

**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**New Scheme Based On AICTE Flexible Curricula**

**Electronics & Communication Engineering V-Semester**

**EC501 MICROPROCESSOR AND ITS APPLICATIONS**

**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

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

**UNIT III** Introduction to the various interfacing chips like 8155, 8255, Interfacing key boards, LEDs , ADC, DAC and memory Interfacing.

**UNIT IV** General purposes programmable peripheral devices ( 8253), 8254 programmable interval timer, 8259A programmable interrupt controller & 8257 DMA controller, USART, serial I/O & data Communication .

**UNIT V** Introduction to microcontrollers (8051) and embedded systems: 8051 architecture, pin description , I/O configuration , interrupts, addressing modes, an overview of 8051 instruction set, embedded system, use of microcontrollers in embedded systems

**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. 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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**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  $\pi$  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.

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**Electronics & Communication Engineering V-Semester**

**Departmental Elective EC- 503 (B) 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.

**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.

**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

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**New Scheme Based On AICTE Flexible Curricula**

**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, Publisher: Wiley
5. Discrete time Control system— K. Ogata, Pearson; 2 edition

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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 of 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) 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

#### 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:

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