Sir,

I hereby attach the draft syllabus of BSc. Electronics course for inviting suggestions form the teachers to the e mail id.s/phone no.s of the Chairman and members of the Board (email Ids of the Chairman and the members shall be furnished)

1.Sri.Siby Joseph,
Associate Professor,
WMO Collge, Muttil,
Wayanad – 9447431558 (**Chairman**) E-mail:- wmocsiby@gmail.com

2 Sri.K.C.Prakash,
Associate Professor,
Sree Ayyappa College,
Chengannur – 9447484272 E-mail:- keyceepee@gmail.com

3 Sri.P.P.Joseph,
Assistant Professor,
Dept. of Electronics,
Prajyothi Nikethan College,
Pudukkad, Thrissur – 9400845181 E-mail:- josephpullokkaran@rediffmail.com

4 Sri. P.Askarali,
Assistant Professor,
Govt. College, Mananthavadi,
North Wayanad – 9447517090 E-mail:- ashkarali@gmail.com

5 Mr. Pradeep Somasundaram,
Principal College of Applied Science,
Vadakkanchery,
Palakkad-678 018 E-mail:- pradipsomasundaran@gmail.com

6 Sri. Usman Vengassery,
Associate Professor,
Dept. of Physics, MES Kalladi College,
Mannarkkad, Palakkad (DT)
Mob: 9496351739

7 Sri. Sarin,
Assistant Professor,
Dept. of Electronics,
Govt. College, Chittoor,
Palakkad (DT) Mob: 9495758116 E-mail:- sarincrema@gmail.com

8 Mrs.Shemi.P.Ali,
Assistant Professor,
Dept.of Electronics,
MES College, Marampilly,
Aluva-7, Ph:9995969975 E-mail:-

9 Sri. Harikumar,
Retd. Scientist (USSC),
TC 16/16669 JWRA-17,
Aswani, Opp. Ayswarya Appartments,
DPI Junction, Jagadi,
Trivandrum – 695 014 E-mail:-

10 Mrs. Sumitha,
Principal,
College of Applied Science,
Vazhakkad,
(Reminika, Edakkad. P.O., Calicut-5.) Email:- sumithasuresh@rediffmail.com

UNIVERSITY OF CALICUT

B.Sc Electronics Programme Draft Syllabus

Programme Objective

There are two main objectives to the B.Sc Electronics Programme.

a) To produce electronic professionals who can be directly employed or start his/her own work as Electronic circuit Designer, Electronics consultant, Testing professional, Service engineer and even an entrepreneur in electronic industry.

b) To train students to a level where they can readily compete for seats for advanced degree courses like MSc (Electronics) and MBA etc. On completion of the B.Sc Electronics Programme, the student will:

- Have basic communicative skill in the English language
- Have environmental and civic awareness
- Communicative skills and literary sensibility in languages other than English
- Have sound knowledge of the theory behind core subjects like, Electronic components, Electronic measuring and testing instruments, Analog and Digital IC's, Electronic circuit design and implementation, Troubleshooting and maintenance of electronic and electrical devices.
- Have sound skills in assembly Language and High Level Language programming, Interfacing of electronic devices with computers, etc
- Be in a position to develop industrial and entrepreneur applications

Eligibility

Candidate of admission to the B.Sc Electronics Programme should have passed the Higher secondary / Technical higher secondary / Vocational Higher secondary examinations of Govt. of Kerala or CBSE or IELE or any other examinations recognized as equivalent there to by the University of Calicut with Mathematics or Computer Science or Computer Applications as one of the
optional subjects.

Duration of the Programme

Duration of the programme shall be 6 semesters. Each semester should have 90 instructional days with 5 hours of instruction per day 5-days a week system.
The University will conduct semester-end examinations.

Programme Structure

Semester	Course No	Courses	Course Code	Course Title	Contact Hours			Credits
					Theory	Lab	Total	
I Semester	1	Common Course – 1		English course I	4		4	4
	2	Common Course – 2		English course I	4		4	4
	3	Common Course – 3		Additional Language course 1	4		4	3
	4	Core Course – 1		Basic Electronics	3	2	5	3
	5	Complimentary course – I		Mathematics - I	4	-	4	3
	6	Complimentary course – 2		Optional -1	2	2	4	3
	Total						25	20
II Semester	1	Common Course – 4		English course III	4		4	4
	2	Common Course – 5		English course IV	4		4	4
	3	Common Course – 6		Additional Language course III	4		4	3
	4	Core Course – 2		Electronic Circuits	3	2	5	3+2 (lab)
	5	Complimentary course – I		Mathematics – II	4	-	4	3
	6	Complimentary course – 2		Optional- 2	2	2	4	3
	Total						25	20
III Semester	1	Common Course –7		English course VI	3		3	4
	2	Common Course – 8		General course II	3		3	4
	3	Core Course – 3		Network Theory	3		3	3
	4	Core Course – 4		Analog Integrated Circuit	3	3	6	3
	5	Complimentary course – I		Mathematics – III	5		5	3
	6	Complimentary		Optional- 3	3	2	5	2

		course – 2						
		Total					25	
IV Semester	1	Common Course –9		General course III	3		3	4
	2	Common Course – **10**		General course IV	3		3	4
	3	Core Course – 5		Electromagnetic Theory	3		3	3
	4	Core Course –6		Digital Electronics	3	3	6	3+2 (lab)
	5	Complimentary course – I		Mathematics – IV	5		5	3
	6	Complimentary course – 2		Optional- 4	3	2	5	2
V Semester	1	Core Course – 7		Analog Communication System	3	3	6	3+2 (lab
	2	Core Course –8		Principles of DSP	3	-	3	3
	3	Core Course – 9		Microprocessors	3	3	6	3
	4	Core Course –10		Control Systems	3	-	3	3
	5	Core Course –11		Project Work	-	4	4	
	6	Open Course – 1		Choose a Course from Open cours I	3		3	2
	Total						25	
IV Semester	1	Core Course – 12		Digital Communication System	3	-	3	3
	2	Core Course –13		Microwave theory and techniques	3	-	3	3
	3	Core Course – 14		Microcontroller 8051	3	3	6	3+2 (lab
	4	Core Course –15		PC Hardware	3	-	3	3
	5	Core Course –16		Project Work	-	5	5	2
	6	Core Course –17		Seminar(Present the seminar report for external evaluation and viva. Seminar should not be project based. It is considered as lab)		2	2	2
		Open Course – 2		Choose a Course from Open cours I	3		3	2
		Total					25	

