Uttarakhand Technical University, Dehradun

Scheme of Examination as per AICTE Flexible Curricula

Evaluation Scheme & Syllabus for B. Tech Third Year

W.E.F. Academic Session 2020-21

V & VI SEMESTER

Bachelor of Technology (B. Tech.)

[Electronics & Communication/Electronics & Telecommunication Engineering]

Uttarakhand Technical University, Dehradun

New Scheme of Examination as per AICTE Flexible Curricula

Bachelor of Technology (B.Tech.) III Year
[Electronics & Communication Engineering]
W.E.F. Academic Session 2020-21

V Semester

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credit
				Theory			Practical						
				End Sem	Mid Sem	Quiz / Assignment	End Sem	Term Work /Lab Work & Sessional		L	T	P	
1.	EC 501	DC	Microprocessors & Interfacing	100	30	20	30	20	200	3	0	2	4
2.	EC-502	DC	Digital Communication	100	30	20	30	20	200	2	1	2	4
3.	EC-503	DE	Departmental Elective	100	30	20	-	-	150	3	1	0	4
4.	EC-504	OE	Open Elective	100	30	20	-	-	150	3	1	0	4
5.	EC-505	D Lab	CSNT Lab				30	20	50	0	1	2	2
6.	EC-506	O/E Lab	Matlab Programming & PCB Design and Fabrication	-	-	-	30	20	50	0	1	3	2
7	EC-507	IN	Evaluation of Internship-II completed at II year level	-	-	-	-	100	100			4	2
8	EC-508	P	Minor Project – I	-	-	-		100	100	0	0	6	3
9		IN	Internship -III	To be completed any time during Fifth/ Sixth semester. Its evaluation/credit to be added in Seventh semester.									
Total				400	120	80	120	280	1000	11	5	19	25
NSS/NCC													

Departmental Electives			Open Electives	
EC 503(A)	CNTL		EC-504(A)	Electromagnetic Theory
EC 503(B)	Computer System Organisation		EC-504(B)	IC Technology
EC 503(C)	Advanced Control System		EC-504(C)	Process Control Instrumentation
			EC-504 (D)	Innovation and Entrepreneurship

VI Semester

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credit
				Theory			Practical						
				End Sem	Mid Sem	Quiz / Assignment	End Sem	Team Work / Lab Work & Sessional		L	T	P	
1.	EC 601	DC	Digital Signal Processing	100	30	20	30	20	200	3	1	2	5
2.	EC-602	DC	Antenna and Wave Propagation	100	30	20	30	20	200	3	1	2	5
3.	EC-603	DC	Data Communication and Networking	100	30	20	30	20	200	2	1	2	4
4.	EC-604	DE	Departmental Elective	100	30	20	-	-	150	3	1	0	4
5.	EC-605	OE	Open Elective	100	30	20			150	3	1	0	4
6.	EC-606	O/E Lab	Microcontroller & Embedded System Lab	-	-	-	30	20	50	0	0	4	2
7	EC-607	P	Minor Project -II					50	50	0	0	4	2
		IN	Internship - III	During 5/6 semester									
Total				500	150	100	120	130	1000	14	5	14	26

Note: Meaning of Last Character of Subject Code (T – Theory; P – Practical)

Departmental Electives		**Open Electives**	
EC 604(A)	Cellular & Mobile Communication	EC-605(A)	Microcontroller and Embedded Systems
EC 604(B)	CMOS Design	EC-605(B)	Bio Medical Electronics
EC 604(C)	Satellite Communication	EC-605(C)	Power Electronics

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Electronics & Communication Engineering V-Semester
EC501 MICROPROCESSOR AND INTERFACING

UNIT I

Salient features of advanced microprocessors. RISC & CISC processors. Review and evolution of advanced microprocessors: 8086, 8088, 80186/286/386/486/Pentium, introduction to 8086 processor: Register organization of 8086, Architecture, signal description of 8086, minimum mode 8086 systems and timings and maximum mode 8086 systems and timings , Knowledge on iCore processors.

UNIT II

Intel 8086 microprocessor programming: 8086 Instruction Set, Addressing modes, Assembly Language Programming with Intel 8086 microprocessor

UNIT III

Introduction to the various interfacings chips like 8155, 8255, Interfacings key boards, LEDs , ADC, DAC and memory Interfacing.

