

GANPAT UNIVERSITY  
U. V. PATEL COLLEGE OF ENGINEERING  
GANPAT VIDYANAGAR, KHERVA-382711

ELECTRONICS & COMMUNICATION ENGINEERING DEPARTMENT



## DETAILED SYLLABUS FOR 5<sup>TH</sup> SEMESTER

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**U. V. Patel College Of Engineering**  
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## EC 501 : ADVANCED MICROPROCESSOR AND MICROCONTROLLER

Teaching Scheme			Examination Scheme							
Lect.	Pract.	Total	Theory				Practical			Grand Total
			Int. Assess.	Sem Marks	End Hrs	Total	Int. Assess.	Sem End	Total	
3	2	5	30	70	3	100	25	25	50	150

### **1. Computers, microcomputers and microprocessors:**

Types of computers, how computers and microcomputers are used, microcomputer structure and operation, execution of a three-instruction program, microprocessor evolution and types, the 8086 microprocessor family overview, 8086 internal architecture, introduction to programming the 8086.

### **2. 8086 system connections, timing and troubleshooting:**

A basic 8086 microcomputer system, addressing memory and ports in microcomputer systems.

### **3. Microprocessors and microcontrollers:**

Microprocessors and microcontrollers, Z80 and the 8051, a microcontroller survey, development systems for microcontrollers.

### **4. 8051 architecture:**

8051 micro controller hardware, input/output pins, ports, ports and circuits, external memory, counters and timers, serial data i/o, interrupts.

### **5. Moving data:**

Addressing modes, external data moves, code memory read PUSH and POP opcodes, data exchanges.

### **6. Logical operations:**

Byte-level logical operations, bit-level logical operations, rotate and swap operations.

### **7. Arithmetic operations:**

Flags, incrementing and decrementing, addition, subtraction, multiplication and division, decimal arithmetic.

### **8. Jump and call instructions:**

Jump and call program range, jumps, calls and subroutines, interrupts and returns.

### **9. An 8051 microcontroller design:**

Microcontroller specifications, 8051 micro controller design, testing the design, timing subroutines, look up tables for 8051, serial data transmission.

### **10. Applications:**

Keyboards, displays, pulse measurements, D/A and A/D conversions, multiple interrupts.

### **11. Serial data communication:**

Network configuration, 8051 data communication modes.

### **12. Introduction to other 16 bit, 32 bit microprocessors and microcontrollers:**

Intel 80x86, PIC, ARM etc families.

**Reference Books:**

1. Microprocessors & Interfacing – Programming & hardware By D. V. Hall (TMH)
2. The 8088 AND 8086 microprocessors By Walter A. Trebel & Avtar Singh (PHI)
3. 8086 Microprocessor By Uffenbeck (PHI)
4. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor Architecture, programming and interfacing. By Barry B. Brey (PHI)
5. The 8051 Microcontroller: Architecture, programming and applications By Kenneth J. Ayala (Penram International)
6. The 8051 Microcontroller and Embedded Systems By Mazidi & Mazidi (PHI)

## EC 502 : ELECTROMAGNETIC THEORY

Teaching Scheme			Examination Scheme							
Lect.	Pract	Total	Theory				Practical			Grand Total
			Int. Assess.	Sem End		Total	Int. Assess.	Sem End	Total	
				Marks	Hrs					
4	0	4	30	70	3	100	0	0	0	100

### 1. Vector analysis:

Scalars and vectors, Dot and cross products, Co-ordinate systems and conversions.

### 2. Coulomb's law and electric field intensity:

Coulomb's law, fields due to different charge distributions.

### 3. Electric flux intensity, gauss's law and divergence:

Concept of electric flux density, Gauss's law and its application, Differential volume element, divergence, Maxwell's first equation and divergence theorem.

### 4. Energy and potential:

Energy expended in moving a point charge in electrical field, line integral, definition of potential difference and potential, potential field of a point charge and system of charged, potential gradient, dipole, potential density in Electro static field.

### 5. Conductors, dielectrics and capacitance:

Definition of currents and current density, continuity equation, metallic conductors and their properties, semiconductors, dielectric materials, characteristics, boundary conditions, capacitance of a parallel plate capacitor, coaxial cable and spherical capacitor.