Open Course – I

	1	Consumer Electronics
	2	Computer Hardware
	3	Principles of Mobile Communications
	4	Engineering Materials (Electric, Magnetic, Dielectric Properties)
	5	Electronics Fundamentals

	6	Digital Fundamentals /Computer Networks
Open Course – I		
	1	Embedded Systems
	2	Antennas and Wave Propagation
	3	Fiber Optics &Optical Communication
	4	Mobile Communication
	5	Principle of VLSI
	6	Electronic Instrumentation

Semester I

Basic Electronics

Module I

Introduction to Electronics - Definition, applications, modern trends, Electronic Components (active and passive), colour code, Units [1]
Electricity – Electric field, Potential, Potential difference, current, relation between charge and current
Resistance and Resistivity – Factors affecting resistance, effect of temperature, temperature coefficient, ohm's law, power dissipation, Load resistance and load current, concepts of open and short circuits, Direct current and Alternating Current [2]

Module II

Structure of Solids - Bonding in solids, Energy bands, Insulators, Conductors, Semiconductors [2]
Semiconductors - Semiconductor materials, Intrinsic Semiconductors, Extrinsic Semiconductors [1]
Semiconductor Parameters - Intrinsic concentration, Mobility, Conductivity, Mass action law, Energy gap, Drift and Diffusion Current [2]
Semiconductor Diodes – PN junction, Junction Theory, VI characteristics of PN junction diode, Ideal diode, Static and Dynamic Resistance [1][2], Diode current equation[2], Diode notations, diode testing [3][2]
Special Diodes - Construction, Characteristics and applications of Zener diode, Tunnel diode, varactor diode and LED [2]

Module III

Bipolar Junction Transistors – Types, Construction, biasing ,Operation, Common Base configuration- input and output characteristics, Common Emitter configuration- input and output characteristics, Common collector configuration, Limits of operation, Transistor testing, Transistor casing and terminal identification [3]
Field Effect Transistors – introduction, Types, Construction and Characteristics of JFET, Transfer Characteristics [3]
Metal Oxide Semiconductor Field Effect Transistors – Depletion Type, Enhancement Type, MOSFET handling [3]

Module IV

SCR – construction, characteristics, operation, and ratings, Terminal identification, Applications [2]
DIAC – construction, characteristics**,** operation and applications [2]
TRIAC - construction, characteristics**,** operation [2]
UJT – construction, characteristics,operation, Relaxation oscillator [2]

Text Books

1. NN Bhargava, DC Kulshreshta, SC Gupta "Basic Electronics and Linear Circuits" Tata McGraw-Hill Publishing Company LTD
2. R.S. Sedha "A text book of applied Electronics" S Chand and Company LTD
3. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory" , 10th edition, Pearson

References

1. Jacob millman, Christos c halkias, satyabrata jit , 2nd edition "Electronic Devices and circuits", Tata McGraw Hill Education pvt Ltd.
2. B.L. Theraja, "Electrical and Electronic Engineering", S Chand and Company LTD
3. R.K. Puri , V.K. Babbar, "Solid state physics and Electronics" , S Chand and Company LTD
4. V.K Mehta, "Principles of Electronics", S Chand and Company LTD

Basic Electronics Lab
1. Familiarization of passive components - Colour codes of resistors and capacitors
2. Familiarization of Active Components - Packaging and lead identification
3. Familiarization of various measuring and testing equipments – Voltmeter, Ammeter, Multimeter, LCR meter, CRO, etc,.
4. Familiarization of various sources (Power supplies, Signal Generators,etc,.)
5. Testing of various Electronic components using multimeter and CRO
6. Soldering and desoldering Practice
7. Diode Characteristics (Si, Ge, LED)
8. LDR characteristics
9. Photodiode characteristics
10. Zener Diode Characteristics
11. Common base transistor characteristics
12. Common emitter transistor characteristics
13. FET characteristics
14. UJT characteristics
15. SCR characteristics
16. TRIAC characteristics
17. Circuit and PCB design with suitable software
References
1. NN Bhargava, DC Kulshreshta, SC Gupta "Basic Electronics and Linear Circuits" Tata McGraw-Hill Publishing Company LTD 2. Jacob millman, Christos c halkias, satyabrata jit , 2nd edition "Electronic Devices and circuits", Tata McGraw Hill Education pvt Ltd.

Semester II
Electronic Circuits

Module I

Series circuit - Equivalent resistance, Voltage division rule, Total power, open and short [1]
Parallel Circuit - Equivalent resistance, Current division rule, Total power, open and short [1]
Kirchhoff's Laws – KVL, KCL [1]
Alternating Current – Types, Important terms [1]
Wave shaping – Integrator, Differentiator [1]

Module II

Rectifiers – Half wave, full wave, bridge – average value, RMS value, PIV, Ripple factor, efficiency, Comparison of rectifiers [1]
Filters - C, LC, π [1]
Regulators – Zener regulator, Transistor shunt regulator, Transistor series regulator [1]
Clipping circuits – Positive, Negative, Biased, Combination [1]
Clamping Circuits – Voltage doublers, Voltage Tripler and quadrupler [1]

Module III

Transistor Biasing – operating point, Fixed bias, Emitter bias, Voltage Divider bias, Collector feedback, Emitter follower, bias stabilization [2]
BJT AC Analysis – Amplification in the ac domain, BJT modeling, The Hybrid equivalent model, cascaded system, RC coupled BJT amplifier, Darlington connection[2]
Frequency Response –Logarithm, decibel, general frequency consideration, gain bandwidth product[2]
Power Amplifier – concepts and types, class A,B,C and D amplifiers[2]

Module IV

Feedback - Concepts, types, effect on gain, input impedance, output impedance, frequency distortion, noise, nonlinear distortion, bandwidth and gain stability [2]
Sinusoidal Oscillators – oscillator operations, phase shift oscillator, wien bridge oscillator, colpitts oscillator, Hartley oscillator, crystal oscillators [2]
Non sinusoidal Oscillators – classification, transistor as a switch, astable, monostable and bistable multivibrators, Schmitt trigger[1]

Text Books

1. R.S. Sedha "A text book of applied Electronics" S Chand and Company LTD
2. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory" , 10th edition, Pearson

References

1. NN Bhargava, DC Kulshreshta, SC Gupta "Basic Electronics and Linear Circuits" Tata McGraw-Hill Publishing Company LTD
2. Jacob millman, Christos c halkias, satyabrata jit , 2nd edition "Electronic Devices and circuits", Tata McGraw Hill Education pvt Ltd.
3. V.K Mehta, "Principles of Electronics", S Chand and Company LTDJacob millman, C halkias "Integrated Electronics", Tata McGraw Hill

