BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024.

M.Sc. Applied Physics (Computer Electronics) – Course Structure under CBCS
(For the candidates to be admitted from the academic year 2005-2006 onwards)

Seme ster	Course	Course Title	Ins. Hrs / Week	Credit	Exam Hrs	Marks Int.	Marks Ext.	Total
I	Core Course – I (CC)	Mathematical Physics	6	4	3	25	75	100
	Core Course – II (CC)	Integrated Circuits and Applications	6	4	3	25	75	100
	Core Course – III (CC)	C++ and Java Programming Module – I	6	4	3	25	75	100
	Core Course – IV (CC) *	Practical – I – General Electronics	6	4	3	25	75	100
	Elective Course – I (EC)	---	6	4	3	25	75	100
II	Core Course – V (CC)	Solid State Physics	6	4	3	25	75	100
	Core Course – VI (CC)	Solid State Devices	6	4	3	25	75	100
	Core Course – VII (CC) *	Practical – II – Digital Electronics	6	4	3	25	75	100
	Elective Course – II (EC)	---	6	4	3	25	75	100
	Extra Disciplinary Course – I (EDC)	---	3	2	3	25	75	100
	Extra Disciplinary Course – II (EDC)	---	3	2	3	25	75	100
III	Core Course – VIII (CC)	C++ and Java Programming Module – II	6	4	3	25	75	100
	Core Course – IX (CC)	Crystal Growth and Thin film Physics	6	4	3	25	75	100
	Core Course – X (CC)	Computer Hardware and Operating Systems	6	4	3	25	75	100
	Core Course – XI (CC) *	Practical – III – Computer Lab C++ and Java	6	4	3	25	75	100
	Elective Course – III (EC)	---	6	4	3	25	75	100
IV	Core Course – XII (CC)	Embedded Systems and Digital Signal Processing	6	4	3	25	75	100
	Core Course – XIII (CC)	Practical – IV – Hardware Lab	6	4	3	25	75	100
	Project Viva voce 25 marks Dissertation 75 marks	---	18	4	-	-	-	100
			120	72				

The Department of Physics will offer the following Elective Courses :
1. Analog Electronics
2. Advanced Microprocessor and Interface
3. Fiber Optics and Network Communications

EDC – I Troubleshooting Techniques in ELECTRONIC EQUIPMENTS and Computers
EDC II – COMPUTER HARDWARE

* Examination at the end of the even semesters (II & IV)

CORE COURSE I – MATHEMATICAL PHYSICS

Unit I   Integral Transforms

Fourier Series – Dirichlet's condition – Sine and Cosine series – Fourier transform – Faltung theorem – Laplace transform – solution of ordinary differential equations – convolution theorem.

Unit II   Matrix Theory

Solution of linear algebraic equations rank of a matrix – characteristic equation of a matrix – Eigen values and eigen vectors – Trace of a matrix – Cayley – Hamilton theorem – Reduction of a matrix to diagonal form – Hermitian and unitary matrices – Direct sum and products of matrices.

Unit III   Computer Oriented Numerical Methods

Bisection and Newton – Rapson method for finding roots of the equations – solutions of simultaneous linear equation by Gauss elimination method – solution of ordinary differential equation by Euler method and Runge-Kutta second order and fourth order method – Evaluation of integrals by means of power series – Simpson's rule (one – third) – Error estimates.

Unit IV   Vector Fields

Concept of Vector and Scalar fields – Gradient, divergence, Curl and Laplacian – Vector identities – Line integral and volume integral – Gauss theorem, Green's theorem, Stoke's theorem and applications – Orthogonal curvilinear coordinates – Expression for gradient, divergence, curl and Laplacian in cylindrical and spherical coordinates.

Unit V   The Theory of Complex Variables

Functions of a complex variable – The derivative and the Cauchy – Riemann differential equations – Line integrals of complex functions – Cauchy's integral theorem – Cauchy's integral formula – Taylor's series – Laurent's series – Residues – Cauchy's residue theorem.

Books for Study :

1. Mathematical Physics, B.s. Rajput Pragati Prakashan, Merrut (1996).
2. Mathematical Physics, B.d. Gupta Vani Educational Books, Vikas Publishing House Pvt. Ltd U.P. (India) (1990).
3. Mathematical Physics, P.P. Gupta, R.P.S. Yadav, G.S. Malik, Kedarnath Ramanath Meerut, Delhi (1984).
4. Introductory methods of Numerical Analysis S.S.Sastry Prentice Hall of India Private Limited, (Ind. Edition), New Delhi, 1993.
5. Numerical methods by E.Balagurusamy Tata McGraw Hill, New Delhi (2000).
6. Numerical Methods by P.Kandasamy, K. Thilagavathi, K.Gunavathy S.Chand and Company, New Delhi (2000).