UNIT IV

General purposes programmable peripheral devices: Timer (8253/8254), 8259A programmable interrupt controller & 8257 DMA controller, USART, serial I/O & data Communication. Interfacing Programs for chips

UNIT V

Introduction to 8bit and 16 bit microcontrollers and embedded systems, 8051 architecture, pin description , I/O configuration , interrupts, addressing modes instruction set, embedded system, use of microcontrollers in embedded systems, Display systems using microcontrollers

Reference Books:

1. Advance microprocessor and peripheral –A.K. Ray and K. M. Bhurchandi, Tata Mcgraw Hill
2. Microprocessor and Interfacing – D.V.Hall, McGraw Hill.
3. The Intel microprocessor - Barry B. Brey, Pearson
4. The 8086 & 8088 Microprocessor- LIU and Gibson, Tata McGraw Hill
5. GS Tomar, Advanced Microprocessors and Interfacing, Sun India Pub
6. The 8051 microcontroller and embedded systems-M.A. Mazidi, Janice GillispieMazidi, Pearson Prentice Hall

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Electronics & Communication Engineering V-Semester

EC502 DIGITAL COMMUNICATION

Unit I

Sampling theorem for low pass and band pass signals, Ideal sampling, Natural sampling, Flat top sampling, crosstalk, aliasing, time division multiplexing, PAM, PWM and PPM their generation and detection.

Unit II

Pulse code modulation, Quantization, quantization noise, companding, Inter symbol interference, Eye pattern, Delta and adaptive modulation, Encoding techniques: On-Off signaling, Polar signaling, RZ signaling, Bipolar signaling, AMI, Manchester code, Differential encoding their advantage and disadvantages.

Unit III

Band pass data transmission: ASK, Binary phase shift keying (BPSK), QPSK, DPSK, coherent and non coherent BFSK, minimum shift keying, QAM, Concept of M-ary PSK and M-ary FSK. Spectral properties of QPSK and MSK.

UNIT IV

Matched filter and correlator detector. Gram Schmidt orthogonalization procedure and concept of signal space for the computation of probability of error, calculation of error probability for BPSK, QPSK, QAM and coherent BFSK, comparison of different modulation techniques.

Unit V

Concept of information theory, entropy, information rate, channel capacity, Shannon's theorem, Shannon Hartley theorem , BW and signal to noise ratio trade off, sources encoding, extension of zero memory source, Error correcting codes**:** linear block codes and cyclic codes: encoder and decoder circuits, burst error correcting codes, concept of convolution codes.

Reference Books:

1. Communication Systems –Simon Haykins, Wiley
2. Principle of Communication Systems-Taub and Schilling, Tata McGraw-Hill
3. Communication Systems-Singh and Sapre, Tata McGraw-Hill

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering V-Semester
Departmental Elective EC- 503 (A) Communication Network and Transmission Lines (CNTL)

Unit I
Characteristic Parameters of symmetrical and asymmetrical two port networks and their design Image impedance, iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient , iterative transfer coefficient, Lattice and Bridged T networks, reactive matching networks, matching techniques, insertion loss, symmetrical and asymmetrical attenuators and their design.

Unit II
Passive LC Filters Analysis and design of Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, Filter specifications, Butterworth approximation, Chebyshev approximation, elliptic function approximation, frequency transformation.

Unit III
Positive real function LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune's method, Bott-Duffin method, Synthesis-Coefficient.

Unit IV
Transmission line fundamentals Lumped parameter equivalent, voltage and current on a transmission line, infinite line, characteristic impedance and propagation constant, waveform distortion, attenuation and phase equalizers, distortion-less line, loading, liner reflection on a line, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection loss, insertion loss, T and π equivalents of a line, location of line fault, construction and design of two wire line and coaxial cable. Academic Session 2017-18

Unit V
Line at radio frequencies Parameters of line and coaxial cable at radio frequencies, dissipation-less line, voltage and current on a dissipation-less line, standing waves, standing wave ratio, input impedance of open circuit and short circuit, power and impedance measurement on lines, eighth-wave, quarter-wave and half wave line, circle diagram, Smith chart, solution of problems using Smith chart, single and double stub matching .introduction to micro-strip lines and its analysis.

References:
1. Ryder: Networks and Transmission Lines, PHI Learning.
2. Valkenberg: Introduction to Modern Network synthesis, Wiley India.
3. Suresh: Electric Circuits and Networks, Pearson Education.
4. Raju: Electromagnetic field theory and Transmission Lines, Pearson Education.
5. Ganesan: Transmission Lines and Waveguides, TMH.
6. Rao: Electromagnetic Waves and Transmission Lines, PHI learning.

Uttarakhand Technical University, Dehradun

New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering V-Semester
Open Elective EC- 504 (B) Computer System Organization

Unit-I

COMPUTER BASICS AND CPU Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro-operations, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer.

Unit-II

CONTROL UNIT ORGANIZATION Hardwired control unit, Micro and nano programmed control unit, Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming,
ARITHMETIC AND LOGIC UNIT Arithmetic Processor, Addition, subtraction, multiplication and division, Floating point and decimal arithmetic and arithmetic units, design of arithmetic unit.