Electronic Circuits

1. Verification of equivalent resistance of series and parallel resistor networks, Voltage division and Current division Rules
2. Half wave Rectifier
3. Full wave Rectifier
4. Bridge Rectifier
5. Different Filter circuits (C,L.pi)
6. Zener Regulator
7. Diode clippers and Clampers
8. RC differentiator and Integrator
9. Fixed bias with and without emitter resistance
10. Collector to base feedback bias circuit
11. Voltage divider biasing circuits
12. RC coupled amplifier
13. Push pull amplifier
14. Emitter follower
15. Wein bridge oscillator
16. Crystal oscillator
17. UJT Relaxation Oscillator
18. Astable Multivibrator and Monostable multivibrator using BJT
19. Series voltage regulator
20. Simulation of the experiments using software

References

1. NN Bhargava, DC Kulshreshta, SC Gupta "Basic Electronics and Linear Circuits" Tata McGraw-Hill Publishing Company LTD
2. Jacob millman, Christos c halkias, satyabrata jit , 2nd edition "Electronic Devices and circuits", Tata McGraw Hill Education pvt Ltd.

Semester III

Network Theory

Module 1

Basic Circuit Concepts: Voltage and current sources, Resistance, Capacitance, Inductance, Mutual Inductance, Series and Parallel elements, Duality, voltage division and current division.

Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node analysis, Mesh analysis, Star-Delta conversion.

Network Theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, Maximum power transfer theorem.

Module 2

DC Transient Analysis : Initially charged RC circuit, RL circuit with initial current, time constant, RL and RC circuits with sources, DC response of series RLC circuits (using differential equations).

Module 3

AC circuit analysis: Sinusoidal voltage and current, Definition of instantaneous, peak, peak to peak, root mean square and average values. Voltage-current relationship in resistor, inductor and capacitor. Phasor, complex impedance, power in AC circuits: instantaneous power, average power, reactive power, power factor. Sinusoidal circuit analysis for RL, RC and RLC circuits. Mesh analysis, node analysis and network theorems for AC circuits.

Module 4

Resonance:

Resonance in series and parallel RLC circuits, frequency response of series and parallel RLC circuits, Quality (Q) factor and bandwidth. Passive filters: low pass, high pass, band pass and band stop.

Suggested Books:

1. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill(2005)
2. Robert L. Boylestad, Essentials of Circuit Analysis, Pearson Education (2004)
3. M. Nahvi and J. Edminister, Electric circuits, Schaum's outline series, Tata McGraw Hill (2005)
4. S. A. Nasar, Electric Circuits, Schaum's outline series, Tata McGraw Hill (2004)
5. C. Alexander and M. Sadiku, Fundamentals of Electric Circuits , McGraw Hill (2009)
6. John. D. Ryder, Networks, Lines and Fields, Prentice Hall of India (2002)

7.Circuit theory:analysis & synthesis,A.Chakraborthy,dhanpat rai & co(2010);

8. ,D.Roy Choudary ,Networks and systems: second edition.2010,New age International publishers

Analog Integrated Circuits

Module 1

Block Diagram of typical operational Amplifiers – Ideal Op-amp characteristics – Op amp Parameters – Inverting and Non-Inverting Amplifier – Voltage Follower- Summing Amplifier- Differential Amplifier- Instrumentation Amplifier – V to I and I to V converter-Integrator – Differentiator – Typical circuits – Applications.

Module 2

Introduction – First order – Butter worth – Low pass, High pass, Band pass, Band Reject, Notch and All pass Filters – Typical circuits- Applications. Wave form generators – Square wave generator- Triangular and Sawtooth wave generators – sine wave oscillators(Phase shift, Wien Bridge and Quadrature Oscillators).

Module 3

Basic comparator – Characteristics – Typical comparator circuits using op amp – zero crossing detector – Schmitt trigger – Typical Circuits – Operation – Application-Window detector-Peak detector-Sample and Hold circuit-Clippers and Clampers-half wave Rectifier – Precision Rectifier.

Module 4

Introduction to Timer-Monostable and Astale Multivibrator using 555-Application of Monostable and Astable Multivibrator- Voltage controlled oscillator (VCO), PLL – block diagram, Operating principle, parameters, pinout, function, applications and typical circuits.

ANALOG LAB

1. Inverting and non inverting op-amp configuration and its characteristics.
2. Differentiator and integrator circuit characteristics.
3. Summing and difference amplifiers.
4. Voltage follower and instrumentation amplifier.
5. Low pass and High pass filters and frequency response.
6. Band pass filter and Band rejection filter and their frequency response.
7. Schmitt trigger-measurement of UTP and LTP.
8. Triangle wave generator.
9. Frequency Multiplication and FM Demodulation using IC 566 PLL.
10. Frequency Response of IC 566 voltage controller oscillator.
11. Oscillators: 1) Wein bridge 2) RC phase shift.

Semester IV

Electro Magnetic Theory

Module 1: Fundamental of Vector Analysis:-

Fundamental vector operations, Coordinate systems-unit length, area and volume, Integrals of vector functions, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stokes's theorem, Physical Interpretation of Gradient, divergent and curl, coordinate transformations.

Module 2: Electrostatics:-

Static Electric Fields; Postulates of electrostatics, Coulomb's law, Gauss's law and applications, Electric potential, dielectrics, flux, boundary conditions, capacitance, capacitors, Electrostatic energy and forces, Solution of Electrostatic Problems- Poisson's and Laplace's equations-Method of images, Boundary conditions and Boundary value problems.

Module 3: Magnetostatics:-

Steady Electric Currents; current density, Ohm's law, Boundary condition for current density, Equation of continuity and Kirchhoff's law, Biot-Savart Law, Postulates of Magnetostatics, Vector Magnetic Potential, Force between two current wires, Ampere's Circuit Theorem, Magnetic dipole, Boundary conditions for magnetostatic fields, Magnetic energy, Magnetic forces and torques.

Module 4: Time varying Electromagnetic fields and waves:-

Faraday's law of electromagnetic induction, Inconsistency of Amperes law, Maxwell's equations , Integral and differential forms, conduction current and displacement current- Uniform Plane waves- Poynting theorem and Poynting vector- Solution for free space condition-Intrinsic impedance- wave equation for conducting medium- Wave polarization, Reflection and transmission, TE, TM and TEM waves, fundamentals of antennas and parameters.