CORE COURSE II – INTEGRATED CIRCUITS AND APPLICATIONS

Unit I   Integrated Circuits

Fabrication and Characteristics – Integrated circuit technology – Basic monolithic integrated circuits – Epitaxial growth – Masking and etching – Diffusion of impurities – Transistors for monolithic circuits – Monolithic diodes – Integrated resistors, capacitors and inductors – Monolithic circuit layout – Additional isolation methods, LSI and MSI and the metal – semiconductor contact.

Unit II   Active Filters and Precision Circuits

RC active filters using op-amp, VCVS filters, state – variable filters, Gyrator, switched capacitor filters, amplifier and instrumentation amplifier.

Unit III   Nonlinear Analog Systems

Inverting and Non-inverting amplifier – Precision AC / DC converters – Log and antilog amplifier – Log multiplier – Peak detector – Sample and hold – Free running, monostable and bistable multivibrators using op-amp- OP-amp version of Schmitt trigger – Triangular and ramp wave generators.

Unit IV   Linear Integrated Circuits

Basic relationship in op-amp-ideal op-amp-CMRR-Op-amp as inverter, non-inverting amplifier, subtracting amplifier, the summing amplifier, the comparator, the voltage follower, the current sources, the integrator, the differentiator and analog computer.

Unit V   Charge – Transfer Devices

General Concepts – Loss Mechanisms in CCDs – Charge coupled Delay Lines and Filters – Charge coupled Memories – Imaging CCD Arrays – CCD – Logic structures – Bucket – Brigade Circuits.

Books for Study :

1. Integrated circuits and semiconductor devices, C.Deboo and D.Burrous, McGraw Hill, Singapore, 1989.
2. Integrated Electronics, Millman and Halkias, McGraw Hill, Singapore, 1991.
3. The Art of Electronics, Paul Horowitz and Winfield Hill, Cambridge University Press, Cambridge, 1989.
4. Semiconductor Devices and Integrated Electronics, A.G.Milnes, CBS Publishers and Distributors, Delhi (1987) Unit V.

CORE COURSE III – C++ AND JAVA PROGRAMMING MODULE – I

C++ PROGRAMMING

Unit I   Introduction to C++

Basic concepts of Object Oriented Programming – simple C++ program – structure of C++ program – Basic data types – Operators in C++ - Cin and Cout statements – setw, end switch statements – do while, while and for loops.

Unit II   Functions and Pointers in C++

Function prototyping – call by reference – return by reference – intime function – function overloading – Friend and Virtual functions – arrays – one and multidimensional arrays – Pointers – the new operator – delete – operators – arrays of pointers and pointers to arrays.

Unit III   Classes Objects and Inheritance

C++ Program with class – defining – member function – arrays within a class – arrays of objects – constructors in a class copy constructors - overloading many, binary operators using friends – single inheritance – multiple inheritance.

JAVA PROGRAMMING

Unit IV – Introduction

Introduction to JAVA – Features of Java – Java architecture – Java important to Internet – A first simple Program - Data types, Variables and Arrays – Operators – Control statements. Classes and Objects – Class variables and Class methods – "This" operator – Reusing classes.

Unit V

Inheritance – Inheritance Basics – Using Super – Creating multilevel Hierarchy – Dynamic Method Dispatch – The "Final" key word – Polymorphism – Abstract classes and methods – Packages and interfaces – Packages – Access Protection – Interfaces – I/O, Applets.

Books for Study :

1. Object Orient Programming with C++, E-Balagurusamy, Tata McGraw Hill Publishing Limited, New Delhi
2. Schaum's Outlines Theory and Problems with C++ - John R.Hub Bard – Tata McGraw Hill Publishing Limited, New Delhi.
3. The Complete Reference Java 2 – Patrick Naughton and Herbert Schildt – Tata McGraw Hill Publishing Limited, New Delhi – 2000.
   Unit IV – Chapter 1, 2, 3, 4, 5 6 & 7.
   Unit V – Chapter 8, 9 & 12.
4. Schaum's Outlines Theory and Problems of Programming with JAVA, John R.Hubbard, - McGraw Hill International, 1999.