### 6. Poisson's and Laplace equation:

Poisson's and Laplace's equation, Uniqueness theorem, Examples of solutions of Laplace and Poisson equation.

### 7. Steady magnetic field:

Bio-Sawart law, ampere's circular law, concept of curl, Stoke's theorem, definition of magnetic flux and magnetic flux density, scalar and vector magnetic potential.

### 8. Magnetic forces, materials and inductance:

Force on a moving charge, force on a differential current element, force and torque on a close circuit, magnetization and permeability, magnetic boundary condition, magnetic circuit inductance and mutual inductance.

### 9. Time varying field Maxwell's equation:

Faraday's law, displacement current, Maxwell equation in point and integral form.

### 10. The uniform plane waves:

Wave motion in free space, perfect dielectric, lossy dielectric pointing vector, power consideration, propagation in good conduction, phenomena of skin effect, reflection of uniform plane waves.

### Reference Books:

1. Electronic magnetic wave propagation By William Hayt, (TMH)
2. J. D. Kraus, Fleisch, Daniel: Electromagnetic, 5th edition, McGraw-Hill, 1999
3. J. Griffiths, Introduction to Electrodynamics, 2nd edition, PHI, 1995.
4. E.C. Jordan & K. G. Balmain, Electromagnetic Waves and Radiating Systems, 2<sup>nd</sup> Edition, PHI
5. Elements of Electromagnetic, Matthew N O Sadiku Oxford, 3<sup>rd</sup> Edition

## EC 503 : POWER ELECTRONICS

Teaching Scheme			Examination Scheme							
Lect.	Pract	Total	Theory				Practical			Grand Total
			Int. Assess.	Sem End Marks	Hrs	Total	Int. Assess.	Sem End	Total	
3	2	5	30	70	3	100	25	25	50	150

### 1. Introduction:

Application of power electronics, power semiconductor devices, control characteristics of power devices, types of power electronics circuits, design of power electronic equipments.

### 2. Power semiconductor diodes and circuits:

Diode characteristics, reverse recovery characteristics, power diodes types, series and parallel connected diodes, diodes with RC, RL, LC and RLC loads, freewheeling diodes .

### 3. Diode rectifiers:

Single phase half wave rectifiers, Performance parameters, Single phase full wave rectifiers, multiphase star rectifiers, three-phase bridge rectifier.

### 4. Power transistors:

Bipolar junction transistors, power MOSFETs, SITs, IGBTs, series and parallel operation, di/dt and dv/dt limitations.

### 5. DC to DC Converters:

Step-up and step-down choppers, performance parameters, converter classifications, switching mode regulators, comparison of regulators.

### 6. PWM inverters:

Principle of operation, performance parameter, single phase bridge inverters, three phase inverters, voltage control of single phase and three phase inverters, harmonic reductions.

### 7. Thyristors:

Thyristor characteristics, two transistor model of thyristor, thyristor turn-on and turn-off, types of thyristor, series and parallel operation of thyristors, di/dt and dv/dt protection, Thyristor commutation techniques: Natural and forced commutation techniques.

### 8. Controlled rectifiers:

Principles of phase control converter operation, single phase semi, full, dual and series converters, three phase half wave, semi, full and dual converters, effect of load and source inductances.

### 9. AC voltage controllers:

Principles of on/off control, principles of phase control, single phase controllers with R and L loads, three phase full wave controllers.

### 10. Power supplies:

DC power supplies, UPS, design of transformers.

### 11. DC drives:

Basic characteristics of DC motors, operating modes, single phase, three phase and DC-DC converter drives, close loop control of DC drives.

### 12. AC drives:

Induction motor drives, synchronous motor drives.

### **13. Protection of devices and circuits:**

Cooling and heat sinks, Snubber circuits, Reverse recovery transients.

#### **Reference Books:**

1. Power Electronics circuits, devices and application By M.H.Rashid. (PHI)
2. Power Electronics By Bimbira Khanna Publications.
3. Power Electronics By Williams.
4. Power Electronic systems: Theory and design By J. P. Agrawal (Pearson Education)

## EC 504 : COMPUTER NETWORKS

Teaching Scheme			Examination Scheme							
Lect.	Pract	Total	Theory			Practical			Grand Total	
			Int. Assess.	Sem End		Total	Int. Assess.	Sem End		
				Marks	Hrs			Marks		Hrs
3	2	5	30	70	3	100	25	25	50	150

### 1. Introduction:

Uses of computer Networks, Network Hardware-LAN,MAN,WAN, Internetworks, Network Software - Design Issues, interfaces & services, Connection Oriented & Connectionless services. Service primitives, Relationship of services to protocols, Reference Models - OSI & TCP/IP, their comparison & critiques, ATM model, Frame relay & X.25.