Text Books

1. Engineering Electromagnetics – Haytt (McGraw-Hill Education)

2. Elements of Electromagnetics--Matthew N. O. Sadiku (Oxford University Press)

3. Electromagnetic Field Theory and Transmission Lines--G. S. N. Raju (Pearson Education)

Digital Electronics

Unit 1

Number System and Codes: Decimal, Binary, Hexadecimal, Octal, BCD, conversion of one code to another, Complements (one's and two's), Signed and Unsigned numbers, Addition and Subtraction, Multiplication Gray and Hamming Codes.
Logic Gates and Boolean Algebra: Truth Tables, OR, AND, NOT, XOR, XNOR, Universal (NOR and NAND) Gates, Boolean Theorems, DeMorgan's Theorems, Principle of duality.
Digital Logic families: Fan-in, Fan out, Noise Margin, Power Dissipation, Figure of merit, Current and Voltage parameters, RTL, DTL, TTL, ECL, HTL, MOS, CMOS.

Unit 2

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Karnaugh map minimization. Multiplexers and Demultiplexers, Implementing logic functions with multiplexer, Adder (half and full) and subtractor, Encoder and Decoder.

Unit 3

Sequential logic design: Latch, Flip flop (FF), S-R FF, J-K FF, T and D type FFs, Clocked FFs, Registers, Counters (synchronous and asynchronous, ring, modulo-N),Shift registers –Serial and parallel

Unit 4

A/D and D/A Converters: Successive Approximation ADC, R/2R Ladder DAC.
Memories: General Memory Operation, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM,EAPROM.

Suggested Books:

1. R.L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw-Hill (1994)
2. Donald P. Leach, Albert Paul Malvino, Digital Principles and Applications, Tata McGraw Hill (1995)
3. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia, (2007)
4. Thomas L. Floyd , Digital Fundamentals, Pearson Education Asia (1994)
5. S.P. Bali , Solved Problems in Digital Electronics, Sigma Series, Tata McGraw-Hill, (2005)
6. W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India
(2000)
7. R.P. Jain , Modern Digital Electronics, Tata McGraw-Hill (2003)

Digital Electronics LAB

DIGITAL ELECTRONICS LAB EXPERIMENTS

I. Familiarization of Logic Gates and Study of Universal Gates

Aim

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• To familiarize the different logic gate IC chips and verification of their truth table 7400, 7402, 7404, 7408, 7432, 7486.

• To implement the basic logic gate and, or, and not gates using the universal gate nand and nor gates.

II. Adders, Subtractors and Comparators

Aim

• To implement the half adder, half subtractor and full subtractor circuits.

• To familiarize the 4-bit binary adder 7483 and 4 bit magnitude comparator 7485.

III. Multiplexers and Demultiplexers

Aim

• To implement a 4:1 multiplexer and 1:4 demultiplexer circuits.

• To familiarize the nibble multiplexer IC 74157, 8:1 Multiplexer 74151 and 3:8 Demultiplexer 74138 and 2:4 Demultiplexer 74156.

IV. Decoders, Encoder & Seven Segment Displays

Aim

• To familiarize the BCD 70 decimal Decoder IC7442, BCD to Seven Segment Decoder 7448, Seven Segment Display LT 542, BCD to Binary 74154 and Decimal to Binary priority and 74147.

V. Latches and Flip Flop

Aim

• To implement JK Flip-Flop and SR Flip Flop using Discrete Gates.

• To familiarize the 4 bit latch IC 7475, JK Flip-Flop, IC7476, D Flip Flop IC 7474, Master slave JK Flip Flop IC 74107.

VI. Converters

• To familiarize the different counter chip asynchronous binary converter 7493 BCD Counter 7490, Binary Up/Down Counter 7493, Presettable Binary Counter 74197.

• To implement a Johnson Counter and Ring Counter.

VII. Shift Registers

• To familiarize the different shift register ICs, 7495, 74166, 74195.

Semester V

ANALOG COMMUNICATION System

Module I

Communication Systems- Modulation – Need for modulation, Noise-External- Internal, Noise calculation- Noise Figure, Signal to Noise ratio, Amplitude Modulation- Frequency spectrum of AM wave – Representation of AM wave, Power relation in AM wave, Generation of AM-DSBSC, SSB Techniques –- Filter system, Phase shift method, Third method, Extensions of SSB-Pilot carrier systems, ISB and VSB.

Module II

Frequency Modulation – Theory of Frequency and Phase modulation, Description of system, Mathematical representation of FM, Phase Modulation-inter system comparison, Noise and FM-Noise Triangle, De-emphasis, Pre-emphasis, Forms of interference, Comparison of Wide band and Narrow band FM, FM Generation and Detection-Generation of FM – Direct method, Varactor diode modulator- Stabilized reactance modulator- Indirect method, Slope detection, Balanced Slope deector, Phase discriminator, Ratio detector.

Module III

Radio receivers- Reciever types, TRF superheterodyne receiver, Sensitivity, Selectivity, Image frequency and its rejection, double spotting, image frequency and IF amplifiers, AGC-diode detector, AFC, FM receivers – Amplitude limiting, Stereo-phonic FM multiplex system.

Module IV

Ground wave propagation - surface waves -atmospheric propagation -critical frequency and MUF - skip distance - Radio horizon – space wave propagation - concept duct and tropo scatter propagation. Line of sight, over the horizon system.

Text book:

Communication systems- A. Bruce Carlson, Paul B. Crilly

Electronic Communication Systems - Kennedy and Davis

Reference Book:

Electronic Communication – Roody and Coolen- PH

Principles of DSP

MODULE I- SIGNALS

Signals – Various types and classifications – Uni dimensional and multi dimensional-Analog, Discrete and Digital Signals- Energy and power signals, Causal and non causal signals- even and odd signals-Representation methods-Functional, Graphical, Tabular and Sequential -Important test signals. Mathematical operations on discrete time signals- signal as summation of impulses.

MODULE II- LAPLACE, FOURIER AND Z TRANSFORMATIONS

Laplace transformation-definition-properties- Fourier transform on discrete signals (DTFT) -definition-properties-Z transform-definition and its properties.

MODULE III-SYSTEMS AND CONVOLUTION

Definition-various classifications-Static & Dynamic, Time invariant & Time variant, Linear & Nonlinear, Causal & Non causal, Stable & Unstable, FIR & IIR, Recursive & Non recursive-Excitation, response and Impulse response of system-their relations- transfer functions and its properties-Convolution- Linear and circular-their properties-sectioned convolution-overlap add and overlap save method.