CORE COURSE IV : PRACTICAL – I - GENERAL ELECTRONICS

(ANY FIFTEEN)

1. Characteristics of FET
2. Characteristics of UJT
3. Characteristics of SCR
4. Characteristics of Light sensitive devices (LED, LDR and Phototransistor)
5. Schemitt trigger – Transistor
6. Wein's Bridge Oscillator – Transistor
7. Phase Shift Oscillator – Transistor
8. OP – AMP – Parameters
9. OP – AMP – Schemitt Trigger
10. OP – AMP – Current to Voltage to current converters
11. OP - AMP – Wave form generators (Sine, Square, Triangular & Ramp waves).
12. OP – AMP Wein Bridge Oscillator
13. OP – AMP – Phase Shift Oscillator
14. IC Power supply – Single Dual (three Pin Regulators)
15. UJT Relaxation Oscillator
16. FET Amplifier – Common Source configuration
17. FET – Oscillator
18. C Power supply using – single and dual (Three pin regulator)
19. Solving simultaneous equations using OPAMP.
20. Setup analog computer to solve first order differential equations using OPAMP.

CORE COURSE V - MATERIALS SCIENCE

Unit-I: Crystal Structure and Defects

Bonding of solids - crystal structure- NaCl, CsCl and ZnS-Reciprocal lattice- Method of Determining crystal structure – X ray Diffraction – Electron Diffraction – Neutron Diffraction – Structure Determination – Imperfection in crystals – Point defects – Line imperfection – Burger vector

Unit –II Crystal Growth and Nucleation

Nucleation and thermodynamics of crystal growth – Theories of crystal growth – Volume theory – Kossel Theory – Bravais theory – BCF theory – Low temperature solution growth – Evaporation method –Gel method – Melt method – Bridgmann method – Czochralski crystal pulling technique – Chemical Vapour transport method

Unit-III: (a) Mechanical Properties

Strength _Elasticity- Plasticity- Ductility- Malleability-Toughness- Hardness-Testing of Materials- Non-destructive Tests –Radiographic –Photo elastic and Ultrasonic methods of testing –Methods of Hardness Testing –Mechanism of deformation –Griffth's theory of fracture.

(b) Alloys: Ceramics and glasses – cement and concrete- organic polymers composite materials.

UNIT-IV Electrical Properties of Materials

Properties of Metals-Free electron Gas- Free electron theory-Zone theory of solids-Classification of conductors, insulators and semiconductors based on Zone theory-one dimensional Brillouine Zones – construction-Variation of electrical conductivity with temperature-Fermi level-carrier concentration of Intrinsic semiconductor-Barrier potential across PN Junction-Junction properties rectifier equation-Hall effect, Hall mobility, Experimental Determination of Hall coefficient, Dielectrics-Types of Polarizability-Clausius-Mosotti relation.

Unit-V- Nanotechnology

Introduction- Definition of Nanomaterials – Nanostructure - synthesis- methods Nano-pen lithography, electron beam lithography-self assembly-Characterization of Nanocrystals by spectroscopic, electrochemical, electron microscopic methods - Nanocrystalline powders- Microwave irradiation method-introduction to Nanocrystal growth- Carbon Nanotube (CNT) - Applications of Nanomaterials in electronics and optics.

Books for study and reference

1. Kittel, C Solid State physics, Wiley and Sons, New York, (1983).
2. P.Santhanaragavan, P.Ramasamy, Crystal Growth Processes and Methods, KRU Publications, Kumbakonam, (1998).
3. Gupta, Kumar Solid State Physics, S. Chand & Co., New Delhi, (1983)
4. Mark Ratner, Daniel Ratner, Nanotechnology, Pearson Education, 2003.

CORE COURSE VI - COMPUTER SYSTEM ARCHITECTURE

Unit - I Basic Computer Organization

Instruction codes – computer instructions – Timing and control – Instruction cycle – Memory reference instructions – Input/ output and interrupt

Unit-II Programming

Machine language – Assembly language – The assembler- Program loops – Programming arithmetic and logic operations – Subroutines – Input/output programming.

Unit-III Central Processing Unit

Central processing unit – General register organization – Stack organization – Instruction formats – Addressing modes – Data transfer and manipulation – Program control. Pipeline processing – Pipelining – Instruction pipeline – Multiprocessor – characteristics – Interconnection structures – Inter process arbitration. Computer arithmetic – Addition, subtraction and Multiplication algorithms – Division algorithms.

Unit – IV Input/Output Organization

Input/Output interface – Asynchronous data transfer – Modes of transfer – Priority interrupt – DMA – IOP – Serial communication.

Unit - V Memory Organization

Memory hierarchy – Main memory – Auxiliary memory – Associative memory – Cache memory – Virtual memory – Memory management hardware.