Unit-III

INPUT OUTPUT ORGANIZATION Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor.
Data transfer – Serial / parallel, synchronous/asynchronous, simplex/half duplex and full duplex.

Unit-IV

MEMORY ORGANIZATION Memory Maps, Memory Hierarchy, Cache Memory -Organization and mappings. Associative memory, Virtual memory, Memory Management Hardware.

Unit-V

MULTIPROCESSORS Pipeline and Vector processing, Instruction and arithmetic pipelines, Vector and array processors, Interconnection structure and inter-processor communication.

Books:

1. Morris Mano: Computer System Architecture, Pearson Education.
2. William Stallings: Computer Organization and Architecture, PHI
3. Carl Hamacher: Computer Organization, TMH
4. Tanenbaum: Structured Computer Organization, Pearson Education

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Electronics & Communication Engineering V-Semester
Departmental Elective EC- 503 (C) ADVANCED CONTROL SYSTEM

Unit I Advantages and disadvantages of digital control system, Ideal sampler, sampled and hold circuit, zero order hold circuit, Z transform, Inverse Z transform by various method, mapping between s plane and Z plane, solution of the linear difference equation.

Unit II Pulse transfer function, general procedure for obtaining pulse transfer function, pulse transfer function of cascaded elements, pulse transfer function of closed loop systems. Transfer function of discrete data system, stability analysis of closed loop system in the z plane, Jury stability test.

Unit III Non Linear Systems: introduction , common physical non linearity's, phase plane method , basic concepts ,singular points, stability of non linear system , construction of phase trajectories, system analysis by phase plane method, Describing functions methods, basic concepts derivation of describing function, liapunov's stability criterion.

Unit IV Review of root locus, lead compensation, lag compensation, lag- lead compensation and their comparison, review of state space methods, observability and controllability of system , pole placement by state feedback.

UnitV Tuning rules of PID controller, modifications of PID controllers, Introduction to software package used in control systems- MATLAB SIMULINK.

Reference Books:
1. Automatic control system—B. C.Kuo, wiley
2. Control system engineering—Nagrath & gopal, Publishers: New Age International
3. Modern control engineering –K. Ogata, Pearson; 5 edition
4. Control system engineering—Norman Nise, **P**ublisher: Wiley
5. Discrete time Control system— K. Ogata, Pearson; 2 edition

Uttarakhand Technical University, Dehradun
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Electronics & Communication Engineering V-Semester
Open Elective EC- 504 (A) ELECTROMAGNETIC THEORY

Unit I
Steady Electric Field: Coulomb's Law, units, Electric field intensity, Electric flux and flux density, Gauss law, Boundary relations, concept of divergence, Curl, scalar and vector potential. electric field in dielectric and conductor, continuity equation, methods of images.

Unit II
Magnetic field due to steady currents, force between current carrying wires, Stokes theorem, vector magnetic potential, magnetization vector and its relation to magnetic field.

Unit III
Maxwell's Equation**:** Time varying field and displacement current, faraday's law.

Unit IV
Wave Equation: Pointing vector, Plane electromagnetic waves in free space, dielectric medium and conducting medium, Skin depth, slepian vector.

Unit V
Waves propagation in lossy dielectrics, plane waves in lossless dielectrics, reflection of a plane wave at normal incidence, reflection of a plane wave at oblique incidence .

Reference Books:
1. Elements of Engineering Electromagnetic Third Edition- N.N. Rao- Prentice Hall, India.
2. Elements opf Electromagnetic, Second Edition- Matthew N.O. Sadiku- Saunders coll Publishing.
3. Fields & Waves in Communication Electronics- S.Ramo, J.R. Whinnery& T. Van Duzer- John Wiley & Sons.
4. Electromagnetic- J.D. Kraus-McGraw Hill
5. Electromagnetic Waves & Radiating Systems- E.C. Jordan & K.G. Balmain- Prentice Hall.

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Electronics & Communication Engineering V-Semester
Open Elective EC- 504 (B) IC Technology

UNIT-I

Semiconductor technology trend, Clean rooms, Wafer cleaning, Phase diagram and solid solubility, Crystal structure, Crystal defects, Czochralski growth, Bridgman growth of GaAs, Float Zone growth, Wafer Preparation and specifications

Unit -2

Deposition: Evaporation, Sputtering and Chemical Vapor Deposition, Epitaxy: Molecular Beam Epitaxy, Vapor Phase Epitaxy, Liquid Phase Epitaxy, Evaluation of epitaxial layers, Silicon Oxidation: Thermal oxidation process, Kinetics of growth, Properties of Silicon Dioxide, Oxide Quality, high κ and low κ dielectrics, Diffusion: Nature of diffusion, Diffusion in a concentration gradient, diffusion equation, impurity behavior, diffusion systems, problems in diffusion, evaluation of diffused layers, Ion Implantation: Penetration range, ion implantation systems, process considerations, implantation damage and annealing