MODULE IV-STRUCTURAL REPRESENTATION OF DISCRETE TIME SYSTEMS

Representation of IIR systems-Direct form I, Direct form II, Cascade representation and Parallel representation- Representation of FIR systems-Direct form representation, Cascade representation and Linear phase realization.

MODULE V-DISCRETE FOURIER TRANSFORM

DFT-definition-properties- relation between Z transform and DFT-computation techniques--FFT-radix 2 FFT-DIT FFT and DIF FFT- butterfly diagram- computation techniques.

References

1. Digital Signal Processing by A. Nagoor Kani
2. Digital signal Processing by S Salivahan

Microprocessors

Module I :

General architecture of computer, Introduction to Microprocessor, Memory classification, Introduction to 8085,Microprocessor bus organizations ,data bus,address bus,control bus. Memory addressing,memory mapping. 8085 architecture in detail. General purpose registers and special purpose registers,flag register -8085 pins and signals.

Module 2 :

Assembly language programming basics. Opcode, Mnemonics etc. 8085 instruction set ,Data transfer ,Arithmetic and Logic,Shifting and rotating,Branching/Jump,Program control. Addressing modes. Memory read and write cycle. Timing diagram. Instruction cycle , machine cycle and T-states. Types of I/O addressing .Simple programs.

Module 3

Types of programming techniques looping,indexing(pointers),delay generation. Stack in 8085, call and return Instructions. Data transfer between stack and microprocessor. Subroutine and delay programs. Interrupts in 8085.Interrupt driven programs.

Module 4

Interfacing microprocessor to peripherals .Programmable Peripheral Interface controller 8255A, DMA controller 8237,Programmable Display/Keyboard interface 8279.Interfacing ADC/DAC using microprocessor.

Text Book:

1. 8085 - Architecture programming and techniques By Ramesh Goanker.

2. Microprocessor and interfering programming and Hardware - By Doughles V Hall -

Tata Mc Hill.

3. Microprocessor and microcomputer - Based system Design - CRC press - M. Rafiquzzman.PHI

4. Microprocessors and micro-controllers – Krishna Kant -PHI India.

Reference Book:

1. Micro computer system - The 8086/8088 family architecture programming and Design - LIU.Y and Gibson - PHI.

2.Microprocessors PC Hardware and interfacing –N.Mathivanan -PHI

Control Systems

Module I

Basics of control system, classification of control system, open loop , closed loop, examples Servomechanism, feedback and feed forward system, Basics of Laplace Transform, Use of Laplace transform in control system.

Module II

Transfer function, Impulse response, poles, zeroes, pole-zero plot , order and type number ,Mathematical modeling of control system, Mechanical, rotational and electrical systems, servomotors, speed control system.

Module III

Block diagram representation; block diagram reduction, signal flow graph, Mason's gain formula, Time response analysis, standard test signals, steady state error, Analysis of first and second order system. Time domain specifications.

Module IV

Frequency domain analysis, Frequency domain specifications, frequency response plots, Bode plot, polar plot, stability analysis, Routh Hurwitz criterion, Nyquist stability, concept of Root locus- Controllers –PI,PD,PID ,Compensators-Lag, lead, Lag-lead

Ref:- Control System Engineering-U.A Bakshi , V.U Bakshi

Control Systems – Nagoor Kani

Semester VI

DIGITAL COMMUNICATION System

Module I

Information Theory – Concept of information, Communication Channel, Entropy - Shannon's theorem-channel capacity- Bandwidth Considerations –Noise trade off –Analog Vs Digital Communication-

Module II

Data Communication Techniques-serial and parallel Communication-asynchronous and synchronous Communication-Coding scheme- ON-OFF, RZ, NRZ, Bipolar-Manchester signaling and differential coding.

Module III

Pulse Digital Modulation:–PCM—Basic blocks- Sampling Theorem – Quantization - Quantization noise, Encoding –Generation and Receiver-Companding- Noise considerations in PCM Systems- -DPCM - Delta modulation –Linear prediction –Adaptive Delta Modulation - multiplexer –TDM

Module IV

Pass band Digital Transmission: Digital band pass modulation techniques- coherent binary schemes- ASK, FSK, PSK , M array QAM, QPSK , Differential phase shift keying - Communication system interfaces and standards-current loops-RS232, Modem-Different types, Multiplexers and Concentrators.

Text Book

1. Communication Systems : Simon Haykins, John Wiley & Sons, Inc., 4th Edition, 2001
2. Principles of Communication : Taub and Schilling

References

1. Digital Communications Fundamentals and Applications: Bernard Sklar, Person Education, 2nd edition
2.Modern Digital and Analog communication system: B.P.Lathi, Oxford University Press, 3rd edition

Microwave Theory and Techniques

Module I: An introduction to Microwaves

Introduction, Frequency spectrum, Micro wave bands, Applications of microwaves in different fields, Plane waves and free space propagation, Guided waves-slow waves and fast waves- wave guides, rectangular wave guides, TE and TM waves, Transverse electromagnetic waves, group and phase velocities.

Module II: Basics of transmission lines and waveguides

Transmission lines and wave guides, Review of transmission lines, Telegraph equations, group and phase velocities, characteristic impedance-open circuit, closed circuit, quarter wavelength and half wavelength lines, Standing wave ratio, VSWR, Reflection coefficient, Impedance matching, strip/microstrip transmission lines, microwave guides, propagation through wave guides, cut off frequency and dispersion-wave and group velocity, Ridged waveguides-applications, cavity resonators-design equations, Waveguide Tees, Magic Tees, Rat Race, Directional couplers, Isolators and circualators.

Module III: Microwave Linear beam tubes and Cross field devices

Microwave tubes, Introduction, limitations of conventional tubes, Transit time effects, Multi cavity Klystron, reentrant cavities, Velocity modulation and beam bunching, bunching diagrams, reflex klystron, magnetron, working of magnetron, travelling wave tubes-slow wave structures-amplification mechanism, Forward and backward wave Cross field amplifiers-principle of operation-microwave characteristics.

Module IV: Transferred Electron devices and transit time devices

Microwave Semiconductor devices, Tunnel diodes- negative resistance-band theory for forward and reverse biasing, Schottky diodes, Point contact diodes, Varactor diodes, IMPATTT diode-structure-negative resistance-efficiency and output power, TRAPATT diode-principle of operation and performance, Gunn effect and Gunn diode-modes of operation-oscillation modes-, Applications.