Books for Study and Reference

1. Morris Mano, Computer System Architecture, Prentice Hall of India, New Delhi, Third Edition (2005).

CORE COURSE VII – PRACTICAL – II DIGITAL ELECTRONICS

Any **Fifteen** of the following experiments

1. Logic gates using ICs
2. Universality of NAND and NOR gates
3. Verification of Demorgan's theorem
4. Simplification of Boolean expression by Karnaugh method
5. Half adder and Full adder
6. Half subtractor and Full subtractor
7. Study of counters (IC 7490)
8. RS, JK, D and MS Flip Flops using gates
9. Shift registers using IC 7495
10. Ring counter
11. Decoder and Encoder
12. BCD to Seven segment display
13. Multiplexer
14. Demultiplexer
15. D/A converter – weighted and R-2R method
16. A/D converter
17. Arithmetic Logic Unit
18. Studying RAM cells

CORE COURSE VIII – C++ AND JAVA PROGRAMMING MODULE – II

Unit – I Object-orientated System Development

Introduction – Object-oriented paradigm – Object oriented notation and Graphs – Steps in object oriented analysis – Steps in object oriented design – Templates – Class templates – Function templates – Member function templates – Templates argument – Exception handling.

Unit – II I/O Operation & Working with Files

I/O operations – Introduction – C++ streams classes – Unformatted I/O operations – Formatted I/O operations – Managing output with manipulators. Introduction – Classes for file stream operations – Opening and closing a file – Detecting end-of-file – More about open(). File modes – File pointers and their manipulations – Sequential input and output operations – Updating a file – Random access – Error handling during file operations – Command line arguments.

Unit – III Java Programming – String Handling

String literals – String concatenation – Character extraction – String comparison – Searching strings – Modifying a string data conversion using value Of() – Networking – Networking Basics – Java and the Net – TCP/IP Client Sockets – URL – URL connection – TCP/IP server sockets.

Unit – IV The Applet Class

Applet basics – Applet architecture – Applet skeleton – Simple applet display methods – The HTML APPLET tag – Event handling – The delegation of event modeling – The action event class – Action mouse listener only – Introduction AWT: AWT classes – Window fundamentals – Working with frame windows – Creating a frame window in an applet – Displaying information within a window.

Unit – V Images

Image fundamentals – Creating – Loading – Displaying – Images & graphics – Observer – Servlets – Background – The life cycle of servlet – The Java servlet – Development kit – A sample servlet.

Books for study and reference

1. E.Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill Publishing Limited, New Delhi.

2. Patrick Naughton, Herbert Schildt,The Complete Reference Java 2, Tata McGraw Hill Publishing Limited, New Delhi.

CORE COURSE IX - BASICS OF INSTRUMENTATION

Unit-I Characteristics of instruments

Static characteristics – accuracy – precision – repeatability-reproducibility-resolution- sensitivity-linearity-drift-span-range-Dynamic characteristics-Transfer Function-Zero order instruments-First order instruments-step and ramp response of first order instruments-frequency response of first order instruments-second order instruments –step-ramp response of second order instruments-dead time elements.

Unit-II Transducers-I

Introduction-Primary and Secondary transducers-Electrical Transducers-Active and Passive transducers-Resistive transducers-Potentiometers-Strain Gauges-Resistance thermometers- Thermistor - Inductive transducers-LVDT-Capacitive Transducers.

Unit-III Transducers-II

Thermoelectric transducers- Piezoelectric Transducers- Magnetostrictive transducer-Ionization Transducers - Digital Transducers- Switching magnetic sensors-Squid sensor-Fiber Optic sensor.

Unit-III Electro analytical Sensors

Introduction- electro chemical cell- cell potential- Standard Hydrogen Electrodes- Liquid Junction and other potentials –Sensor electrodes-electro ceramics in general media-chem FET-Smart Sensors.

Unit- V Data manipulation and Recording

A/D conversion techniques- D/A conversion- A/D conversion-Successive approximation–Integrating type - Ramp - Recorders- Graphic recorders-Strip chart recorders- XY recorders- Magnetic tape recorders - Radio telemetry.

Books for study and Reference

1. A.K. Sawhney and Puneet Sawhney, A Course in Mechanical Measurement and Instrumentation, Dhanpat Rai &Sons, New Delhi (2000).

2. D.Patranabis, Sensors and Transducers, Prentice – Hall of India (P) Ltd., New Delhi (2003).

3. D.V.S. Murty, Transducers and Instrumentation, Prentice – Hall of India (P) Ltd., New Delhi (1995).

4. Ernest O. Doebelin, Measurement system applications and design, McGraw Hill International Book Company, Singapore (1983).