Unit-3

Etching: Wet chemical etching, dry physical etching, dry chemical etching, reactive ion etching, ion beam techniques, Lithography: Photoreactive materials, Pattern generation and mask making, pattern transfer, Electron beam, Ion beam and X-ray lithography, Device Isolation, Contacts and Metallization: Junction and oxide isolation, LOCOS, trench isolation, Schottky contacts, Ohmic contacts, Metallization and Packaging, CMOS Process Flow: N well, P-well and Twin tub

Unit 4

Semiconductor Measurements: Conductivity type, Resistivity, Hall Effect Measurements, Drift Mobility, Minority Carrier Lifetime and diffusion length, Packaging: Integrated circuit packages, Electronics package reliability, Testing: Technology trends affecting testing, VLSI testing process and test equipment, test economics and product quality

Unit 5

SOI Technology: SOI fabrication using SIMOX, Bonded SOI and Smart Cut, PD SOI and FD SOI Device structure and their feature, GaAs Technologies: MESFET Technology, Digital Technologies, MMIC technologies, MODFET and Optoelectronic Devices, Silicon Bipolar Technologies: Second order effects in bipolar transistor, Performance of BJT, Bipolar processes and BiCMOS

Reference Books:

1. VLSI Technology, S.M. Sze
2. Physics of Semiconductors, S.M. Sze

Uttarakhand Technical University, Dehradun

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Electronics & Communication Engineering V-Semester
Open Elective EC- 504 (C) Process Control Instrumentation

Unit-I

Introduction: Historical Perspective, incentives of process control, synthesis of control system. Classification and definition of process variables. Mathematical modeling: Need and application of mathematical modeling, Lumped and distributed parameters, Analogies, thermal, Electrical, and chemical systems, Modeling of CSTR, Modeling of heat exchanger, Interactive and non-interactive type of system, Dead time elements, Developing continuous time and discrete time models from process data.

Unit-II

Control Modes: Definition, Characteristics and comparison of on-off, proportional, Integral, Differential, PI, PD, PID, Dynamic behavior of feedback controlled processes for different control modes, Control system quality, IAE, ISE, IATE criterion, Tuning of controllers Ziegler-Nichols, Cohen-Coon Methods, controller trouble shooting.

Unit-III

Realization of Control Modes: Realization of different control modes like P, I, D in Electric, Pneumatic, Hydraulic controllers. Use of DDC and PLC, Process monitoring, man machine interface, real time systems: RTS introduction and its characteristics.

Unit-IV

Actuators: Hydraulic, Pneumatic actuators, Solenoid, E-P converters, control valves, Types, Functions, Quick opening, Linear and equal percentage valve, Ball valves, Butterfly valves, Globe valves, Pinch valves, valve application and selection, Cavitations and flashing, Dampers and variable speed Drives.

Unit-V

Advanced Controls: Introduction to advanced control system like Cascade, Feed forward, Ratio, Selective, Override, Split range and Auctioneering control, Plant wide control. PI Diagrams: Symbols, Terminology, Case studies, a brief study of instrumentation and control relevant to industries.

References:

1. Dale Patrick, Stephen Fardo, “Industrial Process Control System”.
2. Shinskey F.G., “Process Control System”, III Ed., McGraw Hill.
3. Smith C.A. & A.B. Corripio, “Principle & Practiced Automatic Process Control”, J. Willey.
4. Rao M & S.Qiv, “Process Control Engg.”, Gorden & Breach.
5. S Levi and AK Agrawala. Real-time system design. McGraw-Hill International.
6. GeorgeStephanopoulos “ Chemical Process Control” PHI, Delhi
7. C.D. Johnson “Process control instrumentation technology’ PHI
8. Harriott- Process Control 1st ed., TMH
9. Patranabis- Principles of Process Control 2nd ed., TMH

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering VI-Semester
EC- 601 Digital signal Processing

Unit – I: Discrete-Time Signals and Systems

Discrete-time signals, discrete-time systems, analysis of discrete-time linear time-invariant systems, discrete time systems described by difference equation, solution of difference equation, implementation of discrete-time systems, stability and causality, frequency domain representation of discrete time signals and systems.

UNIT –II: z-Transform

The direct z-transform, properties of the z-transform, rational z-transforms, inversion of the z transform, analysis of linear time-invariant systems in the z- domain, block diagrams and signal flow graph representation of digital network, matrix representation.

Unit – III: Frequency Analysis of Discrete Time Signals

Discrete fourier series (DFS), properties of the DFS, discrete Fourier transform (DFT), properties of DFT, two dimensional DFT, circular convolution.

Unit – IV: Efficient Computation of the DFT

FFT algorithms, decimation in time algorithm, decimation in frequency algorithm, decomposition for 'N'composite number.

