BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024.

M.Sc. Electronics - Course Structure under CBCS

(applicable to the candidates admitted from the academic year 2008-2009 onwards)

Semester	Course	Course Title	Ins. Hrs / Week	Credit	Exam Hrs	Marks		Total
						Int.	Extn.	
I	Core Course – I (CC)	Analog & Digital IC's	6	5	3	25	75	100
	Core Course – II (CC)	Advanced Microprocessor and Applications	6	5	3	25	75	100
	Core Course – III (CC)	Electronics Instrumentation	6	4	3	25	75	100
	Core Course – IV (CC)	Power Electronics	6	5	3	25	75	100
	Core Course – V (CC)	Analog and Digital Lab	6	4	3	40	60	100
		Total	30	23				500
II	Core Course – VI (CC)	Microcontroller and Interfacing	6	5	3	25	75	100
	Core Course – VII (CC)	VLSI design and VHDL Tools	6	5	3	25	75	100
	Core Course – VIII (CC)	Biomedical Instrumentation	6	5	3	25	75	100
	Core Course – IX (CC)	Microprocessor Lab - 8086	6	4	3	40	60	100
	Elective – I	Programming in C++	6	4	3	25	75	100
		Total	30	23				500
III	Core Course – X (CC)	Pulse Techniques	6	5	3	25	75	100
	Core Course – XI (CC)	Data Communication Network	6	4	3	25	75	100
	Core Course – XII (CC)	Microcontrollers and Interfacing Lab	6	4	3	40	60	100
	Elective - II	Embedded Systems	6	4	3	25	75	100
	Elective – III	Modern Communication Systems	6	4	3	25	75	100
		Total	30	21				500
IV	Core Course – XIII (CC)	Fiber Optic Communication	6	5	3	25	75	100
	Core Course – XIV	Digital Signal Processing	6	5	3	40	60	100
	Project Work	Dissertation=80 Marks [2 reviews –20+20=40 marks Report Valuation = 40 marks] Viva = 20 Marks	6	5	-	-	-	100
	Elective - IV	Microwave & Radar Communication	6	4	3	25	75	100
	Elective - V		6	4	3	25	75	100
		Total	30	23				500
		Grand Total	120	90				2000

Note:

Core Courses include Theory, Practicals & Project

No. of Courses	14 - 17
Credit per Course	4 - 5
Total Credits	70

Elective Courses

(Major based / Non Major / Internship)

No. of Courses	4 – 5
Credit per Course	4 – 6
Total Credits	20

	Internal	External
Theory	25	75
Practicals	40	60

Project

Dissertation	80 Marks	[2 reviews – 20+20	=	40 marks
		Report Valuation	=	40 marks]
Viva	20 Marks			20 marks

Passing Minimum in a Subject

CIA	40%	Aggregate 50%
UE	40%	

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CORE COURSE I - ANALOG AND DIGITAL ICS

Unit I: OPERATIONAL AMPLIFIERS

Op-AMP Dc characteristics :- input bias current input -offset current - input offset voltage-total output offset voltage- thermal drift.

OP-AMP Ac characteristics: - frequency response-stability of op.amp-frequency compensation-slew rate-Inverting and non-inverting amplifiers and its applications:- Adder-Subtractor-Integrator-Differentiator-Current to voltage-Voltage to current converters-current amplifier- instrumentation amp-bridge amp-Voltmeters and current meter-Solving simultaneous equations-Solutions to differential equations for radio active decay, harmonic oscillator and damped harmonic oscillator.

Unit II: COMPARATORS AND APPLICATIONS

Comparator characteristics and limitations-comparator applications:- zero crossing detector-level detector-window detector-Time marker generator - Phase detector-Schmitt trigger-voltage limiter-Precision half wave –full wave rectifier-peak detector -clipper-clamper-sample and hold circuit – log and antilog amplifier-frequency multiplication and division-A/D and D/A converter.

Unit III: FILTER AND WAVE GENERATORS

Filters: first order low pass filter-second order low pass filter-High pass filter and second order band pass filter – Narrow band wideband pass filter-Band rejection filter-Notch filter and band rejection filters.
Astable – Monostable Multivibrator- Triangular wave generator -Sine wave generator-Phase shift and Weign bridge oscillator.

Unit IV: TIMER APPLICATIONS

IC 555 Application In Monostable mode: Missing pulse detector-Linear ramp generator-Frequency divider-Pulse width Modulation- Frequency Divider-water level fill control-Touch switch.

Adjustable duty cycle- rectangular wave generator-FSK generator-Pulse position modulator-Tone burst generator-Dual timing circuit-Voltage controlled frequency shifter-VOC(IC566) voltage to frequency converter factor.

PLL applications:- Frequency multiplication/division-frequency translation-AM/FM detection – FSK demodulator.

Unit V: POWER AMPLIFIERS AND REGULATOR ICS

Monolithic power amp. IC LM 380-Programmable Transconductance amplifier OTA3080 -. Voltage regulation:- IC 723 voltage regulator- Low /High Voltage regulator-current limit protection-current Fold back- current boosting - Swtiching regulator –SMPS.

