BHARATHIAR UNIVERSITY, COIMBATORE

B.Sc. Electronics and Communication Systems

Scheme of Examination (CBCS PATTERN)

For candidates admitted during the Academic Year 2010-2011 and onwards

SEM	Part	Sub Code	Subject and Paper	Instruction Hrs./Week	Examinations				Credit
					Dur.Hrs.	CIA	Marks	Total Marks	
I	I		Language -I	6	3	25	75	100	4
	II		English – I	6	3	25	75	100	4
	III		**Core :**						
			Paper I : Principles of Electronics	5	3	25	75	100	4
			Pract. I Electric Circuits and Electronic Devices Lab	3	-	-	-	-	
			Pract.II Electronic Circuits Lab	3	-	-	-	-	
			Allied : I Mathematics –I	5	3	25	75	100	4
	IV		Environmental Studies #	2	3	-	50	50	2
II	I		Language - II	6	3	25	75	100	4
	II		English - II	6	3	25	75	100	4
	III		**Core**						
			Paper II :Electronic Circuits	5	3	25	75	100	4
			Pract. I Electric Circuits and Electronic Devices Lab	3	3	40	60	100	4
			Pract.II Electronic Circuits Lab	3	3	40	60	100	4
			Allied : II Mathematics – II	5	3	25	75	100	4
	IV		Value Education – Human Rights #	2	3	-	50	50	2
III	III		**Core :**						
			Paper III : Principles of Communication Systems	4	3	25	75	100	4
			Paper IV : Digital Principles and Applications	4	3	25	75	100	4
			Paper V : IC's and Instrumentation	4	3	25	75	100	4
			Pract. III Digital Electronics Lab.	3	-	-	-	-	
			Pract. IV Radio, TV and Instrumentation Lab	3	-	-	-	-	
			Allied : III Programming in C	4	3	20	55	75	3
			Pract. V Computer Programming Lab	3	-	-	-	-	
	IV		**Skill based Subject I :**						
			Computer Architecture and Organization	3	3	20	55	75	3
			Tamil @ / Advanced Tamil# (OR) Non-major elective - I (Yoga for Human Excellence)# / Women's Rights#	2	3	50		50	2

IV	III		Paper VI : Microwave and Fiber Optic Communications	4	3	25	75	100	4
			Paper VII : Television Engineering	4	3	25	75	100	4
			Paper VIII : Digital and Cellular Communications	4	3	25	75	100	4
			Pract. III Digital Electronics Lab.	3	3	40	60	100	4
			Pract. IV Radio, TV and Instrumentation Lab	3	3	40	60	100	4
			Allied: IV Object Oriented Programming using C++	4	3	20	55	75	3
			Pract. V : Computer Programming Lab	3	3	20	30	50	2
	IV		**Skill based Subject II :**						
			Visual Programming	3	3	**20**	55	75	3
			Tamil @ /Advanced Tamil # (OR) Non-major elective -II (General Awareness #)	2	3	50		50	2
V	III		Paper IX : 8085 Microprocessor and Applications	6	3	25	75	100	4
			Paper X : Industrial and Power Electronics	6	3	25	75	100	4
			Pract. VI: Microprocessor and Microcontroller Lab	3	-	-	-	-	
			Pract. VII: Industrial and Power Electronics Lab	3	-	-	-	-	
			Pract. VIII: Electronic Communication Lab	3	-	-	-	-	
			Elective – I	6	3	25	75	100	4
	IV		**Skill based subject – III**						
			Internet and Java Programming	3	3	20	55	75	3
VI	III		Paper XI : Satellite and Network Communications	5	3	**25**	75	100	4
			Paper XII: 8051 Microcontroller and Embedded Systems	5	3	**25**	75	100	4
			Pract. VI: Microprocessor and Microcontroller Lab	3	3	40	60	100	4
			Pract. VII: Industrial and Power Electronics Lab	3	3	40	60	100	4
			Pract. VIII: Electronic Communication Lab	3	3	40	60	100	4
			Elective – II	4	3	20	55	75	3
	IV		**Elective - III**	4	3	20	55	75	3
			Skill based subject – IV						
	V		Practical Visual and Java Programming	3	3	**30**	**45**	75	3
			Extension Activities @	-	-	50	-	50	2
			Total					3500	140

@ No University Examinations. Only Continuous Internal Assessment (CIA)

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List of Elective papers (Colleges can choose any one of the paper as electives)		
Elective – I	**A**	ASIC Design
	B	Remote Sensing
	C	Mobile Computing
Elective – II	**A**	Robotics and Automation
	B	Programmable Logic Control
	C	Automotive Electronics
Elective - III	**A**	Industrial Management
	B	Virtual Instrumentation
	C	Biomedical Instrumentation

SEM –I Core Paper- I

PRINCIPLES OF ELECTRONICS

Subject Description **:** This subject is the introductory for electronics, it presents the basic components theorems, devices and circuits

Goals **:** Enable the students to learn the basics of Electronics

Objectives **:** Upon completion of the subject, the student should understand the Basic components and its operations Gain knowledge about Electric and Electronic circuits and Network theorems

UNIT I PASSIVE CIRCUIT COMPONENTS

RESISTORS: Fixed resistor – Variable resistor – Color coding – Tolerance - Series and parallel connection.
CAPACITORS: Basic structure and symbol – Fixed capacitor – Variable capacitors – Dissipation factor – Series and parallel connection
INDUCTORS: Inductance of the coil – Fixed inductors – Variable inductors – Inductive reactance – Energy stored in an inductor – Q factor – Mutual inductance – Series and parallel connection

UNIT II AC AND DC CIRCUITS FUNDAMENTALS

Alternating current – peak value – average value – rms value – frequency – time period – wave length – phase angle – Three phase AC Power - AC circuits with resistance – AC circuits with XL – AC circuits with XC – Series reactance and resistance – Parallel reactance and resistance – Series parallel reactance and resistance - Real power – Apparent power – Series resonance circuit – Parallel resonance circuit.