CORE COURSE X - PC TROUBLESHOOTING AND MAINTENANCE

Unit I – Microcomputer system and peripheral devices

Computer organization- Memory- ALU- control unit- Interrupts- I/O techniques-Device controller-error detection techniques- personal computer concepts and techniques-peripheral devices- keyboard-printer-Magnetic storage devices – FDD-HDD- mouse and trackball – modem- CD-ROM drive-scanner- Digital camera- DVD.

Unit-II PC Hardware Overview

Hardware-BIOS-DOS interaction- PC family – PC Hardware- Interconnections between boxes- inside the system box- Motherboard logic- memory space- I/O port interrupts- DMA channel – Keyboard interface- Parallel and serial interface- CRT controller- FDC- HDC- memory refresh- POST sequence-overview of advanced PCs.

Unit III – Installation and preventive maintenance

System configuration – Pre installation planning – Installation practice- Routine checks- PC assembling and integration- BIOS set up- preventive maintenance – virus- data recovery

Unit IV- Troubleshooting

Computer faults- Nature of faults- Types of faults- fault elimination process- systematic troubleshooting- Fault diagnosis- Fault rectification-POST-Layman checks –I/O slot checks-Motherboard problems diagnosis – Printer interface problem- serial port problem- FDC problem-HDC problem- Display adaptor problem- CRT monitor problem- FDD problems- HDD problems-CD drive problems

<u>**Unit V- Introduction to Networks**</u>

History of Networking – Network elements – advantage- Networking topologies- Transmission cables-Networking architecture- LAN extension device- LAN technologies- Broadband and Base band LANs – Data transmission modes-Fault tolerance- Network interface card

<u>**Books for Study and Reference**</u>

1. B.Govindarajalu, IBM PC and Clones Hardware, Troubleshooting and Maintenance, Tata Mc-Graw Hill Publishing Pvt., Ltd, New Delhi, Second edition, (2003).

2. Stephen J.Bigelow, Troubleshooting, Maintaining and repairing PC's, Tata Mc-Graw Hill Publishing Pvt., Ltd, New Delhi, (1999).

<u>**CORE COURSE XI – C++ and JAVA PROGRAMMING LAB**</u>

Any **Fifteen** of the following experiments

<u>**C++ Programming**</u>

1. Arranging words in alphabetical order
2. Arranging numbers in the ascending order
3. Arranging numbers in the descending order
4. Picking the largest of a set of numbers
5. Picking the smallest of a set of numbers
6. Solving quadratic equation
7. Find the trace of a square matrix
8. Invert a square matrix
9. Finding the eigen values of a matrix
10. Multiplication of a square matrix
11. Solving the simultaneous equation by using Gauss Seidal iterative method
12. Solution of the first order linear differential equation by Runge-Kutta method
13. Finding the roots of equations using Newton-Raphson method
14. Evaluate the standard deviation and coefficient of variation for a given set of data
15. Evaluation of correlation coefficient and regression coefficient
16. Least square curve fitting
17. Graphic generation of simple curve
18. Calculation of salary of an employee using file
19. Conduction of heat through insulting wall

JAVA PROGRAMMING

1. Class object – Sorting Programs (Using command line argument & Data input systems)
2. Package – Sum of single digit, factorial
3. Interface – Mark sheet preparation, Pay bill preparation
4. Exception handling – IOE, arithmetic, Number format, Array index out of bound array store
5. Create web pages – College profile
6. Graphics – Oval, rect, line, arc and fill commands

CORE COURSE – XII MICROCONTROLLER AND DIGITAL SIGNAL PROCESSING

Unit-I 8051 Microcontroller Architecture

Microprocessors and microcontrollers-8051 architecture- microcontroller hardware-program and data memory-External memory- counters- timers- serial data I/O- interrupts

Unit-II 8051 Microcontroller Instructions and Simple programs

Addressing modes- Instructions – data transfer instructions- logical- arithmetic- jump and call instructions- bit manipulation -Addition- sum of N numbers, Multibyte addition- subtraction- multiplication-division- biggest and smallest numbers.

