

M.SC INDUSTRIAL ELECTRONICS

FIRST YEAR

PAPERS	Subject	Max. Marks	Exam Hrs
1	Analog and Digital IC's & Application	100	3
2	Power Electronics	100	3
3	Data Communication System	100	3
4	Micro Processor and its Applications	100	3
5	Control Systems	100	3
Practical 1	General Electronics	100	3
Practical 2	Advanced Electronics	100	3

SECOND YEAR

PAPERS	Subject	Max. Marks	Exam Hrs
1	Fiber Options and their applications	100	3
2	PC hardware Maintenance and trouble shooting	100	3
3	Modern Communication System	100	3
4	VLSI Chip Design & embedded System Software	100	3
5	Microcontrollers and its Applications	100	3
	Practical III	100	3
	Practical IV	100	3
	Project Work & Viva-voce	200	-

FIRST YEAR

PAPER – 1

ANALOG AND DIGITAL IC'S AND APPLICATION

UNIT – I

Integrated circuit fabrication: Introduction & fundamentals of Monolithic IC technology – Basic planar processes – Fabrication of a circuit – Active & passive components & ICs – diodes – resistors – capacitors – Monolithic transistors – Fabrication of FET, Thin & Thick film technology.

UNIT – II

Digital IC families: RTL, DTL, (Modified Integrated Circuit) – HTL, TTL, ECL, Logic families – characteristics – I^2I (TSL). CMOS logic – CMOS device driving TTL circuits, TTL device driving CMOS Gates.

UNIT – III

Operational Amplifier: Operational amplifier – Ideal operational amplifier – operational amplifier parameters – inverting – Non – inverting amplifier – applications – subtraction – Integration – Differentiation amplifier – Instrumentation amplifier.

UNIT – IV

Non linear & Analog system: Comparator – sample & hold circuit, log and antilog amplifiers, AC amplifier, V to I and I to V converter- regenerative comparator (Schmitt triggers) Astable multivibrator - Monostable – Triangular wave generator – sine wave generator.

UNIT – V

PLL and Timers: basic principles – phase detector comparator voltage controlled oscillator – phase lock loop – PLL applications – frequency multiplication / division – frequency translation 555 timer – Astable -Monostable, 8038 function generator.

Reference Books

1. Integrated Circuits – Botkar K.R - Khanna Publishers, New Delhi (Unit I).
2. Linear Integrated circuits - D. Roy chouchury Sahil Jain – (Unit II, III, IV, V)
3. Op-amps & Linear integrated Circuits – Ramakant, A. Gayakwood- PHI

PAPER – 2
POWER ELECTRONICS

UNIT I

SCR, DIAC, TRIAC, UJT, characteristics and applications – Triggering Circuits.

UNIT II

DC machines – component parts – methods of excitation, various types of motors and their characteristics. AC machines – Induction motor torque – slip characteristics – synchronous motor.

Controlled rectifiers: Introduction – principles of phase controlled converters – single – phase semi converters – single – phase full converters – single – phase dual converters – single phase series converters.

UNIT III

Chopper (quantitative slides only) relays – characteristics – circuits using SCR and photo electric devices. Inverter and power supplies: introduction – principles of operation – single phase bridge inverter.

UNIT IV

DC chopper introduction – principles of step down operation – step up operations switching mode regulators type A, Type B, Type C.

UNIT V

Trigger circuits used with SCR, self and external commutation of SCR Series and parallel operations, controlled rectifiers and inverters, UPS and SMPS. Motor control circuits.

Text Books

1. Rashid M.A “Power Electronics: Circuits devices and Application” IInd Edition PHI New Delhi – 1996.
2. Introduction to Thyristors and its application Ramamoorthy

Reference Books

1. Timothy J. Maloni: Industrial Solid state electronic devices and circuits IInd Edition. 1986.
2. Ramamoorthy M An introduction to Thyristor and their application East west press Pvt. Ltd., New Delhi, 1977.
3. Jaganathan – Introduction to power Electronics PHI
Asghar – Power Electronics – PHI

PAPER – 3

DATA COMMUNICATION SYSTEMS

UNIT I: Introduction : Data Transfer Modes: Synchronous and Asynchronous, Speed Matching Concept, Multiplexers, Statistical Multiplexer- Modems.