Ohm's law – Kirchoff's law – Analysis of series circuit, parallel circuits and series parallel circuits – Voltage divider – Current divider – Simple problems in DC circuits.

UNIT III NETWORK THEOREM

Superposition theorem – Thevenin's theorem – Thevenzing a circuit with two Voltage Source – Thevenzing a bridge circuits – Norton theorem – Thevenin's Norton conversion – Conversion of voltage and current source – Millman's theorem – Maximum power transfer theorem – Simple problems in DC circuits

UNIT IV SEMICONDUCTOR DEVICES

Conductor – Semiconductor – Intrinsic semiconductor – Extrinsic semiconductor – P type and N type semiconductor – PN junction diode –V-I characteristics - Zener diode - V-I characteristics
Construction of NPN and PNP transistors – Operation of NPN, PNP transistors – Characteristics of CE and CB Transistor configurations

UNIT V

Introduction and V-I characteristics of JFET, MOSFET, SCR, DIAC, TRIAC and UJT.

TEXT BOOKS

1. R.S.Sedha "A Text Book Of Applied Electronics" S.Chand and Company Ltd., 2005
2. Bernard Grob "Basic Electronics" Tata McGraw – Hill, 9th edition 2003.

SEM – II Core Paper – II

ELECTRONIC CIRCUITS

Subject Description **:** This subject describe the classification and operation of amplifiers, oscillators, rectifiers and filter circuits

Goals **:** Enable the students to become an electronic technician and circuit designer

Objectives **:** Upon completion of the subject, the student should be able to design and troubleshoot the amplifiers, oscillators, power supply and filters

UNIT I SMALL SIGNAL AMPLIFIERS

Classification of amplifiers – Methods of transistor biasing – CE amplifiers – RC coupled amplifiers – Gain – Frequency response – Multistage amplifiers – Transformer coupled amplifiers.

UNIT II POWER AMPLIFIERS

Classification of amplifiers – Class A operation – Class B operation – Push pull configuration – Class AB operation – Class C operation – Power relation – Load power – Power dissipation – Current drain – stage efficiency – Complementary pair operation – Distortions.

UNIT III FEEDBACK AMPLIFIERS

Basic concept – Effect of negative feedback on gain – Gain stability – Band width – Distortion and noise – Analysis of voltage and current feedback amplifier circuits.

UNIT IV OSCILLATORS

Classification – Barkhausen criterion – Hartley oscillator – Colpitts oscillator – clap oscillator – Phase shift oscillator – Wein bridge oscillator

UNIT V WAVESHAPING CIRCUITS

Clipping, Clamping circuits – Half wave, full wave and bridge rectifiers – Average value – RMS value – Ripple factor – Rectification efficiency.
Filters: Capacitors, Inductors, LC and PI filter – Regulated power supplies using Zener diode – Fixed voltage regulators using IC's.

TEXT BOOKS

1. Grob, "Basic Electronics", Tata McGraw Hill, 8th edition.
2. V.K.Mehta, "Principles of Electronics", S.Chand&Co, New Delhi, 2nd edition
3. R.S.Sedha "A Text Book of Applied Electronics" S.Chand & Company Ltd, Secondly revised edition

SEM – I & II Core Practical – I

ELECTRIC CIRCUITS AND ELECTRONIC DEVICES LAB

(ANY 16 EXPERIMENTS)

1. Study of CRO, Multimeter and color codes of resistors and capacitors
2. Measurement of resistance and capacitance in series and parallel
3. Series resonance circuit
4. Parallel resonance circuit
5. Verification of Ohm's Law
6. Verification of Kirchhoff's Law
7. Verification of Thevenin's Theorem
8. Verification of Norton Theorem
9. Verification of Millman's theorem
10. Verification of Maximum power transfer Theorem
11. Study of Power and Energy Meter
12. Temperature Coefficient of Junction diode
13. Band gape energy of Silicon.
14. Characteristics of PN junction diode
15. Characteristics of Zener diode
16. Transistor DC Load line Analysis
17. Characteristics of Transistor – CE configuration
18. Characteristics of Transistor – CB configuration
19. Characteristics of FET
20. Characteristics of UJT
21. Characteristics of SCR
22. Characteristics of TRIAC
23. Characteristics of DIAC

SEM – I & II Core Practical – II

ELECTRONIC CIRCUITS LAB

(ANY 16 EXPERIMENTS)

1. Transistor biasing – self bias
2. Transistor biasing – Fixed bias
3. RC coupled amplifier
4. Feedback amplifier
5. Emitter follower
6. Class B push pull amplifier
7. Complementary symmetry push pull amplifier
8. Transient response of RC circuits
9. Hartley Oscillator
10. Colpitts oscillator
11. Phase shift Oscillator
12. Wein Bridge oscillator
13. UJT relaxation Oscillator
14. Crystal Oscillator
15. Function generator using 8038
16. Low pass, High pass and Band pass filters using Passive Components
17. Clipping circuits
18. Clamping circuits
19. Voltage doubler
20. Half wave and full wave rectifier
21. Bridge rectifier
22. DC regulated power supply using Zener diode
23. DC regulated power supply using IC's