Unit –III Discrete time signals and Linear system

Block diagram of DSP system – Advantages and disadvantages- applications of DSP- Classification of signals – signal representation – standard discrete time signals – Classification of discrete time signals – operation on signals – Discrete time system – analog to digital conversion

Unit – IV DFT and FFT

Discrete Fourier transform – Properties of FFT – Linear and circular convolution – Filtering long duration sequence FFT – Decimation in time algorithm and frequency algorithm

Unit – V FIR and IIR filters

Magnitude and phase response of digital filters – frequency response of LPFIR filters- IIR filter design by approximate of derivatives by impulse invariant method and by Bilinear transformation – Butterworth - Chebyshew – Inverse Chebyshew and Elliptic filters

Books for Study and Reference

1. Kenneth J.Ayala, The 8051 microcontroller, architecture, programming and applications, Thomson, Delmar Learning (ISE). (2004).
2. P.Ramesh Babu, Digital Signal Processing, Scientech Publishing Pvt., Ltd., Chennai, (2003).
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, The 8051 microcontroller and Embedded system, Pearson Education, (2004).
4. Sanjit K. Mitra, Digital Signal Processing – A Computer based Approach, Tata McGraw Hill Publishing Ltd., New Delhi. (2003)

CORE COURSE - XIII – HARDWARE LAB

Any **Fifteen** of the following experiments

8085 Microprocessor

1. Simple programs: addition, subtraction, multiplication and division
1. Find the smallest and biggest numbers in a given array
2. Find the ascending and descending order in a given array
3. Block of data transfer using string instructions
4. Find the character in a string
5. Traffic light controller
6. Relay control
7. Logic controller
8. Stepper motor interface
9. D/A converter (Generate square, triangular, saw tooth wave forms)
10. Interface BCD to 7-segment display
11. A/D converter
12. Key board display interface

8086 Micro processor

13. Simple programs: addition, subtraction, multiplication and division
14. Find the smallest and biggest numbers in a given array
15. Block of data transfer using string instructions
16. Find the character in a string

8051 Microcontroller

17. Simple programs, addition, subtraction, multiplication and division
18. Program to convert gray code to 8 bit binary number
19. Fibonacci series
20. Find the factorial of a number
21. Find the square root of a number

ELECTIVE COURSE I – ANALOG ELECTRONICS

Unit I   BJT and FET Biasing

Operating point – fixed bias circuit – Emitter stabilized Bias Circuit – Voltage Divider Bias – D.C. Bias with Voltage feedback – Design Operations – Transistor switching networks – FET biasing – Introduction – Fixed Bias Configuration – Self-Bias Configuration – Voltage Divider Biasing – Combination Networks.

Unit II   BJT Small Signal Analysis

Amplification in the AC domain – BJT transistor modeling – important parameters – Transistor model – Hybrid equivalent model – Graphical determination of h-parameters. Variation of Transistor parameter – Common emitter fixed bias configuration – Voltage divider bias – CE bias configuration – Emitter follower configuration – Common base configuration – Collector feed back configuration – Complete hybrid equivalent model.

Unit III   FET Small Signal Analysis

Construction and characteristics of JFETs – Transfer characteristics – Special Sheets (JFETs) Depletion – Type MOSFETs – Enhancement – Type MOSFETs – MOSFET Handling – VMOS – CMOS – FET Small Signal Model – AC equivalent Circuit – Basic JET circuits – Source follower – common gate circuit – Enhancement MOSFET amplifier – Design of JFET amplifier circuit.

Unit IV   Oscillators

Feedback concepts – Practical feedback circuits – Feedback amplifier – Phase and frequency considerations – Oscillator operations – Phase – Shift Oscillator – Wein Bridge Oscillator – Tuned Oscillator circuits – Crystal Oscillator – Injection Oscillator.

Unit V   Operational Amplifier

Differential and Common mode operation – Opamp basics – practical opamp circuits – Opamp specification – DC offset Parameters – Opamp specification and frequency parameters – Opamp circuit specification – Constant gain multiplier – Voltage Summing – Voltage Buffer – Controlled source – active filters.

Books for Study :

1. Electronic Devices and Circuit Theory, Robet Boylestad and Louis Nashelsky, Prentice Hall of India, Private Limited, New Delhi, 1996, Unit I to V.

Books for Reference :
1. Integrated Electronics, C.Halkias and Jacop Millman, McGraw Hill, Singapore, 1991.
2. Hand Book of Electronics, S.L.Gupta and V.Kumar, Pragati Prakash, Meerut, 1993.