UNIT II: Network Structure, topology and Applications : Services and Standardization, ISO Reference Model for Open System Interconnection. Functions and Design Issues of the OSI Layers.

UNIT III:

Transmission and Protocols: Elementary Data Link Protocols, Sliding Window Protocols Pipelining of Data Frames, Protocol Performance, Specification and Verification, routing Algorithms and Congestion Control.

Unit IV:

OSI and Internetworking : Bridges and Gateways, Multiple Access Networks, Remote Procedure Calls, connection Management, TCP/IP ATM Networks, Electronic Mail , ISDN, Satellite, Fiber optic and Packet Radio Networks.

UNIT V:

Local and Metropolitan Area Networks : Bus and ring Architectures, CSMA/CD, Slotted Ring and token Passing LAN Protocols, IEEE 802 standardization in OSI mode: IEEE 802.2, 802.3, 802.4 and 802.5 standards.

Text Books:

1. Behrouz A. Forouzan, “Data Communication and Networking”, Tata Mc-Graw Hill, 2004
2. Pallapa Venkataram and S.S.Manvi, “ Communication Protocol Engineering”, PHI, 2004.

Reference Books:

1. William Stallings, “High Speed Networks”, PHI 1998.
2. A.S. Tanenbaum, “Computer Networks”.

PAPER – 4**MICROPROCESSOR AND ITS APPLICATION****UNIT – I**

Microcomputer system and hardware: Introduction to microcomputer – microprocessor and assembly language – Microprocessor architecture and microcomputer system – 8085 based microcomputer systems – instruction timings.

UNIT – II

Introduction to basic instruction and programming techniques: Data transfer (copy) instruction – arithmetic operations – logic operations – branch operation – writing assembly language programs .

UNIT – III

Advanced technique in programming: Counters and time delays – illustrative example – Hexa decimal counter – illustrative program – Zero to nine (MOD 10) counter delay programs – stack – subroutine – conditional call and return instruction – advanced subroutine concepts.

UNIT – IV

Data structure and software development: BCD to binary conversion – binary to BCD conversion – BCD to seven segment LED code conversion – binary to ASCII to binary code conversion – BCD addition – BCD subtraction.

UNIT – V

Interrupts: The 8085 interrupt – Software & Hardware interrupts – additional I/O concepts and processes.

Text Books

1. Ramesh S Gaonakar “Microprocessor Architecture Programming and Application with 8085/8080A” Iind Edition - Pentram Publications

Reference

1. Introduction to Microprocessor – A.P. Mathur - TMH

Paper – 5

CONTROL SYSTEM

UNIT – I : Mathematical Models of Control System

Introduction – Examples – Mathematical Models – Mechanical translation system – Mechanical rotation system – Electrical system – Transfer function of Armature controlled DC motor – Transfer function of field controlled DC motor – Electrical, Analogous of mechanical translation system.

UNIT – II

Block diagram – Block diagram reduction – Introduction of signal flow graph – Thermal system – Hydraulic system.

UNIT – III

Pneumatic system – Components of control system – potentiometer – synchros – controllers.

UNIT – IV

Introduction of servomotor – DC servomotors – Electromagnetic field motors – Construction and working of AC servo motors – stepper motors – Tacho generators – Types – Vibrator as a modulator.

UNIT – V

Introduction to time response – Test signals – order of a system – second order system – Time domain specifications. Introduction to frequency domain specifications – correlation between time and frequency domain.

Text :

1. Control System – A. Nagoor Kani – RBA Publication-(First Edition).

PRACTICAL-I

GENERAL ELECTRONICS

1. Construction of regulators
2. Clipping and clamping circuits
3. CE amplifier design
4. CS FET amplifiers design
5. Feedback amplifier design
6. Colpitts oscillators
7. Hartley oscillator
8. Wien bridge oscillators
9. Phase shift oscillators
10. Multivibrators
11. Crystal oscillators
12. Power amplifiers
13. Instrumentation amplifier.