SEM – III Core Paper – III

PRINCIPLES OF COMMUNICATION SYSTEMS

Subject Description : An important consideration in the design of the subject is to provide knowledge about communication medium, transmitter, receiver and modulation techniques

Goals : Enable the students to learn the basic principles used in communication systems

Objectives : After successful completion of the course the students should understand the concepts and techniques in communication systems

UNIT I WAVE PROPAGATION

EM waves – Free space propagation – Surface wave propagation – sky wave propagation – space wave propagation – Trophospheric scatter propagation – Structure of Atmosphere – Virtual height – MUF – LUF – Skip Distance – OWF – Isonoperic abnormalities- duct propagation

UNIT II ANTENNAS

Electro magnetic radiations – Elementary doublet – Current and Voltage Distribution – Resonant antennas, radiation patterns and length calculations – Non resonant antennas – Antenna gain and Effective radiated power – Antenna resistance – Bandwidth, Beam width and Polarization – Grounded and Ungrounded antennas – Effects of height – Feed point – Couplers – Impedance matching – Dipole Arrays - Yagi Uda antenna – Parabolic antenna – Horn and Lens antenna – Helical antenna

UNIT III MODULATION TECHINIQUES

Introduction to Communication Systems – Information – Transmitter – Channel – Noise – Receiver –- Need for Modulation Band width requirement – Amplitude modulation: AM Theory – frequency spectrum of AM wave – Representation of AM – Power relations in AM wave – AM Transmitter block diagram – Frequency modulation – System description – Mathematical representation – Frequency Spectrum – Generation of FM – Direct and Indirect methods.

UNIT IV SINGLE SIDEBAND MODULATION

Introduction – Principles – Balanced modulator – SSB Generation: Filter method, Phase shift method and Third method – SSB Reception: Pilot Carrier SSB and Independent Side band – vestigial sideband transmission – Introduction to PAM, PWM and PPM

UNIT V RECEIVER

Introduction – Super heterodyne Receiver – Choice of IF and Oscillator Frequencies – Image Rejection – Adjacent Channel Selectivity – spurious response - Tracking – AGC – Double conversion receiver

TEXT BOOKS

1. Kennedy and Davis "Electronic Communication Systems" Tata McGraw Hill, 8th edition, 1999
2. Dennis Roddy and John Coolen, "Electronic Communications" PHI, 4th edition, 1995
3. K.D. Prasad and Satyaprakahan "Antenna Wave Propagation" 3rd edition

SEM – III Core Paper – IV

DIGITAL PRINCIPLES AND APPLICATIONS

Subject Description : The design of the subject is to impart the knowledge about code conversion, Boolean algebra, logic gates, combinational and sequential logic, and converters.

Goals : Enable the students to design the logical circuits

Objectives : Upon Completion of the subject, the student should be able to Convert one number system to another number system, Construct truth tables for logic gates, Simplify Boolean expression, Write VHDL coding for logic circuits

UNIT I NUMBER SYSTEM AND CODES

Decimal, Binary, Octal and Hexa Decimal numbers – Conversion – Floating point representation – Binary addition, Subtraction and Multiplication – 1's and 2's compliments. Binary Coded Decimal (BCD) – Weighted codes and Non-weighted codes – Excess three – Grey code – Error detection codes – Hamming codes – ASCII codes – EBCDIC codes – Hollerith code – Parity advantages.

UNIT II BOOLEAN ALGEBRA AND LOGIC GATES

Boolean logic operations – Boolean functions – Truth Tables – Basic laws – DeMorgans theorem – Sum of Products and Products of Sums – Karnaugh map – Logic gates – OR, AND, NOT, NAND, NOR, EX-OR AND EX-NOR GATES – Code conversion – VHDL Coding for Logic gates.

UNIT III COMBINATIONAL LOGIC CIRCUITS

Half adder – Full adder – Half subtractor – Full subtractor – Parallel binary adder – 4 bit binary adder / subtractor – BCD adder – Multiplexer – Demultiplexer – Decoders – Encoders – Parity generators / checkers – Magnitude comparators – VHDL coding for Combinational Circuits

UNIT IV SEQUENTIAL LOGIC CIRCUITS

Flip Flops – RS, Clocked RS, JK, JK Master Slave, D and T Flip Flops – Shift Registers and its types – Ring counters – Ripple counters – Synchronous counter – Up down counter – Mod-3, Mod-5 counters – Decade counter – Applications.

UNIT V D/A AND A/D CONVERTERS

Digital to Analog converters: Resistive divider type and Ladder type – Accuracy and Resolution – Analog to Digital converters: Counter – Ramp type – simultaneous conversion – Dual slope type – Successive approximation type – Accuracy and resolution.

TEXT BOOKS

1. Malvino & Leech, "Digital Principles and Applications", Tata McGraw Hill, 5th edition, 2002.
2. M.Morris Mano "Digital Logic and Computer Design" PHI 2005.
3. M.Morris Mano "Digital Design" PHI 2005.