Unit – V: Digital filters Design Techniques

Design of IIR and FIR digital filters, Impulse invariant and bilinear transformation, windowing techniques rectangular and other windows, examples of FIR filters, design using windowing.

References:

1. Oppenheim and Schafer: Digital Signal Processing, PHI Learning.
2. Johnny R. Johnson: Introduction to Digital Signal Processing, PHI Learning.
3. Proakis: Digital Signal Processing, Pearson Education.
4. Rabiner and Gold: Theory and Application of Digital Signal Processing, PHI Learning.
5. Ingle and Proakis: Digital Signal Processing- A MATLAB based Approach, Thompson, Cengage Learning.

List of Experiments:

1. Generation, analysis and plots of discrete-time signals.
2. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding etc).
3. Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality.
4. Computation and plot of DTFT of sequences, verification of properties of DTFT.
5. Computation and plots of z-transforms, verification of properties of z-transforms.
6. Computation and plot of DFT of sequences, verification of properties of DFT.
7. Computation and plots of linear/circular convolution of two sequences.
8. Computation of radix-2 FFT- Decimation in time and Decimation in frequency.
9. Implementation of IIR and FIR filter structures (direct, cascade, parallel etc).
10. Implementation of **v**arious window design techniques (Rectangular, Bartlett, Hann, Hamming etc).

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Electronics & Communication Engineering, VI-Semester
EC- 602 Antennas and wave Propagation

Unit I
Radiation
Potential function and the Electromagnetic field, potential functions for Sinusoidal Oscillations, retarded potential, the Alternating current element (or oscillating Electric Dipole), Power radiated by a current element, Application to short antennas, Assumed current distribution, Radiation from a Quarter wave monopole or Half wave dipole, sine and cosine integral, Electromagnetic field close to an antenna,Solution of the potential equations, Far-field Approximation.

Unit II: Antenna Fundamentals
Introduction, network theorems, directional properties of dipole antennas, travelling –wave antennas and effect of feed on standing-wave antennas, two –element array, horizontal patterns in broad-cast arrays, linear arrays, multiplication of patterns ,effect of earth on vertical patterns, Binomial array, antenna gain, effective area.

Unit III: Types of antennas
Log periodic antenna, loop antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna, lens antenna, turnstile antenna. Long wire antenna: resonant and travelling wave antennas for different wave lengths, V-antenna, rhombic antenna, beverage antenna,

Unit IV: Aperture and slot
Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna , Reflector antenna , Aperture blockage , Feeding structures , Slot antennas , Microstrip antennas – Radiation mechanism – Application ,Numerical tool for antenna analysis

Unit V: Propagation of radio waves
Fundamentals of electromagnetic waves, effects of the environment, modes of propagation. Ground wave propagation- Introduction, plane earth reflection, space wave and surface wave, transition between surface and space wave, tilt of wave front due to ground losses. Space wave propagation- Introduction, field strength relation, effects of imperfect earth, curvature of earth and interference zone, shadowing effect of hills and buildings, absorption by atmospheric phenomena, variation of field strength with height, super refraction, scattering, tropospheric propagation, fading, path loss calculations. Sky wave propagation- Introduction, structural details of the ionosphere, wave propagation mechanism, refraction and reflection of sky waves by ionosphere, ray path, critical frequency, MUF, LUF, OF, virtual height, skip distance, relation between MUF and skip distance.

References:

1. Jordan and Balmain: Electromagnetic Waves and Radiating System, PHI Learning.
2. Krauss: Antennas and wave propagation, TMH.
3. Balanis: Antenna Theory Analysis and Design, Wiley India Pvt. Ltd.
4. Harish and Sachidananda: Antennas and wave propagation, Oxford University Press.
5. Raju: Antennas and Wave Propagation, Pearson Education.
6. Kennedy: Electronic Communication Systems, TMH.

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Electronics & Communication Engineering, VI-Semester

Departmental Elective EC- 603 DATA COMMUNICATION and Networking

Unit-I

Data Communication: Introduction, Components, data representation Serial & Parallel transmission, Modes of data transmission, Line Encoding: Unipolar, Polar, Bipolar, Networks – Protocols and standards – Standards organizations – Line configurations – Topology– Transmission mode – Categories of networks – Inter networks.