PRACTICAL-II

ADVANCED ELECTRONICS

1. Addition, Subtraction, 8 bit and 16 bit
2. Multiplication, Division, 8 bit and 16 bit
3. Square and Square root of the given number.
4. Finding Maximum / Minimum numbers in an array
5. Ascending / Descending of array
6. Number of Zero, Positive, and Negative number of array.
7. ADC
8. DAC
9. Stepper motor control
10. Traffic light control
11. Speed control of DC motor
12. Rolling and flashing display
13. Digital Clock

SECOND SEMESTER

PAPER – 6

FIBER OPTICS AND THEIR APPLICATIONS

UNIT I: Introduction

Optical fibers : Structures and wave guiding fundamentals – basic optical laws and definitions – optical fiber modes and configurations – mode theory for circular wave guides – graded index fiber structure – fiber materials and fabrication methods.

UNIT II : Optical sources and detectors

Optical Sources – light emitting diodes – laser diodes – modes of threshold condition – light source linearity model and reflection noise – modulation and temperature effect-reliability consideration photo detectors – principles of photo – diodes – photo detectors – noise – response time – avalanche multiplication noise – temperature effects o avalanche gain.

UNIT III : Receivers and measurements

Fundamental receiver operation – digital receivers – performance calculations – pre amplifier design – analog receivers Attenuation measurements – fiber fault location .

UNIT IV : Advanced systems and techniques

Wavelength division multiplexing – optical fiber bus – ring topology – star architecture – fail safe fiber optic nodes – optical amplifiers – types – gain noise figure – application – optical bandwidth – photonic switching – integrated optical switch.

UNIT V : Applications and future developments

Public network operation – trunk network – junction network – local access network – submerged systems – synchronous network – military.

Text Books:

1. A. Selvarajan, S. Kar, and T.Srinivas, “Fibre Optic Communications”, Tata Mc-Graw Hill, 2002
2. Gerd Keiser, “Optic Fibre Communications”, Mc-Graw Hill, 1984.

Reference Books:

1. N.Sharma, “Fibre Optics in Telecommunications”, Tata Mc-Graw Hill.
2. D.C.Agarwal, “Fibre Optic Communications”, Wheeler Publishing, 1993.

PAPER – 7

PC HARDWARE MAINTENANCE AND TROUBLE SHOOTING

UNIT - I

PC hardware overview – introduction – hardware BIOS – Dos interaction – PC family – PC hardware – product engineering – interconnection between the boxes – inside the system box – mother board logic – DMA channels – peripheral interface and controllers – keyboard interface – parallel/serial interface and controllers – key board interface – parallel/serial interface – CRT display controller – floppy disk controller – hard disk – controller – hard disk card.

UNIT - II

IBM PC operation : Introduction – chip location scheme – CPU – special support chips – memory design – bus structure – GPIB – PCI bus – monochrome video adapter – color graphic adapter – disc drive and its controller card- key board operation,

UNIT - III

Installation and troubleshooting : Introduction – pre-installation planning – installation practice – routine checks – special configuration – memory upgradation – hard disk up gradation - An introduction to trouble shooting – computer faults – nature of faults – types of faults – printer problem – monitor problems

UNIT - IV

Interrupts – Driving force – special features of 286, 386, 486 series – extended memory – virtual memory – expanded memory – basic disk concept – varieties of the disks – DOS disk overview – physical and logical formatting – structure of DOS disk – hard disk features and partitions – an overview of video modes – video standards and text mode

UNIT -V

BIOS and DOS – ideas behind the BIOS – how ROM BIOS works – BIOS services – concept of DOS – installable drivers and flexible facilities – command processing – batch processing – DOS services – translating the programs need for networks.

Text Books

1. Govindarajulu B. :IBM PC and Clones” Tata Mc Graw Hill Co.,New Delhi 1995
2. Robert C. Brenner “IBM PC Troubleshooting and repaid guide” BPB publishers
3. George W Gorsline “Computer organisation, hardware/software” IInd edition PHI

PAPER – 8
MODERN COMMUNICATION SYSTEMS

UNIT – I

Amplitude Modulation

Definition of Amplitude modulation – Generation and detection of AM – Generation and detection SSB / DSB VSB modulation – Frequency division multiplexing – Block diagram of AM radio transmitter and super heterodyne receiver. SSB – Transmitter and receiver – Pre-emphasis – de-emphasis.

UNIT – II

Angle Modulation

Definition of Frequency and phase modulation – FM generation and demodulation – Block diagram of FM radio transmitter and receiver – Narrow band and wide band.