SEM – III Core Paper – V

IC'S AND INSTRUMENTATION

Subject Description : The design of the subject is to impart the knowledge on IC fabrication, Timer, PLL, Op-amp., transducers and electronic instruments

Goals : Enable the students to acquire the knowledge of IC fabrication, and its application in electronic circuits and know the measurements using electronic instruments

Objectives : Upon Completion of the subject, the student should : Understand the IC fabrication, Design circuits with ICs and Gain knowledge about electronic instruments.

UNIT I IC FABRICATION TECHNOLOGY

Fundamentals of Monolithic IC technology – Basic planar process – Wafer preparation – Epitaxial growth – Oxidation – Photolithography – Diffusion of impurities – Isolation techniques – Metallization – Monolithic transistors –Integrated resistors – Integrated capacitors- integrated Inductors- Thin and Thick film technology

UNIT II TIMER AND PLL

Functional block diagram of 555 timer – Monostable operation – Applications: – Linear ramp generator – Pulse width modulator – Astable operation – Applications: Schemitt trigger – FSK Generator

Phase locked loop: Functional block diagram – Phase detector / Comparator –Voltage Controlled Oscillator – Low pass filter – Applications: Frequency multiplier/Division – AM detection

UNIT III OPERATIONAL AMPLIFIER

Inverting and non inverting amplifier – Op-amp parameters – Summing Amplifier – Differential Amplifier – Integrator – Differentiator – Instrumentation Amplifier – Voltage to current converter – Current to Voltage converter – Precision half wave rectifiers – Precision full wave rectifiers.

UNIT IV TRANSDUCERS

Introduction – Electrical Transducer – Basic requirements of Transducer – Classification of transducers – selection of transducers – resistive transducers – potentiometers – Thermistors – Thermocouple – LVDT – RVDT – Piezoelectric transducers – hall effect transducers – Photoelectric transducers – digital displacement transducers.

UNIT V ELECTRONIC INSTRUMENTS

Q Meters- CRO: Block Diagram – cathode ray tube – Measurement of frequency – Measurement of voltage and current – Digital Oscilloscope – digital voltmeter: Ramp type DVM – dual slope integrating type DVM – Digital multimeter – Humidity and humidity measurement – Measurement of PH.

TEXT BOOKS

1. D.Roy Choudhury and Shahil B Jain, "Linear Integrated Circuits", Second Edition New Age International Publishers 2004.
2. K.R.Botkar, "Integrated Circuits", 10th Edition Khanna Publishers 2006.
3. J.B.GUPTA "A course in electronic and electrical measurements and instrumentation", 12th Edition, S.K Kataria & sons

SEM – III Skill based Subject – I

COMPUTER ARCHITECTURE AND ORGANIZATION

Subject Description **:** This subject presents the Modern computer organization, Processor and memory design, Peripherals and recent system architecture.

Goals **:** Enable the students to learn the newest computer technology and trends.

Objectives **:** Upon Completion of the subject, the student should : Gain the knowledge of Processor and Memory Design and understand the recent computer organization and architecture

UNIT I MODERN COMPUTER ORGANIZATION

Introduction – Layers in modern computer - Computer organization – Main Memory – CPU Operation – Computer types – System performance and measurement – High performance techniques – Booting sequence – Computer design process – Computer structure – Computer Function – Architecture and Organization – CISC Vs RISC

UNIT II PROCESSOR DESIGN AND DATA PATH

Introduction – Processor role – Processor design goals – Processor design process – Data path organization – Main memory interface – Local storage register file – Data path simple instructions

UNIT III MEMORY DESIGN AND MANAGEMENT

Introduction – Memory parameters – Classification of memory – Memory Technology – Main memory allocation – Static RAM IC – Dynamic RAM – ROM logic – Multiple memory decoding – Memory Hierarchy – Cache memory – Principle of cache – Virtual memory Concept – Advantage of Virtual memory

UNIT IV COMPUTER PERIPHERALS

Introduction – Keyboard – CRT display monitor – Printer – Magnetic storage devices – Floppy disk drive – Hard disk drive – Special types of disk drives – Mouse and Track ball – Modem – CD-ROM Drive – Scanner – Digital Camera – DVD.

UNIT V ADVANCED SYSTEM ARCHITECTURE

Introduction – High performance computer architecture – RISC systems – Superscalar architecture – VLIW architecture – EPIC architecture –Multiprocessor Systems

TEXT BOOK

1. Govindarajalu.B “Computer Architecture and Organization Design Principles and Applications” Tata McGraw-Hill, 2006

SEM – IV Core Paper – VI

MICROWAVE AND FIBER OPTIC COMMUNICATION SYSTEMS

Subject Description : An important consideration in the design of the subject is to provide knowledge about microwave, microwave devices, radar and optical fiber communication.

Goals : Enable the students to learn the microwave and fiber optic communication systems.

Objectives : After successful completion of the course the students should: understand the concepts and techniques in microwave and optical communication, *acquire knowledge about radar and optical fiber systems

UNIT I INTRODUCTION TO MICROWAVES

Introduction – Maxwell's equation – Amperes law – Faradays law – Gauss law – Wave equation – Types of wave guides – TE and TM modes – Propagation of TM waves in rectangular wave guide – TM modes in rectangular wave guides.