TEXT BOOKS

1. Linear Integrated circuits - D. Roy choudry, Shail jain.
2. Operational amp and Linear IC's –Robert E. CoushIir-PHI Edition.
3. Opamp and linear IC's - Ramakant-A.- Gayakwad PHI Edition.
4. Digital and analog techniques-G.N. Navaneeth, V.M. Gokhulae Kitab Mahal Publishers.

REFERENCE BOOK:

1. Integrated circuits- K.R. Bothkar.

CORE COURSE II – ADVANCED MICROPROCESSORS AND APPLICATIONS

Unit I: ARCHITECTURE:

Organization of the 8086 Microprocessor – Memory organization-Register structure-Addressing modes in 8086 – Minimum mode maximum mode-Exception handling in 8086 - Organization of 68000 microprocessor-Register structure –addressing modes in 68000 – Architecture of 80386 microprocessor.

Unit II

Instruction set (only for 8086)- Data transfer-Arithmetic –Branch-Loop - Flag manipulation-Logical –shift and rotate-instructions-Programming in

8086-Addition –Subtraction-Multiplication-Division BCD Arithmetic - Searching and array for a given number- choosing the biggest and smallest numbers from a list-arraganig a list of numbers in ascending or descending order – Time delay -Character manipulation.

Unit III:

Assembler and Multiprocessing-Assembler-Directives and operators- Data definition and storage allocation-structure - Records- Assigning names and expressions-Segment definition – program definition- Alignment directives-Assembly process-8086 based multiprocessing system-coprocessor configuration –closely coupled and Loosely coupled configuration-8087 numeric processor (architecture only)

Unit IV :

Interfacing memory and I/O devices-I/O Memory mapped I/O - Data Transfer –Parallel- programmed data transfer interrupt driven -Direct memory access data transfer-serial data transfer-Type of interfacing devices-8255 I/O Ports and Progamming-8251 Serial communication interface-8253 timer Interface –interfacing 8257 DMA controller – 8259 interrupt controller.

Unit V:

Application and development tools: A/D-D/A interfacing -stepper motor interfacing-interfacing seven segment display-Keyboard interface- traffic control -Data acquisition –Temperature measurement and control – Microprocessor based software development tools-In circuit emulator.

REFERENCE BOOKS:

1. Introduction to microprocessor-Aditya P. Mathur
2. Micro Computer System 8086-8088 Family- Yuchangliv and Clenn A. Gibson Prentice Hall- New Delhi 1986.
3. Microprocessors and interfacing-Programming and Hardware Douglas V. Hall
4. Microprocessor Architecture Programming and application-Goankar.

CORE COURSE III - ELECTRONICS INSTRUMENTATION

Unit I: BUILDING BLOCKS OF INSTRUMENTATION SYSTEM AND TRANSDUCERS:-

Block diagram of instrumentation system-performance characteristics of instruments-accuracy, precision sensitivity, linearity, resolution, hysterisis, errors.
Electrical transducers-classification-basic requirement of a transducer-displacement transducer-variable resistance-variable inductance-LVDT-RVDT-variable capacitance-Hall effect, digital , piezoelectric , pressure and temperature transducers-flow meter and photosensitive transducers.

Unit II: SIGNAL PROCESSING AND CONDITIONING:-

Transducer bridges-instrumentation amplifier –isolation amplifier-logarithmic amplifier-voltage and current amplifier-integrator-differentiator. Phase sensitive detector-peak detector –sample and hold circuit-RMS count –comparator-linearisation-V to f and f to V converters-filters.

Unit III: DATA ACQUISITION:-

Single channel, mutli channel data conversion-A/D, D/A converters – multiplexers – PID controller –application of microprocessors: temperature controller-control of petrol engine. Firing angle control of SCR-atmospheric data acquistion.

Unit IV: ELECTRONIC INSTRUMENTS, RECORDERS AND DISPLAYS:-

Standard lab. Equipments- signal generator-pulse generator-CRO -VTVM-wave analysis recorders-analog recorders-XY – recorders- stripe chart recorder-oscilloscope recorder-digital recorder- digital readout CRO-digi taperecorder -digital displays.

Unit V: GENERAL PURPOSE ELECTRONIC INSTRUMENTS

Digital voltmeters and multimeters-electronic counters- AC millivoltmeter-wave analyzers and spectrum analyzers-frequency synthesizers –lock in amplifier-frequency response analyzer-phase meter.

BOOKS FOR STUDY:

1. Instrumentation-Devices and Systems- C.S Rangan, G.R. Sharma and V.S.V. Mani-TMH –1983
2. Electronic Instrumentation and Measurement Techniques-W.D. Cooper, A.D. Helfrix - PHI-1988.
3. Principles of Industrial Instrumentation- D. Patranabis
4. Electrical and Electronic Measurements and Instrumentation-A.K. Sawnney-Dhanpat Rai and Sons 1978.