Text books

1. Microwave devices and circuits, Samuel Y. Lio (Prentice Hall)
2. Fundamentals of microwave engineering –Collins (Wiley India)
3. Electronic communication systems – Kennedy and Davis (Tata Mc Graw Hill)

Micro controller 8051

Module I :

Comparison between microprocessor and Microcontroller .The 8051 Microcontroller .Architecture of 8051 microcontroller. Internal memory (ROM) organization. Important Registers .Internal RAM organization. Register banks ,Byte and bit addressable area. Flags and flag register (PSW) .Program counter and data pointer . Stack and Stack pointer. Special Function Registers. 8051 Ports and I/O pins, control signals. External memory interfacing signals..

Module 2 :

8051 instruction set ,Data transfer(internal and external) ,Arithmetic and Logic, Shifting and rotating ,Branching/Jump. Bit related instructions and operations. Addressing modes. External memory related instruction. Stack and subroutine. Call and return instructions. Push and Pop instructions. Delay generation,calculation and programs.8051 Interrupts.

Module 3 :

Counters of Times : Timer / counter interrupts – Delay using Timer - Modes of Operation -Counting .RS232 Communication standard. Serial data input of serial data output : Serial data interrupt - Data transmission Data reception - serial data transmission interrupts : Times Flag interrupt - Serial port interrupt - External interrupt - Reset -Interrupt concept - interrupt priority - interrupt destination - software generated interrupts.

Module 4 :

Key board interfacing program, key denouncing, matrix keypad . Display interface - 7 segment multiplexed display ,scanning . 16X2 LCD Basics, program to display character. **A**/D and D/A converters. Stepper Motor interface, program to rotate motor. Relay and Trafic interface.

Text Book:

1. *The 8051 microcontroller and embedded systems using assembly and C - Kenneth.J.Ayala -CENGAGE Learning.*
2. *8051 Microcontroller and applications – Ali Mazidi*
3. *Microprocessors and micro-controllers (8085,8051)– Krishna Kant -PHI India*

PC Hardware

MODULE – I (8 HOURS)

Fundamentals of Computer – Brief introduction with block diagram. SMPS – ATX/NLX Power Supply – display adapter – alphanumeric character generation system – MDA,CGA, HGA, EGA, VGA, SVGA, AGP.

MODULE – II(10 HOURS)

Organisation of motherboard – form factors – AT, ATX motherboards – different sections of mother boards – Latest Intel microprocessor – Comparison – co-processor – numeric processor – cache memory - chipsets – Bus mastering – ISA, EISA, VESA, PCI,EPCI, PCM CIA- comparison -USB architecture.

MODULE – III(11 HOURS)

Memories– RAM, DRAM –RAM – Refreshing – SIMM, DIMM, DDR technologies memory mapping – conventional memory, upper memory,Extended memory, expanded memory –Magnetic recording techniques – FM, MFM, RLL, EFM, Floppy disk – FAT, Beet area – Directory area, data area – floppy drive – FDC – Hard disk – construction– low level and high level formatting – HDD interfaces – HDC – optical recording techniques – CD – CD recording – DVD Blue ray disc.

MODULE – IV (11 HOURS)

Keyboard – organization – matrix – keyboard controllers – interfacing of keyboard – key switches – types -keyboard connectors – PS/2 connector, USB – mouse – working principles –– opto electronic mouse, optical mouse , wireless Keyboard , wireless mouse introduction– light pen – joystick – tablets – scanner- pointer-touch pad. Printers - dot-matrix – inkjet, laser printers –LCD -TFT-LED monitors introduction.

MODULE - V(10 HOURS)

System assembling procedure – BIOS - CMOS setup - preventive maintenance – viruses -data recovery tools - safety precautions - troubleshooting tools - error codes – beep codes - POST sequences - diagnostic software - procedure of installing internet – UPS- latest system specifications Desktop-Laptop-Notebook – Palmtop.

REFERENCE BOOKS

1. Troubleshooting, maintaining & repairing PCs – Stephen.J.Bigelaw

2. IBM PC clones – B.Govinda Rajulu

3. Upgrading and repairing Pcs – Scott Muller

4. Modern All about Series – Manohar Lotia BPB- Publications

Open 1- V semester

Consumer Electronics

Unit 1.

Audio systems : PA system – Microphone, Amplifier, Loudspeakers Radio receivers – AM/FM Audio recording and reproduction – Cassettes, CD and MP3

Unit 2:

TV and Video systems Television – standards, BW/Colour, CRT/HDTV Video system – VCR/VCD/DVD players, MP4 players ,Set Top box, CATV and Dish TV, LCD, Plasma & LED TV Projectors – DLP Home Theatres Remote Controls

Unit 3.

Landline and Mobile telephony Basic landline equipment – CLI, Cordless Intercom/ EPABX
system Mobile phones – GPRS & Bluetooth GPS Navigation system

Unit 4 :

Office Equipments Scanners – Barcode / Flat bed , Printers , Xerox , Multifunction units (Print, Scan, fax, copy)

Unit 5.

Electronic Gadgets and Domestic Appliances Digital clock, Digital camera, Handicam, Home security system, CCTV Air conditioners, Refrigerators, Washing Machine/Dish Washer,
Microwave oven, Vacuum cleaners

Recommended Books:

1 R. P. Bali Consumer Electronics Pearson Education (2008)
2 R. G. Gupta Audio and Video systems Tata McGraw Hill (2004)

COMPUTER HARDWARE

UNIT I (15 Hours)

Evolution of Computers and Computer Generations, Computer Classification Processing speed of a computer, Technology Trends, Measuring Computer Performance, Architecture, Functional Units and Components in Computer Organization, Computers – Block diagram, Memory addressing capability of a CPU, Word length of a computer, Basic components of a Digital Computer - Control unit, ALU, IO Subsystem of a Computer, Bus Structures, Uses of Program Development Tool, Editor, Compiler, Assembler, Interpreter

UNIT II (10 Hours)

Number systems – Decimal Number system, Binary number system and Hexa-decimal number system, 1's & 2's complement, Representation of Positive and Negative Numbers Binary Fixed- Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow. , Codes, ASCII Logic Gates, AND, OR, NOT GATES and their Truth tables

UNIT III (9 Hrs.)