UNIT II MICROWAVE AMPLIFIERS AND OSCILLATORS

Microwave tubes: - Two cavity Klystron – Multi cavity Klystron – Reflex Klystron – Traveling wave tube (TWT) – Backward wave Oscillator (BWO) – Magnetron – Applications

UNIT III MICROWAVE DEVICES

Microwave transistors – Gallium Arsenide (GaAs) metal semi-conductor FET – Varactor Diode – PIN diode – Scotty diode – Tunnel diode – Gunn diode – IMPATT diode – TRAPATT diode – BARITT diode – Maser principle – Applications

UNIT IV RADAR

Introduction – Block diagram – Classification – Radar range equation – Factors affecting the range of a radar receivers – Line pulse modulator – PPI (Plane Position Indicator) – Moving Target Indicator (MTI) – FM CW Radar- Applications.

UNIT V OPTICAL FIBER COMMUNICATION

A basic fiber optic system – Frequencies – Fiber optic Cables – Refraction – Numerical Aperture – Graded index cables – Single mode – Multi mode – Cable Constructions – Cable losses – Connectors – Light Sources – Light Detector – Systems Components – Advantages and Disadvantages.

TEXT BOOKS

1. Kennedy; Davis – "ELECTRONIC COMMUNICATION SYSTEMS" Tata McGraw Hill Publishing Company Limited, III edition.
2. Robert J Schoenbeck "ELECTRONIC COMMUNICATIONS MODULATION AND TRANSMISSION", PHI,1999

REFERENCES

1. M.Kulkarni – "MICROWAVE AND RADAR ENGINEERING" Umesh Publications, 2nd edition.
2. Samuel Y.Liao – "MICROWAVE DEVICES AND CIRCUITS" PHI Private Limited, 2nd edition.
3. Anikh Singh – "PRINCIPLES OF COMMUNICATION ENGINEERING" S.Chand & Company Limited, 2nd Edition

SEM – IV Core Paper – VII

TELEVISION ENGINEERING

Subject Description **:** The design of the subject is to impart the knowledge on Television standards, receiver section, sync separator color television with advanced techniques.

Goals **:** Enable the students to acquire the knowledge about television and its recent Developments.

Objectives **:** Upon Completion of the subject, the student should acquire knowledge of television standards and be skilled in trouble shooting of television

UNIT I TELEVISION STANDARDS

Geometric form & Aspect ratio of the picture – Vertical scanning – Horizontal scanning – Number of scanning lines – Interlaced scanning – Vertical and horizontal resolution –negative modulation – Complete Channel bandwidth – Reception of VSD Signals – allocation of Frequency band for TV signal Transmission – Standards of TV System – Composite video signal – CCIR .

UNIT II TELEVISION RECEIVER SECTION

Monochrome receiver block diagram – Receiving antennas – Balun – IF Filters RF tuners – VHF Stage and Response – Video detector – sound section – video amplifiers DC restoration – Picture tubes.

UNIT III SYNC SEPARATOR

Sync separator – Basic principle – Noise in sync pulses – Vertical and horizontal sync separation – Automatic frequency Control (AFC) – Horizontal AFC – Vertical and horizontal output stage – EHT generation.

UNIT IV COLOUR TELEVISION

Nature of color – Color perception – Compatibility – Three color theories – Chromaticity diagram – Luminance and color difference signals – weighting factors – color picture tube – Bandwidth for color signal transmission – PAL Color TV systems- Block diagram of color TV Receiver.

UNIT V ADVANCE TECHNIQUES

CCD camera – HDTV – Digital TV – Video Disc – Cable TV – Video Cassette Recorder.

TEXT BOOKS

1. R.R. Gulati, “Monochrome and Colour Television”, New Age International (P) Limited, Publishers, New Delhi.
2. R.R. Gulati, “Modern Television Practice”, New Age International (P) Limited, Publishers, New Delhi.
3. R.R. Gulati, “Colour Television Principles And Practice”, New Age International (P) Limited, Publishers, New Delhi.
4. SP Bali, “Colour Television Theory and Practice”, Tata McGraw Hill Publishing Company Limited New Delhi, V edition 2002.

SEM – IV Core Paper – VIII

DIGITAL AND CELLULAR COMMUNICATIONS

Subject Description : An important consideration in the design of the subject is to enhance the knowledge in communication with digital and cellular systems

Goals : Enable the students to learn the digital and cellular technology

Objectives : After successful completion of the course the students understand the Digital carrier modulation and Quantization, Gain knowledge about Cellular systems

UNIT I DATA TRANSMISSION

Introduction – Representation of data signal – Parallel and serial data transmission – 20milli amps loop and line drivers – Transient noise – Data signal – Signal shaping and signaling speed – Noise and error analysis – Repeaters.

UNIT II COMMUNICATION SYSTEM

Model of communication system – Elements of digital communication system: Information source, Source encoder/decoder, Communication channel, Modulator, Demodulator, Channel encoder/decoder, other functional blocks – Analysis of communication system – Design of communication system.

UNIT III DIGITAL CARRIER MODULATION SCHEMES

Binary phase shift keying – Differential phase shift keying – Differentially encoded PSK – Quadrature phase shift keying – Base band signal receiver – Phase shift keying – frequency shift keying – Non-coherent detection of FSK.

UNIT IV PULSE MODULATION AND QUANTIZATION

Pulse amplitude modulation, Pulse width modulation, Pulse position modulation, Quantization of signals – Quantization error – Pulse code modulation – Electrical representation of Binary digits – PCM system – Companding – Multiplexing PCM signals – Differential PCM – Delta modulation – Adaptive delta modulation.