CORE COURSE IV - POWER ELECTRONICS

Unit I: THEORY AND OPERATION OF SCR, UJT, AND TRIAC

Characteristics- design of relaxation oscillator using UJT-UJT in SCR and TRIAC triggering circuits-PUT's - SILICON bilateral switch –speed control of DC shunt Motor using thyristors – single phase half wave speed control system- Single -phase speed control system- Reversible control system.

Unit II: THYRISTOR COMMUNICATION TECHNIQUES

Introduction-natural commutation-forced commutation-self commutation –impulse commutation-response pulse commutation-external pulse commutation –load side commutation-line side commutation-complementary commutation. Controller Rectifiers:- Introduction-Principle of phase controlled converter – single phase semi-converter-single phase series converter.

Unit III: STATIC SWITCHES

Introduction-single phase AC switches, three phase AC switches-Three phase reversing switches – AC switches for bus transfer – DC switches-

solid -state relays –AC voltage controller: Introduction-Principle of ON OFF control - Principle of phase control –single phase bi-directional controllers with resistive Loads and inductive loads- cycle converters-single phase cycle converters.

Unit IV : DC CHOPPERS

Introduction-principle of step –down operation-step –down with RL load – Principle of step up operation-Switch mode regulator, buck regulator-boost regulator - Buck and Boost regulator – CUK regulator.

Unit V : INVERTORS AND POWER SUPPLIES

Introduction – Principles of operation – single phase bridge inverters-three phase inverters-Voltage control of single phase inverters-Introduction to power supply:- AC and DC power supply- Switched mode DC power supplies-Resonant DC power supplies-Bi- directional power supplies- AC power supplies.

REFERENCE BOOKS:

1. POWER ELECTRONICS: CIRCUITS, DEVICES & APPLICATIONS- M.H. RASHID-PRENTICE HALL
2. POWER ELECTRONICS – SEN

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CORE COURSE V - Analog and Digital Lab

(At least 20 experiments to be done, choosing at least 10 from each group)

Group I (Analog)

1. Op. Amp – Inverting and Non- inverting amplifier.
2. Op. Amp – Generation of Square and ramp.
3. Op. Amp – Wein's Bridge Oscillator.
4. Op. Amp – Solution of simultaneous differential equations.
5. Op. Amp – Logarithmic amplifier.
6. Op. Amp – Antilogarithmic amplifier.
7. Op. Amp – Low pass, high pass filters.

8. Op. Amp – Band pass, Band rejection and Notch filters.
9. Wave shaping circuits and precision rectifier.
10. Schmitt trigger.
11. Hall Effect – Magnetic field measurement.
12. LVDT – Characteristics and Applications.
13. LDR – Characteristics and Applications.
14. Opto coupler – Characteristics and Applications.
15. Photo diode and phototransistor – Characteristics and Applications.
16. Temperature measurement using thermocouple and instrumentation amplifier.

Group II (Digital)

1. Half- adder, Full-adder, Half-subtractor and Full-subtractor using NAND gates.
2. Flip-Flops – RS and JK.
3. Encoder and Decoder.
4. Multiplexer and Demultiplexer.
5. D/A converter – R-2R resistor network.
6. D/A converter - weighted resistor network.
7. A/D converter.
8. Shift Register – Serial/Parallel input/output.
9. Digital comparator.
10. Memory circuits – RAM, ROM.
11. ALU – 74181 – truth table.
12. 9, 99 counter 7490 – 7 segment display.
13. Ripple counter using flip-flops.
14. Parity generator / checker.
15. Multivibrator – Astable, Monostable – 555 timer
16. Code converters.

CORE COURSE VI - MICROCONTROLLERS AND INTERFACING

Unit I:

Introduction Microprocessors and Microcontrollers-comparison microprocessor and Microcontrollers-Microcontroller survey- 4,8, 16,32bit Microcontrollers-8051 architecture-internal memory-input, output pins, ports-External memory –Addressing modes.

Unit II:

Logical separation of program and data memory – timers/counters and programming of counters and timers-register in serial data input/output – serial data Transmission modes-Various types of interrupts –Assembly language Programming –Programming tool and techniques.

Unit III:

Assembly Language programming for 8051 microcontroller family-Data transfer Instruction-Arithmetic instruction –Branch Instructions- Bit manipulation instruction-rotate Instruction-Instructions stack operation-calls and subroutines-Interrupts and returns –multiplication-division – programmes-greatest-smallest no in an array-ascending and descending order- Evaluating simple expression –string manipulation-pattern comparision –alphabetical order-delay –routines-calculation of time delay.

Unit IV:

Microcontrollers design –External Memory and Memory space decoding – Memory -Mapped i/o –Memory decoding –Testing the Design –Timing subroutines-Time delay using software and timer-Look up tables-Serial data transmission –Character Transmission by polling –Interrupt –Driven Character Transmission and reception.