Unit-II

OSI model: Functions of the layers. Transmission media: Guided media – Unguided media – Transmission impairment – Performance. Switching Circuit switching , packet switching (virtual circuit and datagram approach), message switching

Unit-III

ERROR CONTROL AND DATA LINK PROTOCOLS

Error detection and correction: Types of errors – Detection – Vertical Redundancy Check (VRC) – Longitudinal Redundancy Check (LRC) – Cyclic Redundancy Check (CRC) – Check sum – Error Correction. Data Link Layer Protocols: Framing , HDLC, ARQ: Stop and Wait, Sliding Window. Efficiency

Unit-IV NETWORKS

LAN: Project 802 – Ethernet – Token bus – Token ring – FDDI. MAN: IEEE 802.6 (DQDB) – SMDS. X.25, FRAME RELAY, ATM AND SONET/, SDH

Unit-V. NETWORKING DEVICES AND TCP / IP PROTOCOL SUITE

Networking and internetworking devices: Repeaters – Bridges – Gateways – Other devices – Routing algorithms – Distance vector routing – Link state routing. TCP / IP protocol suite: Overview of TCP/IP.

REFERENCE BOOKS

1. Data and Computer Communication – W. Stallings, Pearson
2. LANs – Keiser, Tata Mc-Graw Hill
3. Data Communication & Networking – B.A. Forouzan, Tata Mc-Graw Hill
4. Internetworking with TCP/IP – VOL-I – D.E. Comer, PHI
5. ISDN and Broad band ISDN with Frame Relay & ATM – W. Stallings, Pearson

Textbooks:

1. Computer Networks by Tanenbum/PHI.
2. Shay, William A. / "Understanding Data communications & Networks" / Vikas Publishing House Pvt. Ltd.

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Electronics & Communication Engineering VI-Semester
Departmental Elective EC- 604(A) Cellular and MOBILE COMMUNICATION

Unit I Introduction to wireless communication systems, different generations of wireless networks. Cellular system design fundamentals, frequency reuse, handoff strategies, Interference and system capacity, Trunking and grade of service.

Unit II Mobile radio propagation**:** free space propagation model, Ground reflection propagation model, Long term fading, Small scale multipath propagation, Time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, types of small scale fading, Clarke's model for flat fading, level crossing and fading statistics.

Unit III Capacity in cellular systems, cell splitting and sectoring, cell-site antennas and mobile antenna, cochannel interference reduction, Frequency management and channel assignment.

Unit IV Frequency division and time division multiple access. Global System for Mobile: System Architecture. GSM Radio subsystem,. GSM.. GSM Traffic Channel and Control Channel, Frame Structure. Introduction to 3G/4G/5G communication Systems.

Unit V Spread spectrum multiple access (Frequency Hopped Multiple Access and. Code Division Multiple Access). Different spreading codes. CDMA Digital Cellular system: different standards with detailed description of forward and reverse channels. Capacity of cellular systems. Introduction to Cognitive Radio Networks.

Reference Books:
1. Mobile cellular telecommunication- W. C. Lee, McGraw-Hill
2. Wireless communication -T. S. Rappaport, Prentice Hall
3. Wireless communication – Simon Haykins, Pearson
4. Introduction to Cognitive Radio Networks- GS Tomar, A Bagwari, CRC Publications

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Electronics & Communication Engineering, VI-Semester

Departmental Elective EC- 604 (B) CMOS DESIGN

Unit I

Introduction

Introduction to CMOS VLSI circuit, VLSI design flow, Design strategies ,Hierarchy, regularity, modularity, locality, MOS Transistor as a Switches, CMOS Logic, Combinational circuit, latches and register, Introduction of CAD Tool , Design entry, synthesis, functional simulation.

Unit II

Specification of sequential systems

Characterizing equation & definition of synchronous sequential machines. Realization of state diagram and state table from verbal description, Mealy and Moore model machines state table and transition diagram. Minimization of the state table of completely and incompletely specified sequential machines.

Unit III

Asynchronous Sequential Machine

Introduction to asynchronous sequential machine, Fundamental mode and Pulse mode asynchronous sequential machine, Secondary state assignments in asynchronous sequential machine, races and hazards.

Unit IV

Introduction, Size and complexity of Integrated Circuits, The Microelectronics Field, IC Production Process, Processing Steps, Packaging and Testing, MOS Processes, NMOS Process, CMOS Process, Bipolar Technology, Hybrid Technology, Design Rules and Process Parameters

Unit V

Dc Models, Small Signal Models, MOS Models, MOSFET Models in High Frequency and small signal, Short channel devices, Sub threshold Operations, Modeling Noise Sources in MOSFET's, Diode Models, Bipolar Models, Passive component Models.

Refrences:

1. Neil Weste: Principle of CMOS VLSI Design, TMH.
2. Kohavi: Switching & Finite Automata Theory, TMH.
3. Lee: Digital Circuits and Logic Design, PHI Learning..
4. Geiger, Allen and Strader: VLSI Design Techniques for Analog and Digital Circuits, TMH.
5 Sorab Gandhi: VLSI Fabrication Principles, Wiley India.
6. Weste and Eshraghian: Principles of CMOS VLSI design, Addison-Wesley

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Electronics & Communication Engineering, VI-Semester

Departmental Elective EC- 604 (C) Satellite Communication

Unit-I

Overview of satellite systems: Introduction, Frequency allocations for satellite systems.

Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time.

Unit-II

The Geostationary orbit: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits.

Polarization: antenna polarization, polarization of satellite signals, cross polarization discrimination.

Depolarization: ionospheric, rain, ice.

Unit-III

The Space segment: introduction, power supply, attitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem, Morelos and Satmex 5, Aniksatellites, Advanced Tiros-N spacecraft.

The Earth segment: introduction, receive-only home TV systems, master antenna TV system, Community antenna TV system, transmit-receive earth station.

Unit-IV

The space link: Introduction, Equivalent isotropic radiated power (EIPR), transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, intersatellite links. Interference between satellite circuits.

Unit-V

Satellite services

VSAT (very small aperture terminal) systems: overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network.

Direct broadcast satellite (DBS) Television and radio: digital DBS TV, BDS TV system design and link budget, error control in digital DBS-TV, installation of DBS-TV antennas, satellite radio broadcasting.

References:

1. Roddy: Satellite Communications, TMH.
2. Timothy Prattt: Satellite Communications, Wiley India.
3. Pritchard, Suyderhoud and Nelson: Satellite Communication Systems Engineering, Pearson Education.
4. Agarwal: Satellite Communications, Khanna Publishers.
5. Gangliardi: Satellite Communications, CBS Publishers.
6. Chartrand: Satellite Communication, Cengage Learning.
7. Raja Rao: Fundamentals of Satellite communications, PHI Learning.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VI-Semester

Open Elective EC- 605 (A) Microcontroller & Embedded system

UNIT-I

Introduction to 8-bit microcontrollers: 8051 Interfacing, Applications and serial communication 8051 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051 based data acquisition system 8051 connections to RS-232, 8051 Serial communication , Serial communication modes, Serial communication programming, Serial port programming in C.

UNIT II:

Microcontroller 8096 Introduction to 16-bit Microcontroller, functional block-diagram, memory status, complete 8096 instruction set, classification of instruction set, addressing modes, programming examples using 8096, hardware features of 8096,parallel ports, control &status Registers, Introduction to 16/32 bit PIC microcontrollers and DSPIC.

UNIT-III

Introduction to Embedded Systems:

Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, classification, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, common design metrics, and processor technology: general purpose processor, application specific processor, single purpose processor.

UNIT-IV

Embedded System Architecture:

Von Neumann v/s Harvard architecture, instruction set architecture, CISC and RISC instructions set architecture, basic embedded processor, microcontroller architecture, CISC & RISC examples: 8051, ARM, DSP processors.

UNIT-V

Input Output and Peripheral Devices

Timers and counters, watchdog timers, interrupt controllers, PWM, keyboard controller, analog to digital converters, real time clock.

Reference Books:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson education, 2005.
2. Kenneth J. Ayala, The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
3. V. Udayashankara and M.S. Mallikarjunaswamy, 8051 Microcontroller: Hardware, Software & Applications, Tata McGraw - Hill, 2009.
4. McKinlay, The 8051 Microcontroller and Embedded Systems - using assembly and C, PHI, 2006 / Pearson, 2006.
5. Tim Wilmshurst, Designing embedded system with PIC microcontrollers Principles and applications. 2nd ed. 2011 Bsp books pvt lt
6. Shibu K V, “Introduction to Embedded System”, TMH.
7. David E Simon, “An Embedded Software Primer”, Pearson education Asia, 2001.
8. Steven F. Barett, Daniel J. Pack, “Embedded Systems” Pearson education, First Impression2008.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VI-Semester

Open Elective EC- 605 (B) BIOMEDICAL ELECTRONICS

UNIT I - PHYSIOLOGY AND TRANSDUCERS

Cell and its structure - Resting and Action Potential - Nervous system: Functional organization of the nervous system - Structure of nervous system, neurons - synapse - transmitters and neural communication - Cardiovascular system - respiratory system - Basic components of a biomedical system - Transducers - selection criteria - Piezo electric, ultrasonic transducers – Temperature measurements - Fiber optic temperature sensors.

UNIT II - ELECTRO - PHYSIOLOGICAL MEASUREMENTS

Electrodes -Limb electrodes -floating electrodes - propelled disposable electrodes - Micro, needle and surface electrodes - Amplifiers: Preamplifiers, differential amplifiers, chopper amplifiers -Isolation amplifier. ECG - EEG - EMG - ERG - Lead systems and recording methods – Typical waveforms. Electrical safety in medical environment: shock hazards - leakage current- Instruments for checking safety parameters of biomedical equipments

UNIT III - NON-ELECTRICAL PARAMETER MEASUREMENTS

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound -Pulmonary function measurements - Spiro meter - Photo Plethysmography, Body Plethysmography - Blood Gas analyzers : pH of blood -measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements .

UNIT IV - MEDICAL IMAGING

Radio graphic and fluoroscopic techniques - Computer tomography - MRI - Ultrasonography-

Endoscopy - Thermography - Different types of biotelemetry systems and patient monitoring -Introduction to Biometric systems

UNIT V- ASSISTING AND THERAPEUTIC EQUIPMENTS

Pacemakers - Defibrillators - Ventilators - Nerve and muscle stimulators - Diathermy - Heart -Lung machine - Audio meters - Dialysers - Lithotripsy

REFERENCES

1. M.Arumugam, ‘Bio-Medical Instrumentation’, Anuradha Agencies, 2003.
2. L.A. Geddes and L.E.Baker, ‘Principles of Applied Bio-Medical Instrumentation’, John Wiley & Sons, 1975.
3. J.Webster, ‘Medical Instrumentation’, John Wiley & Sons, 1995.
4. C.Rajarao and S.K. Guha, ‘Principles of Medical Electronics and Bio-medical Instrumentation’,Universities press (India) Ltd, Orient Longman ltd, 2000.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VI-Semester

Open Elective EC- 605 (C) POWER ELECTRONICS

Unit-1

Power Semiconductor Switches

Power diodes - Basic structure and V-I characteristics - various types - **DIACs** – Basic structure and V-I characteristics – **TRIACs** - Basic structure and V-I characteristics

Power BJT: Construction and working principle, quasisaturation, primary breakdown, secondary breakdown.

IGBTs - Basic structure and V-I characteristics.

Power MOSFETs - Basic structure and V-I characteristics

Thyristors - basic structure - static and dynamic characteristics - device specifications and ratings - methods of turning on - gate triggering circuit using UJT

Unit 2: Rectifiers

Thyristors- series and parallel operation, methods of turning off - commutation circuits.

Line frequency phase controlled rectifiers using SCR

Single Phase – Half wave rectifier with R and RL loads – Full wave half controlled and fully controlled converters with continuous and constant currents - Input side harmonics and power factor - Effect of source inductance

Three Phase - Half wave rectifier with R and RL loads - Full wave fully controlled converters with continuous and constant currents

Unit 3: Inverters & Cycloconverters Inverters –

Single phase inverters – series, parallel and bridge inverters. Single Phase Pulse Width Modulated (PWM) inverters – Basic circuit and operation. Single phase series resonant inverter, Single phase bridge inverters,Three phase bridge inverters, Voltage control of inverters, Harmonics reduction techniques, Single phase and three phase current source inverters

Unit-IV

AC Voltage Controllers

Principle of On-Off and phase controls, Single phase ac voltage controller with resistive and inductive loads Three phase ac voltage controllers (various configurations and comparison only), Single phase transformer taps changer. Cyclo Converters-Basic principle of operation, single phase to single phase, three phase to single phase and three phase to three phase cyclo converters, output voltage equation

Unit V: DC – DC Converters

Choppers - Principle of operation - step-up and step-down choppers.

Switching regulators - Buck regulators - Boost regulators - Buck-boost regulators – Switched mode power supply - principle of operation and analysis

Text/Reference Books:

1. Ned Mohan, Power Electronics., John Wiley and Sons, 2nd edition, 1995.
2. Rashid, Power Electronics, Circuits Devices and Applications, Pearson Education, 3rd edition, 2004.
3. G.K.Dubey, Thyristorised Power Controllers, Wiley Eastern Ltd, 1993.
4. Dewan & Straughen, Power Semiconductor Circuits, John Wiley & Sons, 1975.
5. Cyril W Lander, Power Electronics, Mc Graw Hill, 3rd edition, 1993.
6. M.D. Singh and K.B.Khanchandani, "Power Electronics"Tata MC Graw Hill, 2005
7. P.C Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2nd Edition.
8. P.S Bhimbhra , " Power Electronics", Khanna Publishers, 2012

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering VI-Semester

EC- 606 MICROCONTROLLER & EMBEDDED SYSTEM LAB

1. Programming using arithmetic, logical and bit manipulation instructions of 8051.
2. Program and verify Timer/Counter in 8051.
3. Communication between 8051 kit and PC.
4. To study development tools/environment for ATMEL/PIC microcontroller program and Architecture.
5. Write an ALP to generate square of 10Khz using Timer 0.
6. Write an ALP to display a string on LCD.
7. Write an ALP to interface seven segment with 8051 and display 0-9 on it.
8. Write an ALP to interface DC Motor with 8051

9 Write an ALP to transmit the data using P1 of 8051

10. Write an ALP to interface 4x4 keyboard with 8051.
11. Write an ALP to interface temperature sensor using 8051
12. Write an ALP to interface the lcd 16x2 to P16f877A

As per Keil software available in department.