ELECTIVE COURSE – II MICROPROCESSORS

Unit-I 8085 Microprocessor architecture

Architecture of 8085- Instruction classification- data transfer instructions- arithmetic instructions- logical instructions- branching instructions- machine and control operations- instruction format- addressing modes- stack and subroutines – simple programs- 8 bit addition, 16 bit addition, 8 bit subtraction- multiplication- division and smallest and biggest numbers in a given array

Unit –II Interfacing memory and Peripherals

Interfacing memory and devices- I/O and Memory mapped I/O- Type of interfacing devices- Data transfer schemes- programmed and DMA data transfer schemes, Programmable Peripheral Interface (8255A)- 8253 Timer Interface- DMA controller- Programmable Interrupt controller (8259)- Programmable communication Interface (8251)

Unit- III Applications of 8085 Microprocessor

Digital to Analog converter and waveform generator- Analog to digital converter- segment display- stepper motor interfacing- Temperature measurement and control- Water level indicator- Traffic light controller.

Unit-IV 8086 Microprocessor

Pin description of 8086- minimum and maximum mode signals – internal Architecture – register organization- General purpose, index, pointer, segment regsisters and flags- Bus structure – Effective and Physical address and pipeline- addressing modes.

Unit-V 8086 Instructions

8086-instruction set-instructions- data transfer - arithmetic, logical, branching and string manipulation instructions- Assembler and Assemble directives- Simple programs – addition, subtraction, multiplication and division- data transfer using string instructions.

Books for Study and Reference

1. S.Gaonkar, Microprocessor architecture, Programming and applications with 8085, Penram International, Third Edition, New Delhi,1995..

2. Douglas V.Hall, Microprocessors Interfacing, Programming Hardwares- Tata McGraw Hill Publishing Pvt. Ltd., New Delhi, 2003

3. Lance A.Leventhal, Introduction to Microprocessors Software, Hardware Programming, Prentice Hall of India, New Delhi, 1995.

4. Badri Ram, Advanced microprocessor and Interfacing, Tata McGraw Hill Publishing company Ltd., New Delhi, 2003.

5. B.Ram, Fundamentals of Microprocessors, Dhanpat Rai Sons, New Delhi, 2002

ELECTIVE COURSE - III COMMUNICATION ELECTRONICS

Unit I- Communication system
Theory of amplitude modulation – Theory of frequency modulation – Theory of phase modulation. Noise: Internal noise-External noise-noise calculation –noise figure-noise temperature-Antennas: antenna equivalent circuits-coordinate system-radiation fields –Polarization-power gain of Antenna-Hertzian dipole-Half wave dipole-Vertical antenna-Loop ferrite rod antenna-non-resonant antenna-driven array Parastic arrays-UHF-VHF antenna-microwave antenna.

Unit II -Digital Communication
Pulse amplitude modulation-pulse code modulation- delta modulation-Pulse frequency modulation-pulse time modulation-pulse position modulation-pulse width modulation –digital carrier systems – Amplitude shift keying- Frequency shift keying- Phase shift keying- differential and quadrapolar phase shift keying- error control coding-multiplex transmission-frequency and time division multiplexing.

Unit III- Microwaves and Radar communication
Generation of microwaves- Klystron: Reflex Klystron- Multicavity Klystron- Magnetron-detection of microwaves-IMPATT, TRAPATT and Gunn diodes –Radar-radar equation-Pulse and CW radar –MTI and automatic tracking radar.

Unit IV- Optic fiber Communication
Fiber optics-Different types of fiber: Step index and Graded index fibers- signal degradation fibers: Absorption, attenuation, Scattering losses and dispersion- Optical sources and detectors (quantitative Only)-Power launching and coupling: Source to fiber launching -fiber joints- Splicing techniques- general optical communication system

Unit V- Satellite and Cellular communication
Satellite links -Eclipses- orbits and inclination- satellite construction –Satellite communication frequencies-Different domestic satellites-Intelsat system-MARISAT satellites-telemetry- Cellular concept- Multiple Access Cellular Systems- Cellular system Operation and Planning-General Principles- analog cellular systems- Digital Cellular mobile Systems- GSM- CDMA- Cellular standards.

Books for Study and Reference

1. Dennis Roddy and John Coolen, Electonic communication-fourth edition, PHI private Ltd, (1999).
2. G. Kennedy and Davis, Electronic communication system, TMH, New Delhi, (1999).
3. Gerd Keiser, Optical Fiber Communication, Third Edition, McGraw-Hill, Singapore, (2000).
4. Raj Pandya, Mobile and Personal Communication Services and Systems, Prentice Hall of India Private Ltd., New Delhi, (2003).
5. Sanjeev Gupta, Electronic Communication Systems, Khanna publications, New Delhi, (1995).
6. N.D.Deshandae, P.K Rangole, Communication Electronics, Tata McGraw Hill Pvt.Ltd, (1998).
7. M. Arumugam, Optical Fiber Communication and Sensors, Anuradha Agencies, Kumbakonam, (2002).