Unit V

Application:- Interfacing Keyboard-A Scanning program for small keyboards-Interfacing Large Matrix keyboard-Interfacing LED, LCD display –Pulse measurement And pulse width measurement-A/D –D/A interfacing -Multiple Interrupts-stepper motor interfacing –Data acquisition system using a Microcontrollers-Temperature measurement and control using a Microcontrollers.

BOOKS FOR STUDY:

1. The 8051 Microcontroller Architecture, Programming & Applications, Kenneth J. Ayla -Penram International Publishing (India) – Unit I,II,III, IV and V)
2. Microprocessor Architecture Programming and application by Goankar.(UNIT V)
3. Microprocessor and Interfacing: DOUGLAS V. HALL Mc Graw-Hill INTERNATIONAL EDITIONS.

CORE COURSE – VII - VLSI DESIGN AND VHDL TOOLS

Unit-I Introduction to MOS Technology:

Introduction- Basic MOS transistors – Enhancement mode transistor action-Depletion mode transistor action – n-MOS fabrication-n-MOS and C-MOS design rules-Basic electrical properties of MOS circuits – Scaling of MOS circuits- Inverters – super buffers-universal logic(NAND and NOR) circuits-Systems steering logic design – threshold voltage equation – basic dc equation – II order effects of MOS modules – Small signal ac characteristics.

Unit-II: Date and control flow in Systematic structure:

Introduction – 2 phase clocking and generator using D – flip-flops-Dynamic register- Dynamic shift register – Basic arrangement for bus lines – Combinational logic: Parity generator, Bus Arbitration Logic for n-line bus – Multiplexers – Programmable Logic Array – Finite State Machine.

Unit-III LSI Computer System Design:

System overview-overall structure of data path – ALU – Registers – Buses – Barrel shifter – Resister array- System-timing analysis.
C-MOS design projects: An Incrementer/Decremental – Left/Right Shift serial/Parallel Register.
Data flow modeling: Concurrent Signal Assignment Statement-Multiple Drivers – Conditional Signal Assignment Statement- Block Statement – Concurrent Assertion Statement – Value of a Signal.
Hardware Modeling: Modeling synchronize Logic –Clock dividers.

Unit – IV - VISI FABRICATION TECHNIQUES:

An overview of wafer fabrication – wafer processing – oxidation – pattering diffusion-ion implementation deposition – si gate n MOS process – C MOS

process-n well-p well-Twin tub – si on insulator-C MOS process enhancement- interconnect circuit elements.

Unit –V Hardware Description Language:

Basic language Elements-Data Objects – Date types – Operators – Behavioral Modeling – Entity Declaration- Architecture Body-Process Statements – Variable Assignment statement – Signal Assignment Statement – Wait statement – If Statement Case statement- Null statement – Loop statement-Exit statement – Next statement – Assertion Statement – Report statement – More on signal assignment statement – Other sequential statements – Multiple Processes – Postponed Processes.

Text Books:

1. Principle of CMOS VLSI design – Neil H.E.Weste and Kamaran Eshragtian Addison Wes leg (1985).
2. Basic VLSI Design – Daughlas A Puck Nell.
3. A VHDL Primer – J.Bhasker – Pearson Education – III edition.

Reference Books:

1. IC fabrication Technology – Elliot.

Introduction to VLSI design – Convey C.Mead.

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CORE COURSE VIII - BIOMEDICAL INSTRUMENTATION

Unit – I : Physiology

Nerve Physiology : Basic properties of Neurons and Axons – Membrane Potential and action potential – Function of nerves.

Muscle Physiology – Function of skeleton and smooth muscle – Cardiac muscle and rhythmic contraction.

Unit – II Heart and Central Nervous System

Heart Physiology : Dynamics of system blood flow – Electro physiology of the heart – Eithoven triangle.

Respiration : Mechanism and respiration.

Neurophysiology: Central nervous system – Function of the spinal cord and cord reflexes.

Unit – III Instruments and Diagnosis

Electrocardiogram (Qualitative Study Only) – Electroencephalogram (Recording techniques) – Patient Monitoring systems (Brief study) – Ultrasonic scanning modes.

Unit – IV Diagnosing Instruments

Computer axial tomography – Thermography – Blood pressure monitors – Respiration rate monitors (with respect to volume changes) – pH meters.

Unit – V Therapy Instruments

Iostopes (X-rays) – Pace makers – Defibrillators – Dialyzer – Respirator.

Books for study

1. Biomedical Instrumentation – Leslie Cromwell, Fred.J.Weibell and Erich A. Pfeiffer – Prentice Hall India – 2nd edition – 1990

Books for References

1. Biomedical Instrumentation – M. Arumugham , Anuradha Agencies Publishers, Kumbakonam

CORE COURSE IX – MICROPROECESSOR LAB - 8086

(At least 22 experiments to be done. All experiments are done using Microprocessor.)