UNIT V DIGITAL CELLULAR SYSTEMS

GSM Architecture – Layer modeling – transmission – Data Service – Multiple Access Scheme – Channel Coding Inter leaving – Radio resource management – Mobility management – Communication management – Network management – TDMA Architecture – Transmission and Modulation – CDMA – Terms of CDMA Systems – Call Processing – Hand over Procedures

TEXT BOOKS

1. Sam K.Shanmugam, “Digital and Analog Communication Systems”, John Wiley Publications, 2005
2. John G.Proakis, “Digital Communications”, Tata McGraw Hill International, 2001.
3. W.C.Y.Lee, “Mobile Cellular Telecommunication”, McGraw Hill Publications, 1995

SEM – III & IV Core Practical – III

DIGITAL ELECTRONICS LAB

(ANY 16 EXPERIMENTS)

1. Verification of basic gates and universal gates
2. Verification of Demorgan's Theorem
3. 2-bit comparator using gates
4. Half adder and full adder
5. Half subtractor and full subtractor
6. 4-bit binary adder
7. Multiplexer and De multiplexers
8. Encoder and Decoder
9. BCD to 7-segment Display
10. Study of Flip Flops
11. Binary to Grey and Grey to Binary conversion
12. Shift registers and Ring counter
13. Analog to Digital converter
14. Digital to Analog converter
15. Op-Amp: adder and subtractor
16. Op-Amp: integrator and differentiator
17. Current to Voltage and Voltage to Current
18. IC 555: Monostable multivibrator
19. IC 555: Astable multivibrator
20. VCO using IC 555
21. Design and Simulation of Basic Logic Gates using VHDL Coding
22. Design and Simulation of Universal Logic Gates using VHDL Coding
23. Design and Simulation of Adder Circuits using VHDL Coding

SEM – III & IV Core Practical – IV

RADIO, TV AND INSTRUMENTATION LAB

(ANY 16 EXPERIMENTS)

1. Amplitude modulation and Detection
2. Frequency modulation and Detection
3. First IF Amplifier
4. Second IF Amplifier
5. Audio Amplifier using TBA 810
6. Study of AM & FM Radio Receiver
7. Study of Tape Recorder, CD and DVD Player
8. Study of DTH Receiver
9. Alignment of Color Television Using Video Pattern Generator
10. Sync Separator
11. Vertical Section and Horizontal Section fault of a TV Receiver
12. Video Amplifier Fault
13. EHT Generation
14. Study of Pincushion correction and error magnets
15. Degaussing in Color Television
16. Temperature Measurement Using Thermistor
17. Displacement Measurement Using LVDT
18. Weighing machine Using Load Cell
19. Flow measurement
20. Pressure Measurement
21. Measurement of PH
22. Instrumentation Amplifier
23. Characteristics of Photo Voltaic cell (solar cell)

SEM – IV Skill based Subject – II

VISUAL PROGRAMMING

Subject Description **:** The subject presents windows programming, visual basic programming, Visual c++ programming, ODBC and GUI

Goals **:** Enable the students to learn the Visual programming

Objectives **:** After successful completion of the course the students student acquire knowledge about visual programming and able to program the applications using VB and VC++

UNIT I

Visual Basic: Getting started – Visual Basic environment: Tool bars – The Tool box and Custom controls and components – using file menu, edit menu, view menu, project menu, format menu, debug menu, adding menu and window menu – customizing a form and writing simple programs.

UNIT II

Building the user interface: the tool box – creating controls – properties setting – First steps in programming: Code window – Visual Basic's editing tools – Statements in VB – Data types – Working with variables – Input boxes and Message boxes – displaying information.

UNIT III

Controlling program flow – Built-in functions – User defined functions and procedures – Control arrays – List and Combo boxes – the Flex grid control- Finishing the interface: Frames – Option buttons – Check boxes – Scroll bars –Timers – Common Dialog boxes – The Microsoft windows common controls 6.0 – Menus – MDI forms.

UNIT IV

Communicating with other window applications – Database development with Visual Basic (DAO, RDO) – Building ActiveX controls – OLE.

UNIT V

VC++ Fundamentals – Using Visual Studio's IDE – Menus – Writing, Compiling and Debugging simple programs – Building a basic application – Types – Overview of MFC.

TEXT BOOKS

1. Gary Cornell, "Visual Basic 6.0 from the Ground Up", Tata McGraw Hill Company, 1999.
2. Chris H. Pappas & William H. Murray, "The Complete Reference Visual C++ 6" , Tata McGraw Hill, Delhi.

REFERENCES

1. John Paul Muller, "Visual C++ from the Ground Up", Tata McGraw Hill, Delhi.
2. Richard C. Leinecker and Tom Archer, "Visual C++ 6 Programming Bible", Wiley India Pvt Ltd.

SEM – V Core Paper – IX

8085 MICROPROCESSOR AND APPLICATIONS

Subject Description **:** This subject presents the architecture, Programming in 8085ALP and real world applications of the 8085 microprocessor

Goals **:** To enable the students to learn the instruction set, programming, and interfacing concepts of 8085microprocessor

Objectives **:** On successful completion of the course the students should have: Developed the programming skills in 8085ALP Understood the interfacing concept memory, & I/O devices. Understood the concept of microprocessor based system design

UNIT I INTRODUCTION TO 8085

Pin Diagram – Architecture – Demultiplexing the bus – Generation of control signals – Fetching, decoding and execution of instruction – Instruction timing and operation status.

UNIT II INSTRUCTION SET AND ADDRESSING MODES

Instruction set – Addressing modes – Instruction format – Simple program – Memory Read machine cycle – Memory write machine cycle.