### 2. The Physical Layer:

Transmission Media – magnetic media, twisted pair, Co-axial cable, Fiber optics, Wireless Transmission - radio, Microwave, infrared & light wave, PSTN, Cellular Radio- Paging systems, cordless telephones, analog & digital telephones.

### 3. The Data Link Layer:

DLL Design issues, Error Detection & Correction. Elementary Data link Protocols: Stop & Wait, Automatic Repeat Request. Sliding Window Protocols. 1 bit sliding window, Go Back N, Selective Repeat Protocols, Point to point, HDLC.

### 4. Medium Access Sub layer:

Channel Allocation Problem - Static & Dynamic. Multiple Accesses protocols - ALOHA, CSMA, Collision Free Protocols, Limited contention protocols, WDMA protocol , ETHERNET PROTOCOL, wireless LAN protocols, Overview of Bluetooth. Hub, switch, bridges, router, gateway

### 5. The Network Layer:

Network layer Design issues. Routing Algorithms, flooding, Congestion Control Algorithms general policies, congestion prevention policies, traffic shaping, flow specifications, congestion control in VC subnets, choke packets. The network layer in the internet - the IP protocol, IP addresses & subnets, RIP, OSPF & BGP, ICMP, IGMP

### 6. The Transport Layer:

The Transport Service, Elements of Transport Protocols, The Internet Transport Protocols - TCP service model, TCP protocol, TCP Segment Header, TCP Connection Management, TCP Transmission Policy, TCP Congestion Policy. Real Time transmits Protocol, UDP & overview of Socket. Performance Issues - Performance problems in Computer Networks, Measuring Network Performance.

### 7. The Application Layer:

Domain name system, E-mail, Mobile IP, World Wide Web, HTTP, URL, SNMP, IPV6, FTP, TELNET & RLOGIN, Network Security, Traditional Cryptography, Two Fundamental Cryptographic Principles, Secret-Key Algorithms, Public-key.

### Reference Books:

1. Computer Networks By Andrew S. Tannebaum, 4<sup>TH</sup> Ed, (PHI).
2. Data & Computer Communications By William Stallings, 2ed, Maxell Macmillan Int.
3. Communication Networks, Fundamental Concepts & key architecture By Leon-Garcia & Widjaj, (TMH).
4. TCP/IP Protocol Suite By Forouzen (TMH)

## EC 505 : COMMUNICATION SYSTEMS

Teaching Scheme			Examination Scheme							
Lect.	Pract	Total	Theory				Practical			Grand Total
			Int. Assess.	Sem End		Total	Int. Assess.	Sem End	Total	
				Marks	Hrs					
4	2	6	30	70	3	100	25	25	50	150

### 1. Series and Parallel Tuned Circuits:

Series Tuned circuits , Parallel tuned circuits, mutual inductance, coupling circuits topics derivations & problems, passive filters.

### 2. Noise:

Introduction to noise, thermal noise, shot noise, partition noise, flicker noise, burst noise, avalanche noise, BJT noise, FET noise, noise figure, amplifier input noise in terms of F.

### 3. Receivers:

Introduction, Superhetrodyne receiver, tuning range, Tracking, padder, trimmer & three point tracking, Image rejection, relative response, double spotting and image rejection, spurious response, Adjacent channel selectivity, AGC, block diagram and features of double conversion receivers. VCO (Voltage CONTROLLED OSCILLATOR)

### 4. Amplitude Modulation:

Introduction, Amplitude Modulation, Amplitude Modulation index, modulation index for sinusoidal AM, equation, double sideband suppressed carrier modulation, Amplitude modulators, Amplitude demodulator circuits, Amplitude-modulated Transmitters. Base band, AM in presence of Noise.

### 5. Single Side band Modulation:

Introduction, Hilbert transformation, balanced modulator, SSB Generation, SSB Reception.