1. Addition, Subtraction (8 bit).
2. Addition, Subtraction (16 bit).
3. Multiplication, division (8 bit).
4. Multiplication, division (16 bit).
5. To find the largest and smallest number.
6. Searching for a number in an array and pattern comparison.
7. Real time clock.
8. Six letter word display.
9. Rolling Display.
10. LED interface.

11. To find the sum of series.
12. Interfacing – A/D converter.
13. Interfacing – D/A converter.
14. Interfacing - Logic controller.
15. Interfacing – Traffic controller.
16. Interfacing – Keyboard.
17. Interfacing – Seven segment display.
18. Interfacing – Stepper Motor.
19. Interfacing – Object counters.
20. Interfacing – Relay.
21. Interfacing – Temperature measurement.
22. Printer Interfacing.
23. Square wave generator.
24. Sine wave generator.
25. Ramp wave generator.
26. Microprocessor –Block of data transfer.
27. Program involved in subroutine.
28. Program used interrupt.

ELECTIVE COURSE - I - PROGRAMMING IN C++

Unit I:

Principles of object oriented programming(OOP) : software evolution-object oriented Programming paradigm-basic concepts of OOP'S -benefits of oop's .
Introduction to C++ - tokens, keywords, identifiers, variables, operators, manipulators, expression.

Unit II:

Control structures in C++-Functions in c++ - main functions-function prototyping-call by reference –return by reference –functions overloading – friend and virtual functions.

Unit III:

CLASSES AND OBJECTS:- Specification of a class-Accessing class members-member functions of-class, -objects-array of objects-passing objects as Function arguments-Friend Functions-Const Member functions-

Special member functions constructors-Destructors-operator overloading-overloading operators-Rules for overloading operators-Type conversions.

Unit IV: Inheritance:

Single inheritance-Multilevel inheritance-multiple inheritance-hierarchical inheritance-hybrid inheritance pointers-Virtual functions and polymorphism managing console I/O operations working with files –classes for file stream operations –opening and closing a file –end –of –file, deduction-file pointers updating a file error handling during file operations- commandline arguments.

Unit V: PROGRAMS

1. Arranging words in alphabetical order
2. Picking largest and smallest of a set of numbers.
3. Solving quadratic equation
4. Multiplication of two square matrices
5. Least square curve fitting
6. Programs for handling files
7. To solve simultaneous equation by Gauss elimination method.
8. Write a program to convert a number given in base to other bases and number to words.
9. Write functions for (i) find the length of the string (ii) to find a substring with a given string.
10. Write functions for (i) reversing the string(ii) converting integer into string
11. Write functions for (i) String copy (ii)string compare(iii) to replace a substring with another string.
12. Read in a string of characters and determine if they are Palindrome (i) to replace the half with first holy (ii) reverse them half separately.

TEXT BOOK: E. Balagursamy- Object Oriented programing with C++ Tata Mc-Graw Hill publishing company Ltd., 1998.

CORE COURSE X - PULSE TECHNIQUES

Unit I: PULSE FUNDAMENTALS

Types of wave forms- characteristics of pulse waveforms-transistor switching times.

LINEAR WAVESHAPING CIRCUITS

High pass and low pass RC circuits-response to step, square, rectangular, ramp and exponential inputs-high pass RC as a differentiator and low pass RC as an integrator-steady state solutions.

Unit II: CLIPPING AND CLAMPING CIRCUITS

Diode clipping circuits-series and shunt diode clippers- transistor clipping-clipping at the independent levels-emitter coupled clippers-diode comparators-applications of voltage comparators.
Clamping circuits-clamping operations-negative and positive clamping circuits-clamping circuit theorem -biased clamping –zener diode clamper-voltage multiplying circuits.

Unit III: MULTIVIBRATOR CIRCUITS

Collector coupled and emitter coupled astable, monostable multivibrator-collector coupled bistable multivibrator-fixed and self bias-triggering of bistable multivibrator-speed up capacitors-asymmetrical and symmetrical triggering.

Schmitt trigger circuit-designing for the UTP and LTP Schmitt trigger as a squarer, flip-flop and voltage comparator.

Unit IV: VOLTAGE AND CURRENT TIME BASE GENERATORS

Generator features of time base signals-sweep speed error-displacement error-exponential sweep circuit-UJT circuit –Miller and Bootstrap time base generators-general considerations-transistor Miller time base generator-Bootstrap time base generator-basic Principles –transistor Bootstrap time base generator.
Constant current ramp generator-basic television sweep circuits.

Unit V: BLOCKING OSCILLATOR CIRCUITS

Triggered transistor blocking oscillator-base and emitter timing - astable transistor blocking oscillator-diode and RC control applications of blocking oscillators-elementary ideas of pulse modulation and time division multiplexing –basic ideas of pulse transformers-unidirectional and bi-directional sampling gates.

BOOKS FOR STUDY.

1. Solid state Pulse circuits-A. Bell-TMH
2. Pulse Digital and Switching waveforms-Millman and Taub-Mcgraw Hill National Book company

REFERENCES:

Pulse Digital circuits and Computer Fundamentals- R. Venkataraman-Dhanpat Rai and Sons.