UNIT III INTERFACING CONCEPTS

Peripheral I/O instructions – device selection and data transfer – Input Interfacing – Practical Input interfacing using decoders – Interfacing O/P Devices: LED and 7 segment Display – Interfacing memory – Memory time and unit states.

UNIT IV PARALLEL AND SERIAL INTERFACE

Introduction to programmable Peripheral Interface 8255 – Pin Diagram – Architecture – Modes of Operation: I/O and BSR – Architecture and operation of 8251 (USART).

INTERRUPT AND TIMER LOGIC

8085 interrupts - Architecture of programmable interrupt controller 8259 — Architecture of 8254 Programmable Interval timer / counter – Modes of Operation of 8254 – Generating square wave using 8254.

UNIT V APPLICATIONS

Time delay program – Traffic Light Control System – Water Level Controller – Stepper Motor Control – Interfacing DAC – Interfacing ADC – Temperature measurement.

TEXT BOOKS

1. R.S.Gaonkar “Microprocessor Architecture, Program And Its Application With 8085”, New Age International (P) Ltd,
2. S.Malarvizhi, “Microprocessor and Its Application”, - Anuradhe Agencies Publications – I edition, March 1999.

SEM – V

Core Paper – X

INDUSTRIAL AND POWER ELECTRONICS

Subject Description : This subject presents the principles and applications of industrial and power electronics

Goals : To enable the students to learn and design industrial & power electronic circuits.

Objectives : On successful completion of the course the students should have: Developed the circuit designing skills power electronics. Understood the concept industrial electronics system design.

UNIT I

Principles of single phase inverter, converter, cyclo converter and DC chopper – UPS – HVDC – static circuit breaker – battery charging circuit – SCR current limiting circuit breaker – static AC and DC switches – flasher circuits - time delay circuits – fan regulator using TRIAC – thyristor protection circuits: over current protection – over voltage protection – gate protection.

UNIT II

Welding and Heating: resistance welding – types of resistance welding – electronic control in resistance welding: ignitron contractor – heat control – non synchronous timer – synchronous weld timer – sequence timer – energy storage welding systems – induction heating – applications of induction heating – dielectric heating – application of dielectric heating.

UNIT III

Generation of ultrasonic waves – applications of ultrasonic – production of X rays – applications – Measurement of non electrical quantities: pressure measurements – displacement measurements – level measurements – flow measurements – measurement of thickness.

UNIT IV

Application in industrial systems: Thermistor control of quench oil temperature – proportional mode pressure control system – strip tension controller – automatic weighing system – control of relative humidity in a textile moistening process – warehouse humidity controller.

UNIT V

Industrial Robotic Systems: Parts of robotic systems – Classifications of robotic systems – robotic system configurations – degrees of freedom of robotic system – programming robotic systems – motions of robotic systems – sensor for robotic systems – mechanical parts – control systems.

Microprocessor based industrial applications: Speed control of DC motor – measurement of physical quantities – water level indicator – firing angle control of thyristor.

TEXT BOOKS

1. Harish C Rai, "Industrial and Power Electronics" 10th edition, Umesh publications 2002
2. Timothy J Maloni, "Industrial Solid State Electronic Devices and Circuits" 2nd edition 1986

SEM – V

Skill based Subject – III

INTERNET & JAVA PROGRAMMING

Subject Description : The design of the subject is to provide knowledge about internet, Java data types, classes and files

Goals : Enable the students to learn the internet concept and Java programming systems

Objectives : After successful completion of the course the students should Gain knowledge about the concepts of Internet and able to program the applications using Java

UNIT I

Internet – Introduction- Understanding Internet- Internet Addressing - Hardware Requirements to Connect to the Internet

UNIT II

Data types, Arrays, Operators, Flow control – Branching, Looping

UNIT III

Classes – New Operator, Dot Operator, Method Declaration and Calling, Constructors, This In Constructors, Inheritance, Super, Method Overriding Final, Finalize, Static, Package and Import Statement, Interface and Implements

UNIT IV

Exception Handling – Exception Types, Uncaught and Calling, Nested Try Statements, Java Thread Model, and Thread, Runnable, Thread Priorities, Synchronization, Deadlock

UNIT V

File – Input Stream, Output Stream, and File Stream. Applets-Tag, Order of Applet Initialization, Repainting, Sizing Graphics- Introduction to AWT Programming.

TEXT BOOKS

1. Harley Hahn, The internet complete reference,Tata McGraw publicity,2nd Edition ,1997
2. Patrick Naughton., " Patrick Naughton", Then Java hand book, Tata McGraw,1997

SEM – VI

Core Paper – XI

SATELLITE AND NETWORK COMMUNICATION SYSTEMS

Subject Description : An important consideration in the design of the subject is to provide orbital aspects, space craft and satellite system, data communication, network protocols and LAN.

Goals : Enable the students to learn the digital and cellular technology

Objectives : After successful completion of the course the students should: Understand the Digital carrier modulation and Quantization, Gain knowledge about Cellular systems enhance the knowledge in communication with satellite and network systems

UNIT I ORBITAL ASPECTS

Brief history and current state of satellite communications – Equations of the orbit locating the satellite in the orbit – Orbit element – Look angle – Elevation and azimuth calculation – Geostationary orbit – MEO – LEO – Visibility – Orbital perturbations – Orbital effects in communication system performance.