Input Devices - Keyboard, Mouse, Output Devices - CRT Monitor, LCD Displays, Touch Screen Displays Print Devices, Multiprocessor and Multi core Architecture

UNIT IV (9 Hours)

Storing data and Program in Memory, Memory Hierarchy in a Computer, Internal Organization of Semiconductor Main Memory Chips, Semiconductor Memory RAM and ROM, Peripheral Devices, Secondary Storage Memory, Magnetic Memories, and Optical Disks.

UNIT V (9 Hours)

Control Unit Organization: Processor Logic Design – Processor Organization – Control Logic Design – Control Organization

TEXT BOOK

Computer Fundamentals – B. Ram – New Age International Publishers

REFERENCE BOOKS

1. Rashid Sheikh, “Computer Organization & Architecture”
2. Computer Organization – Hamacher, Vranesic and Zaky, Mc Graw Hill.
3. Digital Logic and Computer Design – Morris Mano, PHI
4. Computer Organization and Architecture -William Stallings, Pearson Education Asia.
5. Computer Organization and Design – Pal Chaudhuri, PHI

MOBILE COMMUNICATION

Module 1 (10 hrs)
Evolution of mobile radio communication-Examples of wireless communication system: paging systems, cordless telephone system, cellular telephone system- Trends in cellular radio and personal communication systems

Module 2 (12 hrs)
Frequencies for radio transmission- Basics of multiplexing and multiple access techniques-CDMA-Cellular system concepts- Frequency reuse- Channel assignment and handoff strategies- Improving capacity in cellular system: cell splitting, sectoring, repeaters for range extension, a microcell zone concept.

Module 3 (14 hrs)
Introduction to telecommunicating system- GSM: mobile services (Bearer services, tele services, supplimentary services), system architecture (radio subsystem, network and switching subsystem, opration subsystem)

Module 4 (12 hrs)
Satellite system: history, application, basics, routing, localization and handover- Broadcast system: digital audio broadcasting, digital video broadcasting (basic concepts).

Module 5 (12 hrs)
Wireless LAN-Infrared vs radio transmission- Bluetooth: user scenarios and architecture- Wimax: basic concepts and features- Wi-Fi - basic concepts.

Text Books
1. Rapapport T. S, 'Wireless Communication Principles and Practices', Pearson Education Asia, New Delhi, 3rd Ed.2003.
2. Jochen Schiller,'Mobile communication 'Pearson Education,Asia.

Reference Book
Vijay K Garg, Joseph E Wilkes,' Principles and Applications of GSM', Pearson Edu.

Engineering Materials

Module 1

Electric Properties: Conductivity of metals, Ohm's Law, relaxation time, collision time and mean free path, electron scattering and resistivity of metals, heat developed in current carrying conductor, Superconductivity. Conduction in Semiconductors: Classifying materials as semiconductors, conduction in intrinsic and extrinsic semiconductors, Hall effect.

Module 2

Magnetic Properties: Classification of Magnetic Materials, Origin of Magnetic moment, Origin of dia, para, ferro and antiferro magnetism and their

comparison, Ferrimagnetic materials, Saturation Magnetisation and Curie temperature, Magnetic domains, Concepts of Giant Magnetic Resistance (GMR),Magnetic recording.

Module 3

Dielectric Properties: Polarization and Dielectric constant, the three vectors: D, E and P, Static Dielectric Constant of Solids, Claussius –Mossotti relation, Polarization mechanisms and total polarization, Ferroelectric Materials, Spontaneous Polarization, Curie-Weiss Law, Classification. Piezoelectricity. Dielectrics in Alternating Fields, Temperature and Frequency dependence of dielectric constants.

Module 4

Introduction to Modern Materials : Ceramics, Polymers and Composites. Nanomaterials (role of size in properties and applications).

Suggested Books:

1. A. J. Dekker, Electrical Engineering Materials, Prentice Hall India (2009)
2. A. J. Dekker, Solid State Physics, Macmilan (2003)
3. C. Kittel, Introduction to Solid State Physics, Wiley (1996)
4. W. E. Callister, Material Science and Engineering: An Introduction, Wiley India (2006)
5. M. S. Vijaya and G Rangarajan, Material Science, Tata McGra

Open 2- VI sem

Embedded System

Module I :

Introduction to Embedded Systems, Stand-alone and real-time embedded systems. Requirements of embedded systems, Components of embedded system. Embedded processors (Eg : ARM ,PIC32 etc) Programming languages and tools. Embedded operating system. Embedded system Application examples.

Module 2:

Components of Embedded system,hardware and software. Microcontrollers 8-bit,16-bit,32-bit general overview and examples(8051,PIC,ARM etc).Memory technologies in embedded system,EEPROM,flash memory,DDR RAM, Memory Card (general overview Memory sizes,pins and signals).Peripherals RTC,Temperature sensor,relay etc.

Module 3:

Embedded system software. Assembly languages,high level languages. Embedded C programming (Eg: Kiel C, Microchip C, SDCC Compiler).Data types ,variables,port accessing, functions etc. 8051 in keil C (uVision IDE).Simple programs -LED blinking,LCD,Serial port,EEPROM. Embedded communication standards ,RS232, I2C, SPI ,USB (Over view). Programs using library. Microcontroller programmer,programming tools,debugging tools. Software Simulation.

Module 4:

Advanced embedded systems. ARM processors general architecture.over view of Embedded OS, Android OS. Real Time OS ,Embedded Linux (Examples) .**Case study** ,Traffic Light controller,Water level controller.,DC Motor speed control. Electronics manufacturing process, circuit designing, Programming, PCB designing using software .

text Book:

1. *The 8051 microcontroller and embedded systems using assembly and C - Kenneth.J.Ayala -CENGAGE Learning.(8051.kiel IDE)*
2. *The 8051 microcontroller and embedded system- Ali Mazidi. Pearson.*
3. *Microprocessors and micro-controllers (8085,8051)– Krishna Kant -PHI India*
4. *Introduction to embedded systems -Shibu .K.V - Tata McGraw Hill Publications*
5. *Embedded system architecture,programming and designing.-Raj kamal Tata McGraw Hill Publications.*
6. *Embedded Systems, -Rao, B. Kanta (ARM,PIC)*

Reference Book:

1. *"Introduction to Embedded Systems", Raj Kamal, TMS, Tata McGraw Hill Publications, 2002.*
2. *"Embedded / Real time systems: Concepts, Design and Programming", Dr.K V K K Prasad, Dream Tech* press, New Delhi, 2003

Antenna and Wave Propagation

Unit 1

Electromagnetic Wave Propagation: Maxwell's Equations, Time Harmonic Fields, Waves in general, Uniform Plane Wave, Wave propagation in free space, Wave propagation in Dielectrics, Poynting's Theorem and Power, Propagation in Good Conductors, Skin Effect.