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CORE COURSE XI – DATA COMMUNICATION NETWORK

Unit I: NETWORKING CONCEPTS

Structure of Communication Network –Network Topologies – Telephone Networking – Fundamentals of Communications theory connecting the analog and digital worlds-Synchronizing Network components-Classification of communication protocols-polling/selection systems-non polling systems-pear to pear non-priority system –pear to pear priority system.

Unit II: COMPONENTS AND NETWORK DISTRIBUTED ARCHITECTURE

LAYERING: - Physical -Data link layer- network layer- transport layer-session layer-Application layer. MODEMS:- Modulation techniques – multilevel transmission-other modems- advances in modems-modems market.

SWITCHING : - Circuit Switching –message switching –packet looping - Multiplexing line sharing –compression-FDM –TDM-TDMA

Unit III: LOCAL AREA NETWORK

Introduction-LAN definition –usage –major components of LAN – LAN protocols standards-CSMA/CD-Token ring –token bus- MAN - fiber distributed data Interface(FDDI) – Logical link control -other LAN (ETHERNET IBM token ring)

Unit IV: DIGITAL NETWORK AND PBX

Signal conversion- digital carrier systems –channel and data service units-A/D techniques-ISDN :-Narrow and broad band ISDN. Evaluation of PBX –issue of voice data integration –using PBX in LAN- IV generation PBX-digital multiplexed interface (DMI) and computer to PBX (CPI) proposals.

Unit V: DATA COMMUNICATION APPLICATIONS

Fascimile –scanning methods-flat bed scanner-FAX standards -fax system Telematics-teletex –E MAIL – X .400, X.500 Concept of Internet -feature of Internet –Types of connectors-Internet tools.

TEXTBOOKS

1. Computer Networks-Uyless Black –Second Edition-PHI
2. Data Communication and Distributed Networks-Uyless Black – Third Edition
3. Telecommunication Transmission Systems-Robert G. Winch-McGraw- Hill
4. Data Networks-Dimitri Bertsekas, Robert Gallyer-PHI
5. Internet Concepts Problems and solution-Singh and Singh

CORE COURSE XII - MICROCONTROLLER AND INTERFACING LAB

(At least 22 experiments to be done. All experiments are done using Microcontroller.)

1. Addition, Subtraction (8 bit).
2. Addition, Subtraction (16 bit).
3. Multiplication, division (8 bit).
4. Multiplication, division (16 bit).

5. To find the largest and smallest number.
6. Searching for a number in an array and pattern comparison.
7. Real time clock.
8. Six letter word display.
9. Rolling Display.
10. LED interface.
11. To find the sum of series.
12. Interfacing – A/D converter.
13. Interfacing – D/A converter.
14. Interfacing - Logic controller.
15. Interfacing – Traffic controller.
16. Interfacing – Keyboard.
17. Interfacing – Seven segment display.
18. Interfacing – Stepper Motor.
19. Interfacing – Object counter.
20. Interfacing – Relay.
21. Interfacing – Temperature measurement.
22. Printer Interfacing.
23. Square wave generator.
24. Sine wave generator.
25. Ramp wave generator.
26. Block of data transfer.
27. Program involved in subroutine.
28. Program using interrupt.

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ELECTIVE COURSE II – EMBEDDED SYSTEMS

Unit I PC Hardware

Motherboard – Daughterboard – FDD – HDD – I/O Port Address – Post Sequence SMPS – Functional Units and Intercommunications. Reset Logic – CPU Nucleus Logic – DMA Logic. Wait state Logic – Bus arbitration Logic.

Unit II Peripheral Interface and Controller

Printer Parallel Interface – Floppy Disk controller – Hard Disk controller – CRT display controller 6815 – CGA – Advanced graphic Adopters – RS232 Interface – 1488, 1489.

Unit III Trouble Shooting

Computer faults – Trouble shooting tools – bus faults – Trouble Shooting Levels – Post sequences – PC Diagnostic Software – Motherboard Problems Diagnostic – Printer Interface Problems – Serial port problems – HDC problems – Display adopter problems.

Unit IV Survey of Software Architecture

Introduction – A first look at Embedded Systems – Examples of Embedded Systems – Typical Hardware – Round Robin – with Interrupts – Function Queue – scheduling Architecture – Real Time Operating System – Introduction to RTOS – Tasks and task states – Task and data – shared data problem – Semaphores and shared data – Ways to protect data.

Unit V Embedded Software Development Tools

Cross Compiler – Assemblers – Linker / Locators for embedded software – Output File Formats – Locator Maps – Getting Embedded Software in to the target system – ROM – Emulator – Incircuit Emulators – Debugging Techniques – Basic Techniques – Calling Interrupt Routines – Calling Timer Interrupt Routines using Laboratory tools – Logic Analyser.