EDC – I TROUBLESHOOTING TECHNIQUES IN ELECTRONIC EQUIPMENTS AND COMPUTERS

Unit – I Fundamental Troubleshooting Procedure

Reliance aspects of Electronic equipment – Equipments failures – Causes of equipment failure – Nature of faults- Trouble shooting process – Faultfinding aids & Techniques – PCB – Types of PCB – Layout and Troubleshooting Techniques.

Unit – II Components and Testing

Resistors – Failures of fixed resistors – testing of resistors – Capacitors – failures of capacitor – testing of capacitors – Inductors – Testing of Inductors – Causes of failures in semiconductor devices – testing procedure of semiconductor diode – Solid state relays- Fuses – symbol – Blown up fuses – Holders- Circuit breaker – Digital IC troubleshooter - Logic Pulsar.

Unit – III Troubleshooting in Audio and Radio Communication Equipment

Need of modulation – types of modulation – AM transmitter – Common faults in AM transmitter – FM transmitter using transistor – FM Receiver – Typical faults in receivers - Troubleshooting audiocassette tape recorders & its accessories.

Unit – IV Video Production in Television

Introduction – Problems in TV Transmission & Reception – Scanning Persistence of Vision – Frame – Field and Line Frequencies – Synchronization – Aspect Ratio – Pixels – Bandwidth – Color signals- Composite Video signals - Audio signals – TV camera tubes – TV transmitter & Receiver- TV standards

Unit – V Troubleshooting in Computers

Parts of Computer – Peripheral Identification & Diagnosis: Hard Disk – Floppy Drive – CD – ROM – SMPS: Parts – Types – Problems & Trouble shooting - Keyboard & Mouse Trouble shooting.

Books for Study and Reference

1. R.G. Gupta, Audio and Video Systems: Principles Maintenance and Trouble Shooting Tata McGraw-Hill Publishing Company Limited, New Delhi (2003).

2. R.G. Gupta, Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting, Tata McGraw-Hill Publishing Company Limited, New Delhi, (2001).

3. R.S. Khandpur, Trouble Shooting Electronic Equipments, Tata McGraw-Hill Publishing Company Limited, New Delhi. (2003).

4. B.L.Theraja, Text Book of Electrical Technology, S.Chand Publications, New Delhi, (1998).

EDC II – COMPUTER HARDWARE

Unit I – Microcomputer system and peripheral devices

Computer organization- Memory- ALU- control unit- Interrupts- I/O techniques-Device controller-error detection techniques- personal computer concepts and techniques-peripheral devices- keyboard-printer-Magnetic storage devices – FDD-HDD- mouse and trackball – modem- CD-ROM drive-scanner- Digital camera- DVD.

Unit-II PC Hardware Overview

Hardware-BIOS-DOS interaction- PC family – PC Hardware- Interconnections between boxes- inside the system box- Motherboard logic- memory space- I/O port interrupts- DMA channel – Keyboard interface- Parallel and serial interface- CRT controller- FDC- HDC- memory refresh- POST sequence-overview of advanced PCs.

Unit III – Installation and preventive maintenance

System configuration – Pre installation planning – Installation practice- Routine checks- PC assembling and integration- BIOS set up- preventive maintenance – virus- data recovery

Unit IV- Troubleshooting

Computer faults- Nature of faults- Types of faults- fault elimination process- systematic troubleshooting- Fault diagnosis- Fault rectification-POST-Layman checks –I/O slot checks-Motherboard problems diagnosis – Printer interface problem- serial port problem- FDC problem-HDC problem- Display adaptor problem- CRT monitor problem- FDD problems- HDD problems-CD drive problems

Unit V- DOS operating system

Hierarchy – DOS structure – Boot record – ROMBIOS – DOS programmes – command interpreter – resident portion in DOS initialization.
UNIX: An Overview of UNIX system – structure of UNIX system – file structure – Kernel and Utilities – Shell programming

Books for Study and Reference

1. B.Govindarajalu, IBM PC and Clones Hardware, Troubleshooting and Maintenance, Tata Mc-Graw Hill Publishing Pvt., Ltd, New Delhi, Second edition, (2003).

2. Stephen J.Bigelow, Troubleshooting, Maintaining and repairing PC's, Tata Mc-Graw Hill Publishing Pvt., Ltd, New Delhi, (1999).

3. Dave William, Programmer's Technical Reference MS-DOS IBM PC and Compatibles, Galgotia, 1993.

4. S G Kochan, P H Wood Hayden, Shell Programming, USA, 1990.