UNIT II SPACE CRAFT

Space craft subsystem – Altitude and orbit control system – Telemetry, Tracking and Command (TT&C) – Power systems – Description of communication system – Transponder – Implementation – Transmission impairments – Space craft antennas – Equipment reliability.

SATELLITE LINK: Basic transmission theory – System noise temperature – Noise figure – Down link and up link – Limits on link performance – Design of satellite links for specified 9C/N – rain attenuation model.

UNIT III DATA COMMUNICATION

Trends in computer communications and networks – Messages, characters, bit streams, symbols and waveforms – Digital/analog, serial/parallel, simplex/half duplex/full duplex – Synchronous/asynchronous – MODEM:Modulation and keying alternatives – Multiplexing alternatives.

UNIT IV NETWORKS PROTOCOLS AND OSI MODEL

Introduction – Advantages of Networks – Structure of the Communication Network- Point to Point and Multi drop Circuits – Data Flow and Physical Circuits – Network Topologies Goals of Layered Protocols - Network Design Problems- Communication between Layers- the Layers of OSI

UNIT V LOCAL AREA NETWORKS

Introduction – Primary Attributes Of A LAN- Broadband And Base Band LANS – IEEE LAN Standards – Relationship Of The 802 Standards To The ISO/CCITT Mode l – Connection Options With LANS LLC And Mac Protocol Data Units- LAN Topologies And Protocols – CSMA/CD and IEEE 802.3 – Token Ring and IEEE 802.5 – Token Bus and IEEE 802.4 – Concept of MAN and WAN

TEXT BOOKS

1. Dr.D.C.Agarwall, "Satellite Communications", Khanna Publications, 3rd edition, 1995.
2. K.N Raja Rao "Fundamentals of Satellite Communication"
3. Uyless Black- Computer Networks Protocols, standards and Interfaces- 2nd Edition PHI
4. Johan Freer- Computer Communication and Networks – East –West Press (P) Ltd –First Edition.

SEM – VI

Core Paper – XII

8051 MICROCONTROLLER AND EMBEDDED SYSTEMS

Subject Description : This subject presents the architecture, Programming in ALP & C and real world applications of the 8051 microcontroller.

Goals : To enable the students to learn the instruction set, programming, and interfacing concepts of 8051microcontroller.

Objectives : On successful completion of the course the students should have: Developed the programming skills in 8051ALP Understood the concept of Embedded C programming Understood the concept of embedded system design

UNIT I OVERVIEW AND INSTRUCTION SET

Microcontrollers and embedded processors – microcontrollers for embedded systems – overview of 8051 family – 8051 instruction set and registers.

UNIT II ASSEMBLY PROGRAMMING & ADDRESSING MODES

Introduction to 8051 assembly programming – the program counter and ROM – Data types and directives – flag bits and PSW register – register bank and stack – loop and Jump instructions – I/O port programming – addressing modes.

UNIT III ARITHMETIC AND LOGICAL OPERATIONS IN ALP & C

Arithmetic instructions and programs – unsigned addition and subtraction and unsigned Multiplication and division – logic instructions and programs – single bit instructions and programming. Programming with C: Data types – time delay programming – I/O programming – logic operations arithmetic operations

UNIT IV 8051 INTERRUPTS & PERIPHERALS

Basic registers of timer – programming 8051 timer – counter programming – basics of serial communication – 8051 connection to RS 232 – 8051 serial communication. Programming – 8051 interrupts – programming external hardware interrupts.

UNIT V REAL WORLD APPLICATIONS

Interfacing LCD to the 8051 – interfacing ADC – interfacing sensors to 8051 – interfacing Stepper motor – 8051 interfacing to the keyboard – interfacing DAC to the 8051

TEXT BOOK

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontroller And Embedded Systems Using Assembly And C ", PHI, 2nd edition 2006

SEM – V & VI

Core Practical – VI

MICRO PROCESSOR AND MICROCONTROLLER LAB

(ANY 16 EXPERIMENTS)

8085 MICROPROCESSOR LAB

1. Addition / subtraction of 8 / 16 bit data.
2. Multiplication / division 8 bit data.
3. Block data transfer.
4. Smallest / largest of N numbers.
5. To arrange in ascending / descending order.
6. Sum of N 8 bit numbers.
7. 1's and 2's compliment of an array (8 bit).
8. UP/DOWN counter using 7 segment displays.
9. Traffic light control interface.
10. Data transfer using 8255 (PPI).
11. Square wave generator using 8255.
12. ADC interface.
13. DAC interface.
14. Stepper motor interface.

8051 Microcontroller Lab

15. Arithmetic and Logical Programs
16. Key Interface
17. LED Interface
18. Solid State Relay Interface
19. Square wave Generation
20. ADC interface.
21. DAC interface.
22. Stepper motor interface
23. LCD Interface

SEM – V & VI

Core Practical – VII

INDUSTRIAL AND POWER ELECTRONICS LAB

(ANY 16 EXPERIMENTS)

1. Triggering of SCR by R, C and Diac.
2. Design of snubber circuit.
3. Fan regulator using Triac.
4. Thyristor chopper.
5. TRIAC Flasher.
6. Commutation Techniques.
7. Speed control of DC motor using SCR.
8. Automatic street light controller.
9. Burglar Alarm
10. Sequencer Circuit.
11. Power Inverter
12. Switching Regulators
13. Automatic Battery Charger
14. Fire alarm
15. ON / OFF relay control using opto – coupler
16. Servo stabilizer
17. Layout and Art Work preparation for PCB
18. