: Code division multiple access, multipath suppression

Examples- Fast and slow hopping- Demodulation schemes

Synchronization- Tracking and Acquisitions..

8

TEXT BOOKS:.

4. Haykin Simon, Digital Communication Systems, 2005 reprint, John Wiley & Sons India.

REFERENCE:

1. Bernard Sklar, Digital Communications: Fundamentals & Applications, 2nd Edition, Pearson Education India.
2. B.P. Lathi & Zhi Ding, Modern Digital & Analog Communication Systems, 4th Edition, Oxford University Press, India.
3. John Proakis & Masoud Salehi, Digital Communication,5th Edition, Tata McGraw-Hill Publication, India
4. R.P.Singh & S.D.Sapre, Analog & Digital Communication Systems, 2nd Edition, Tata McGraw-Hill Publication, India
5. Blake, Electronic Communication System, Cengage Learing/Second Edition

IEC-603 : Microprocessor and its Applications

L T P
3 1 0

UNIT-I

Introduction to Microprocessor

Introduction to 8-bit Intel microprocessors, pin configuration, architecture, register organization , PSW, machine instructions and addressing modes, instruction format execution, timing & control, bus interface, interrupt structures.

8

UNIT-II

Assembly Language Programming

Instruction format, classification and description of instructions, assembler directives and operators, Translation of assembler instructions.

8

UNIT-III

Introduction to 16 bit intel microprocessor and modular programming

Pin configuration, architecture, register organization ,PSW, machine instructions, addressing modes, 8088,8087, Linking and relocation, stacks, procedures, interrupts and routines, macros, program design and examples

8

UNIT-IV

I/O Interfacing

I/O interfacing programmed and interrupt driven I/O,DMA ,parallel (8255 PPI),and series (8250/8251,std RS232) I/O,8259, 8237 and 8253/8254 controllers, memory interfacing and organization.

8

UNIT-V

Microprocessor Interfacing and Applications

Keyboard and alphanumeric display interfacing, interfacing of light and temperature sensors, A/D(0808/0809ADC) and D/A(DAC IC 1408) conversions.

Advances microprocessor : Introduction and features of 80X86 and Pentium processors.

Introduction of microcontroller (8051): Architecture and pin diagram

8

TEXT BOOKS:

1. Gaonkar, Ramesh S/Microprocessor Architecture, programming and applications with the 8085/Pen ram International Publishing.

REFERENCE:

1. Liu & Gibson/Microcomputer Systems 8086/8088 Family/PHI /2nd Edition.
2. Hall, D.V./Microprocessor and Interfacing//McGraw-Hill Education India/ Second Edition.

IEC-604 : MICROELECTRONICS TECHNOLOGY

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3 1 0

UNIT-I

Introduction to Integrated Circuit-Bipolar, MOS, BICMOS, basic circuits and structures, Silicon Wafer preparation and characterization-lapping, polishing, cleaning, resistivity measurement using 4Point probe ,crystal orientation, n type, p type, defects in crystal.

8

UNIT-II

Thermal Oxidation: Dry, Wet and Steam oxidation, estimation of oxide layer thickness, furnace for oxidation system, plasma oxidation, dopant distribution at the interface Diffusion of Dopant: Diffusion equation, dopant profile for constant source and limited source, diffusion, sheet resistance, diffusion furnace and accessories for solid, liquid and gaseous sources, measurement of sheet resistance.

ION IMPLANTATION: Ion implantation equipment, ion implantation techniques, range and distribution, dopant profile, annealing.

8

UNIT-III

EPITAXY: Epitaxial reactor, Vapor Phase epitaxial processes for doped silicon, donor and acceptor atoms redistribution during epitaxy

CHEMICAL VAPOUR DEPOSITION CVD processes for polysilicon and dielectric films in IC fabrication.

8

UNIT-IV

PHOTOLITHOGRAPHY AND MASK MAKING: Techniques for pattern transfer mask making, negative and positive photoresist chemicals, etching techniques. Introduction to Electron Beam and X-Ray Lithography

8

UNIT-V

Basic Techniques for Bipolar Integrated Circuits Multiemitter, and Schottkey transistor formations for TTL and IILCircuits MOSFET and MOSIC FABRICATION TECHNIQUES: Metal gate, poly silicon gate, process steps for making N-Channel, P-Channel and CMOS integrated circuits Faults in

Integrated Circuits, Fault Detection and Fault Modeling Die Bonding and Wire Bonding, Dicing and Encapsulation, Types of packages for SSI to VLSI chips

8

References:

1. S Gandhi, VLSI fabrication principles (II edition, John Wiley, 1994)

2. S A Cambell, The science and engineering of Microelectronic fabrication by Oxford University Press 1996

3. S M Sze(ED.) VLSI technology , Mc. Graw Hill International Student Ed., 1988

IEC-605 : WIRELESS COMMUNICATIONS

L T P
3 1 0

UNIT-I

Evolution of wireless systems:

Introduction to 1G,2G,3G & 4G systems, RF propagation, reflection, diffraction, scattering, propagation models, multipath fading, types of fading

6

UNIT-II

Mobile communication concepts

Mobile channels description, mobile call, frequency reuse, handoff strategies, co channel and adjacent channel interferences, improving coverage and capacity in cellular systems, cell splitting, sectoring, microcell zone.

10

UNIT-III

Multiple access techniques

SDMA, FDMA, TDMA, CDMA & it's spectrum efficiency

Wireless networks: ATM, Paging, WLL, Bluetooth, RFID & Cognitive radio

8

UNIT-IV

Wireless Systems & Standards

GSM, personal satellite communication system, CDMA2000, WCDMA, 3G systems, UMTS

6

UNIT-V

Traffic Engineering

Network traffic load and parameters, grade of service and blocking probability,

Markov processes, birth-death processes, Poisson arrival process, holding time of calls, blocking models and loss estimates, lost calls cleared systems with infinite and finite subscribers, lost calls returned systems and lost calls held system, Delay systems and Erlang C formula.

8

Text Book:

1. T.S.Rapparort, "Wireless Communications : Principle & Practice", 2nd Edition, Prentice Hall of India.

2. T. Viswanathan/Telecommunication Switching Systems And Networks/PHI.

References:

6. William C.Y.Lee, “Mobile cellular telecommunications Analog & Digital systems”, Tata Mc Graw Hill, India.
7. Pandya, “Mobile & personal communication Services & system”, Prentice Hall of India Print.
8. Feher, “Wireless Digital communications: Modulation & spread spectrum Applications”, Prentice Hall of India Print.

IEC-011 : Nano Electronics

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2 1 0

UNIT-I

The development of microelectronics, region of nano structure, challenge initiated by nano electronics, Band diagram of semiconductor technological process for micro miniaturization. Estimated optoelectronics,

Basis of Nano electronics: Electromagnetic fields & photons, Quantization of Action, charge and flux, electron behaving waves(Schrodinger Equation), Electrons in Potential wells, photons interacting with Electrons in solids, diffusion process, Data and bits, data processing.

7

UNIT-II

Biochemical and quantum- mechanical computers, DNA computer, parallel processing, quantum computer Parallel Architectures for Nanosystems, Mono and multiprocessor systems, Architecture of parallel processing in Nanosystems, Processors with large Memories , SIMD and PUP Architecture

Soft computing and Nanoelectronics, Fuzzy systems, Evolutionary Algorithms, Computational intelligence systems, Neural Network in Nanoelectronics, Local Processing

7

UNIT-III

Integrated switches and basic circuits: Ideal and real switches. Threshold Gates, Fredkin Gate, Quantu, Electronics Devices, short channel MOS Transistors, Split Gate Transistors, Quantum Cellular Automata, Quantum DoArray, Switches based on Fullerenes and Nanotubes, Polymer Electrons, Optical Molecular Memories. Tunneling diode, Resonant Tunneling Diode(RTD), Digital Circuits based on RTDT,RTDT mobile, RTDT Threshold gate, RTDT Multiplexer, Single Electron Transistor(SET): Performance of single electron transistor technology, logic and memory circuits, SET Adder, Comparison between FET and SET

7

UNIT-IV

Nanoelectronics with super conducting devices, The Macroscopic model, Cryotron, the Josephson Tunneling device, Memory cell, super conducting quantum interferometer device. Flux quantum device: LC gate, single flux quantum device. Limits of integrated electronics: Energy supply and heat dissipation, the limits due to thermal particles motion, thermal noise, reliability as limiting factor, physical limits, equal failure rates by tunneling and thermal noise.

Uncertainties in development of nano electronics

7

Text Books:

1. Karl Goger, Peter Glosekotter, Jan Dienstuhel : Nanoelectronics & NanoSystems (Pub: Springer)

IEC-012 : Embedded System Design

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UNIT-I

Introduction: Embedded systems and its applications, embedded operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design

Hardware Fundamentals for the embedded developers Digital circuit parameters: Open collector outputs, Tristate outputs I/O sinking and sourcing, PLD‟s, Watchdog timers, Hardware design and development Custom Single Purpose Processors: Optimizing program, FSMD, Data path and FSM.

General purpose processors and ASIP‟s (Application Specific Instruction set Programming):Software and operation of general purpose processors-Programmers, View development environment ASIPs, Microcontrollers-DSP Chips.

10

UNIT-II

Introduction to Microcontrollers and Microprocessors, Embedded versus external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures.

5

UNIT-III

8051 Microcontrollers: Assembly language, architecture, registers, Addressing modes, Instruction set, I/O ports and memory organization, interrupts, Timer/Counter and serial communication.

7

UNIT-IV

RTOS-Tasks, states, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes Advanced Processor(only architectures),80386,80486 and ARM(References)

7

Text Books:

1. Embedded System Design-Frank Vahid/Tony Givargis,John Wiley@2005

2. Microcontroller(Theory and Applications) Ajay V Deshmukh,Tata McGraw Hill@2005

3. An Embedded Software Primer-David E. Simon,Pearson Education@1999

Reference Books:

1. The 8051 Microcontroller and embedded systems-Muhammad Ali Mazidi and Janice Gillespie.

2. Microcontrollers(Architecture,Implementation and programming) Kenneth Hintz,Daniel Tabak,Tata McGraw –Hill@2005

IEC-013 : Analog Signal Processing

L T P
2 1 0

UNIT-I

Liner Analog Functions

Addition, Subtraction, Differentiation, Integration, Impedance Transformation and Conversion.

8

UNIT-II

AC/DC Signal Conversion

Signal Rectification, Peak and Valley Detection, rms to dc Conversion, Amplitude Demodulation.

8

UNIT-III

Other Nonlinear Analog Functions

Voltage Comparison, Voltage Limiting(Clipping), Logarithmic Amplifiers, Analog Multipliers, Analog Dividers

8

UNIT-IV

Analog Signal Filtering

Filtering & Filter design, Different component used in filter design, LP, HP, BP, Notch & All Pass Filter design.

8

Text Book:

1. Ramon Pallas-Areny & John G. Webster/Analog Signal Processing/Wiley India Publication

IEC-014 : Speech Processing

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2 1 0

UNIT-I

Fundamental of Speech

Speech Signal & it's type, Phonetics, Voiced & Unvoiced decision making, Different type Audio files, Fundamental frequency of speech.

8

UNIT-II

Parameter of Speech

Calculation of pitch frequency & pitch period, Cepstral domain, Formats & their relation with LPC, Evaluation of formats using Cepstral, Log Spectrum & Power Spectral Density Estimate.

8

UNIT-III

Spectral Parameter of Speech

Homomorphic processing, Cepstral analysis of speech, Perceptual Linear Prediction, Low frequency Power Coefficient, Rasta PLP, STFT, Wavelet transform analysis of speech

8

UNIT-IV

Speech Quantization & Coding

Uniform & Non uniform quantizer and coder, Companded quantizer, waveform coding of the speech & compreison of different waveform coding techniques, Parametric & sinusoidal speech coding technique, multimode speech coding, Transform domain coding of speech

8

Text Books:

1. Dr. Shaila D. Apte/Speech and Audio Processing/Wiley India Publication.

Reference Books:

2. B. Gold and Nelson Morgon/Speech and audio signal processing/Wiley India Publication.