UNIT – III

Pulse Modulation

Sampling theorem – Basic principles of pulse Amplitude modulation – Pulse width modulation – Pulse position modulation.

UNIT – IV

Pulse Code Modulation and Basics of data Transmission and Reception

Principle of PCM – Quantization and quantization error Delta Modulations – Adaptive delta modulation – Time division multiplexing in PCM – Coherent reception – Binary ASK, - FSK – PSK-Comparison of ASK, FSK, PSK.

UNIT – V

Microwave Propagation and Devices

Introduction to antennas – Propagation of Radio waves- Ground wave – sky wave – Space Wave – Introduction to microwave system – Frequency range – Waveguides (qualitative analysis only) – cavity resonators – Two cavity Klystron – reflex klystron – Magnetron – traveling wave tube – gun diode.

Text Book

1. Fundamentals of communication systems – Sanjeeva Gupta.
2. Principles of communication system – Anok Singh.

Reference

1. Electronics communication Systems - Kennedy - TMH
2. Principles of communication systems – Taub and Schiling - TMH

PAPER – 9**VLSI CHIP DESIGN & EMBEDDED SYSTEM SOFTWARE****UNIT I**

COMOS logic – circuit and system Presentation – MOS devices Design Equations – The complementary CMOS inverter – DC characteristics – The differential Inverter – The transmission gate – bipolar devices.

UNIT II

Basic CMOS technology – Layout Design Rules – Resistance Estimation, Capacitance Estimation – Inductance – Switching characteristics – CMOS gate transistor sizing – power dissipation.

UNIT III

CMOS logic gate design – Basic Physical Design of simple logic gates – CMOS logic structures – Clocking strategies – I/O structures – low power design.

UNIT IV

Design strategies – CMOS chip design options – Design methods – The need for testing – Manufacturing test principles – Design strategies for test – chip level and system level test techniques.

UNIT V

Design – capture tools – Design verification tools – VHDL- introductions – Language abstractions.

Reference Books

1. Principle of CMOS VLSI Design Neel H.E. Weste, Eshraghian Addison Wesley 1999.
2. VHDL for designers SJOHOEM & Lindh, Prentice Hall 1977.

PAPER – 10

MICROCONTROLLERS AND ITS APPLICATIONS

UNIT – I

Introduction to Micro Controllers – Comparing Processor and Micro Controller – A Micro Controller Survey.

8051 Architecture: 8051 Block Diagram – Register set –Internal and External Memory – I/O Ports.

UNIT – II

Counters and timers – Serial data I/O Interrupts – Interrupts priority.

UNIT – III

Moving data: Introduction – Addressing modes – External data moves – code memory read only data moves – push and pop opcodes – Data exchanges – Example programs.

UNIT – IV

Logical operation: Byte and bit level operations – rotate and swap operations
Arithmetic operations: Flags – Incrementing, Decrementing – Addition, Subtraction, Multiplication, Division Instruction Jump and call instruction.

UNIT – V

8051 Application keyboard interfacing display interfacing – pulse measurement – D/A and A/D converters.

Text Book

1. The 8051 Microcontroller Architecture, Programming and Applications – Kenneth J. Ayala. Second Edn – Penram Publications.

PRACTICAL-III

ANALOG DESIGN AND COMMUNICATION LAB

1. Inverting amplifier / Non – Inverting amplifier
2. Voltage subtraction
3. D/A Converter using ladder op-amp
4. Voltage integrator / Differentiator
5. Astable, & Monostable vibrator circuits using op-amp
6. Sine Wave generator using op-amp
7. Basic filters using opamp
8. AM modulation and detection
9. FM modulation and detection
10. Voltage controlled oscillator
11. Pulse amplitude modulation
12. Pulse width modulation
13. Pulse position modulation

PRACTICAL – IV
MICROCONTROLLERS AND ITS APPLICATIONS LAB

Using 8051:

1. 8 bit addition, subtraction
2. 8 bit Multiplication and division
3. 16 bit addition, subtraction
4. 16 bit Multiplication and division
5. Stepper motor interfacing
6. ADC
7. DAC
8. 8255 Interface
9. 8279 Interface
10. HEX keyboard interface
11. 8253 interface
12. Traffic light controller
13. DC motor interfacing

Project work & viva voce