Text Books:

1. IBM PC & Clones : Hardware, Trouble Shooting & Maintenance – B.Govindarajalu. Tata McGraw Hill (Unit I, II & III).
2. Embedded System : A software Primer – E.Simon (Unit IV, V).

Reference Book:

1. IBM PC: Troubleshooting and Repair Guide – Robert C Brenner, BPB Publications, New Delhi.

ELECTIVE COURSE III–MODERN COMMUNICATION SYSTEMS

Unit I

Modulation: Introduction – Amplitude modulation (Theory and Mathematical Analysis) – Power in an Am Wave – Vector representation – Block diagram of an Am transmitter – Collector modulation – Double side band modulator – single Side Bank suppressed carrier (SSB/SC) – Vestigial Side Band System (VSM)

Frequency modulation (Theory and Mathematical Analysis) – Frequency Spectrum of FM – Vector representation – Narrow Bank FM – Wide Bank FM – Varactor diode FM Modulator – Transistor Reactance FM Modulator

Phase Modulation (Theory and mathematical Analysis) – Vector Representation – Armstrong phase Modulatior – Pulse Width Modulation (PWM) – Theory and Pulse position Modulation

Unit II

Demodulation and Noise: Detectors – Practical Diode Am Detector – VSB Demodulator – Synchronous Detector – Phase – Licked Loop (PLL) – FM Discriminator Foster – Seeky FM Discriminator – Ration Detector Demodulation of PM

Noise in Communication system: Noise in Am System: Noise in FM system – Noise in Phase Modulated system – Noise in Pulse Modulated System.

Unit III - Digital Communication

Introduction to Digital Communication system _ Amplitude shift Keying (ASK) – Bank width and Spectrum frequency of ASK – Binary ASK Modulator – Coherent ASK Detector – Non Coherent ASK Detector – Frequency shift keying (FSK) – Bandwidth of binary FSK – detection of FSK using PLL – Phase shift keying (PSK) Generation of Binary PSK wave – Detection of Differential phase shift keying (DPSK) – DPSK Transmitter Generator – DPSK Demodulator – Advantage and disadvantage of Digital Communication

Unit IV

Broad band and satellite Communication: Time Division Multiplexing (TDM) – Frequency Division Multiplexing (FDM) – Computer communication – Microwave Service Digital Network (ISDN) – Broadband ISDN (BISDN) – Local Area network (LAN) – Bus topology – Star

Topology – ring Topology – Hybrid Topology – Private Branch Exchange (PBX) – MODEMS

Communication Satellite Systematic Basic Components of Satellite Communication System – Telemetry, Tracking and Command System (Block Diagram) – Satellite Links – Uplink and Down Link – Commonly Used Frequency in Satellite Communication – Multiple Access – Error Detection

Unit V - MOBILE COMMUNICATION.

Evaluation and fundamentals – cellular structure and planning – frequency allocations – propagation problems – Base station antennas and mobile antennas – type of mobile system – access methods – TDMA, FDMA and CDMA – DIGITAL Cellular Radio.

Books for Study:

1. SK. Venkatraman – Digital Communication, S. Chand
2. Arokh Singh and A.K. Chhabra – Principles of Communication Engineering – S. chand
3. Subir Kumar Sarkar – Optical Fibres and Fibre Optic Communication system – S. chand.
4. Wireless Communication Principles & Practice – TS. Rapport
5. BL. Theraja – Basic Electronics – S. chand

Books for Reference:

1. George Kennedy – Electronic Communication systems – Mac Graw Hill International 3 ed.
2. Roddy and Coolen – Communication electronics – PHI
3. B.P. Lathi – Communication System – Wiley Eastern
4. K. Samshanmugam, John Wiley – Digital and Analog Communication System
5. Robert M. Gaghardi – Satellite Communication – CBS Publication

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CORE COURSE XIII - FIBER OPTIC COMMUNICATION

Unit I: INTRODUCTION

Optical fibers: Structures and wave guiding fundamentals-basic optical laws and definitions –optical fiber modes and configurations- mode theory for circular waveguides –graded index fiber structure-fiber materials and fabrication methods-mechanical properties-fiber cables-attenuation-signal distortion in optical waveguides-pulse broadening-mode coupling.

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 –photodetectors-noise-response time- avalanche multiplication noise –temperature effects on avalanche gain.

Unit III: RECEIVERS AND MEASUREMENTS

Fundamental receiver operation –digital receivers-performance calculations-pre amplifier design –analog receivers Attenenuation measurements-fiber fault location-dispersion measurements-refractive index profile measurements-measurement of optical source characteristics-eye pattern.

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, civil, consumer and industrial applications.

TEXT BOOKS:

1. Gerd Keiser- Optical fiber Communication-McGraw Hill- 1984
2. John M. Senior-Optical Fiber Communication-Principle

REFERENCE BOOKS:

1. Fiber Optics in Telecommunication-N. Sharma-TMH
2. H. Zanger and C.Zanger-Fiber Optic communications and other Applications-Maxwell International Edition.