### 6. Angle Modulation:

Introduction, frequency Modulation, Sinusoidal FM, Frequency Spectrum for Sinusoidal FM(no Bessel's function), Non-sinusoidal modulation-Deviation ratio, measurement of modulation index for sinusoidal FM, phase modulation, Equivalence between PM and FM, sinusoidal phase modulation, Angle modulator circuits, FM transmitters, angle modulation detectors, Automatic Frequency Control, amplitude limiters, FM broadcast Receivers, FM stereo receivers, Angle modulation in Presence of Noise, Optimum pre-emphasis and de-emphasis system.

### 7. Satellite Communication:

Introduction, Kepler's laws, orbits, geostationary orbit, power systems, satellite station keeping.

### 8. Probability:

Concept of Probability, Conditional Probability, Events, Random Variable, CDF, Statistical Means, Statistical means and correlation

### 9. Random Process:

Random process and its classification , PSD of Random Processes, Multiple Random Processes, Transmission through linear systems, Band pass Random Processes, Optimum filtering, Numerical or Problem Solving.

### Reference Books:

1. Modern Digital and Analog Communication Systems By B. P. Lathi, 3<sup>rd</sup> Edition, Oxford
2. Communication Systems By Simon Hykin, 2<sup>nd</sup> edition, Wiley Eastern
3. Electronics Communication By Roddy and Coolean, 4<sup>th</sup> Edition, (PHI)
4. Electronics Communication By John Kennedy, 3<sup>rd</sup> Edition, (TMH)

## EC 506 : COMPUTER ORGANISATION

Teaching Scheme			Examination Scheme							
Lect.	Pract	Total	Theory				Practical			Grand Total
			Int. Assess.	Sem End		Total	Int. Assess.	Sem End	Total	
				Marks	Hrs					
3	0	3	30	70	3	100	00	00	00	100

### 1. Basic Structure of Computers:

Computer types, Functional Units, Basic Operational Concepts, Bus structure, Software, Performance, Multiprocessor & Multicomputers, Historical perspective

### 2. Number System:

Floating points numbers and operations

### 3. The Memory System:

Some basic concepts, Read only memory, Speed, size and cost, Cache memories, Performance considerations, Virtual memories, Memory management requirements, Secondary storage, memory organization techniques

### 4. Basic Processing Unit:

Some fundamental concepts, Execution of a complete instruction, Multiple-Bus Organization, Hardwired Control, Microprogrammed Control

### 5. Pipelining:

Basic concepts, Data Hazards, Instruction Hazards, Influence on instruction sets, Data path and control considerations, Superscalar operation, Performance considerations

### 6. Input/Output Organization:

Accessing I/O Devices, Interrupts, Buses, Interface Circuits, Standard I/O Interfaces

### 7. Reduced Instruction Set Computers:

Instruction Execution Characteristics, The use of a Large register File, Compiler-Based Register Optimization, Reduced Instruction Set Computers, RISC Pipelining, MIPS R4000, SPARC, RISC versus CISC Controversy

### 8. IO Subsystem Architecture:

IO Subsystem Performance Measure, Design of IO Subsystem, Architecture of IO Bus, SCSI Bus, ISA Bus Architecture, PCI Bus, Microchannel Architecture

### Reference Books:

1. Computer Organization & Architecture (Sixth Edition) By William Stallings (PHI)
2. Computer Organization (Fifth Edition) By Carl Hamacher, Zvonko Vranesic & Safwat Zaky (TMH).
3. Computer Organization and Design (Second Edition) By P. Pal Chaudhury (PHI)

## EC 507: MINI PROJECT

Teaching Scheme			Examination Scheme							
Lect.	Pract	Total	Theory				Practical			Grand Total
			Int. Assess.	Sem End		Total	Int. Assess.	Sem End	Total	
				Marks	Hrs					
0	2	2	0	0	0	0	25	25	50	50

1. Design concepts for driving LEDs, 7-segment display, LCD, Stepper motor, sensors/transducers and other devices.
2. Practice for basic circuits like amplifiers, drivers, power supplies etc.
3. Troubleshooting the circuits.
4. Review of OrCAD (PCB Designing).
5. Review of Electronic Workbench (Circuit simulation).
6. Project.
7. Project presentation.

**Reference Books:**

1. OrCAD Manual
2. Electronic circuit design principles By Tim Williams.
3. Handbook of PCB