Unit 2

Plane Waves in Dispersive Media: Dispersion, phase velocity and group velocity, pulse broadening in dispersive and lossy media.

Unit 3

Reflection of Plane Waves: Reflection of uniform Plane Waves at normal incidence, Plane Wave
Propagation in General Direction, Plane Wave Reflection at Oblique Incidence, parallel and perpendicular polarizations.

Unit 4

Antennas: Wire and Aperture Antennas**,** the Retarded Potential, Hertzian Dipole, Power radiated, Radiation Resistance, Antenna Characteristics, Antenna Patterns, Radiation Intensity, Directive Gain, Power Gain. Effective Area and Friis Equation, The Radar Equation.
Some Practical Antennas: Half-wave Dipole Antenna, Quarter-Wave Monopole Antenna, Small Loop Antenna, Aperture Antenna, Antenna Arrays.

Suggested Books:

1. W. H. Hayt and J.A. Buck, Engineering Electromagnetics, Tata McGraw Hill (2006)
2. M. N. O. Sadiku, Elements of Electromagnetics, Oxford University Press (2001)
3. D. C. Cheng, Field and Wave Electromagnetics, Pearson Education (2001)
4. J. A. Edminster, Electrmagnetics, Schaum Series, Tata McGraw Hill (2006)
5. N. Narayanrao, Elements of Engineering Electromagnetics, Pearson Education (2006)
6. G. S. N. Raju, Antennas and Propagation, Pearson Education (2001)

MOBILE COMMUNICATIONS

MODULE I(12 hours)

The cellular concept- Introduction-frequency reuse- Channel assignment and handoff –co-channel interference–adjacent channel Interference –power control for reducing interference – improving capacity in cellular systems- cell splitting ,sectoring, microcell zone concept.

MODULE II (10 hours)

Radio wave propagation issues in wireless systems-basic propagation Mechanisms (basic idea only)-small -scale multipath propagation-small -scale multipath measurements - parameters of mobile multipath channels, Fading effects due to multipath time delay spread,fading effects due to doppler spread.

MODULE III (12 hours)

Multiplexing-space division multiplexing, frequency division multiplexing, time division multiplexing and code division multiplexing- modulation- ASK,PSK,FSK, advanced FSK, advanced PSK, multi-carrier modulation – spread spectrum-Multiple access techniques-SDMA,FDMA, TDMA and CDMA- comparison of S/T/F/CDMA

MODULE IV(12 hours)

GSM -Mobile services, system architecture, radio interface, localization and calling, hand over

Satellite systems- History, applications, basics, rooting, localization and hand over

MODULE V (14hours)

Wireless LAN –Infra red vs radio transmission-Infrastructure and ad-hoc network- IEEE 802.11: system architecture and protocol architecture-Blue tooth- user scenarios and architecture, Mobile IP- Goals, assumptions and requirements, Entities and terminology, IP packet delivery, agent discovery, registration, tunneling and encapsulation, optimization, reverse tunneling

Text Books

1. Rapapport T. S, 'Wireless Communication Principles and Practices', Pearson Education

Asia, New Delhi, 3rd Ed.2003.

2. Jochen Schiller,'Mobile communication 'Pearson Education,Asia.

Principles of VLSI

Module I:

Introduction : General classification of integrated circuits – Scale of integration – Advantages over discrete components.

Module 2:

Thick film technology : Features of hybrid IC technology – Thick film conductors – Dielectric – Resistors – Thick film processing – Thick film substrate – Design ideas – Advantages and applications.

Module 3:

Thin film technology : Thin film conductors – resistors – dielectric – substrates – thin film processing – Advantages and applications – Monolithic IC process : Growth and refining of Si crystals – Substrate slicing and polishing – Wafer preparation – Diffusion – Ion implantation – Oxidation – Photo-lithography – CVD – Epitaxial grown – Metallization – Monolithic resistors and capacitors.

Module 4 :

Introduction – Modern VLSI devices – High field effect – MOSFET devices – long channel & short channel MOSFET. Bipolar devices – n.p.n. transistor – characteristics of typical n.p.n. transistor – Bipolar device design – Design of emitter, base and collector region – concept of HDL.

Text Books

1. Module (I, II, III) : Integrated Circuits (K.R. Botkar).

2. Module (IV) : Fundamentals of Modern VLSI Devices by Yuan Taur and Tak H.

NING Cambridge Publishers.

References

1. Basic VLSI Design Systems and Circuits by Dougles A. Pucknell and Kamran Eshragian, PHI.

Fundamentals of Digital Design", Charles H.Roth,Jr., PWS Pub.Co.,1998.

ELECTRONIC INSTRUMENTATION

Module 1

Method of measurement(very low, very high), Introduction – General measurement system – Characteristics – Definitions , AC fundamentals. Network theorems – Superposition, Maximum Power Transfer, Thevenins theorem , Norton's theorem, Millman's theorem .AC fundamentals. ,Moving iron and PMMC- construction, characteristics and applications. Converting Ammeter, Voltmeter, loading effect. Ohm meter. Multimeters.

Module 2:

Power supplies– Transformer, ratings, specifications, V1/V2= I2/I1=N1/N2 Etc. Efficiency and losses. Rectifiers (full wave , half wave , filters). Regulation(line and regulation). Three pin regulators and black box(Ideal constant voltage source, ideal constant current source concept)

Module 3 :
Static and Dynamic Transducers – Different types – Resistive transducer – Strain gauge – Capacitive, inductive transducers – LVDT – Piezoelectric transducers – Temperature transducers – Thermo couple, Thermistors – Photo electric transducers – Photo multiplier tube – Photo cell – Photo voltaic cell – Photo diode – Photo transistor– LDR – Applications.

Module 4:

Whetstone's bridge, Kelvin Bridge; AC bridges, Capacitance Comparison Bridge, Maxwell's bridge, Wein's bridge, Wagner's earth connection

Module 5:

Amplifiers – different terms used in amplifiers , such as signal, source, input ,output voltage and current gain, power gain, decibel, input and output impedance. Classification according to frequency response ,R-C coupled , class A . Common emitter amp, introduction to Class B and C.

BOOKS:

1. Basic Electronics by Benard Grob.

2. Basic Electronics by Malvino.

3. Electrical measurements by Golding.

4. Electronic Instrumentation by Kalsi