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ELECTIVE COURSE V
MICROWAVE AND RADAR COMMUNICATION

Unit I: INTRODUCTION TO MICROWAVES

Introduction –maxwell's equation-ampere's Law Faradays Law -Gauss law-Wave equation-TE –TM wave equation-Wave guides-Rectangular wave guides-propagation of waves in rectangular wave guides-TE-and TM modes-Propagation of TM waves in rectangular wave guides-TM modes in rectangular wave guides.

Unit II: MICROWAVE AMPLIFIERS AND OSCILLATORS

Klystrons-Two cavity Klystron -Multicavity Klystron-Reflex klystron-Power output and frequency characteristics - Efficiency of reflex Klystron – Travelling wave tube (TWT)-Application of TWT - Backward wave oscillator -Magnetron- Cavity Magnetron-sustained oscillation in Magnetron-characteristics and applications of magnetron.

Unit III: MICROWAVE ANTENNAS

Quantitative theory of short dipole antenna- characteristics of grounded quarter wave and ungrounded half wave antenna-radiation resistance and radiation pattern –folded dipole and its application-broad side and end fire array -loop antenna-direction finding by Adcock and beeline tossi system-helical rhombic -Yagi antenna-horn antenna and parabolic reflectors.

Unit IV : PRINCIPLES OF RADAR

Introduction-Block diagram of RADAR – Applications of RADAR – Range equation-minimum detectable signal-Receiver Noise-S/N Ratio – transmitter power –maximum ambiguous range –system losses. Receiver: Duplexer-Local Oscillator-Mixer - Line pulse modulator - Displays- PPI.

Unit V: FM RADAR AND MTI

Doppler effect -CW radar-FM CW radar - Multiple frequency CW radar moving target indicator (MTI) - Non coherent MTI - Pulsed Doppler Radar FM altimeter-Tracking –Sequential lobbing – Conical Scan –Monopulse tracking radar.

TEXT BOOK

1. Microwave and Radar Engineering – N.Kulkarni, Umesh Publication
2. Radar and Navigation-Scholnik- McGraw Hill International edition.
3. Antenna and Propagation- K.D. Prasad-Sathya Prakash Publications.

CORE COURSE XIV - DIGITAL SIGNAL PROCESSING

Unit I: Theory of discrete time systems.

Z-transforms: definition – properties – Inverse Z-transforms and its evaluation- solution of difference equations using one sided Z-transform- Discrete Hilberts transform.

Discrete time systems:

Introduction- sequences – representation of arbitrary sequences- linear time invariant systems- Causality and stability – difference equation – frequency response – frequency response of the first order systems – frequency response of the second order systems.

Unit II: Finite duration Impulse response filters.

Digital Filters: Magnitude response and phase response of digital filters.

FIR filters : Design techniques – Window techniques – rectangular window Function- Hamming window function- Hamming window function - Hanning window function – Blackman window function – Bartlet window function – Kaiser window – Design using Kaiser window function

Basic structures: Basic realization block diagram and the signal flow graph Direct forms, Cascade form and linear phase form realization.

Unit III : Infinite duration impulse response filters.

IIR filters : Introduction – I.I.R. filler design by approximation of derivatives, Impulse invariant method, Bilinear transformation - Butter worth filters –Chesby shw filters – frequency transformation (analog and digital) Basic structures : Direct forms, Cascade form and linear phase form realization.

Unit IV : Effects of finite word length in digital filters

Introduction – rounding and truncation errors - Quantization Effects in Analog to digital conversion of signals – out put noise Power from a digital system – Coefficient quantization effects in Direct form realization of I I R and FIR filters – Limit cycle oscillations – product quantization – scaling – quantization Errors in the computation of DFT .

Unit V : Spectral analysis

Statistical techniques : Introduction – Energy density spectrum– Estimation of auto Correlation and power spectrum of random signals –DFT in spectral estimation–Power–spectral estimation–non –parametric methods. Bartlet Welch, Blackman and turkey methods – Quality of power spectrum estimators – parametric methods – Basics of AR, MA and ARMA models - Power spectrum estimation by AR, MA and ARMA models .

FFT technique : Introduction to radix 2 FFTs – some properties of radix 2 – Decimation in time FFT – data shuffling and bit refusal – ecimation in frequency algorithm.

Books for study : (1) Theory and application of Digital signal processing Signal processing L.R.Raliner and B.Gold Prentice Hall of India, New Delhi–2003
(2) Digital Signal processing Tata McGraw Hill publishing Company, New Delhi – 2004

Books for Reference:

- Digital Signal Processing : Allan V.Oppenheim and Ronald W Schafer Prenlice Hall of India – New Delhi 2000
- Architecture of Digital Signal processing – Peter Pirsoh John Wiley – 1998

- Introduction to Digital signal processing – Johny – R.Johnson PHI, Publication, New Delhi, year -1994
- Digital signal processing K.S.Srinivasan. Anuradha agencies 2003 Kumbakonam

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ELECTIVE COURSE IV
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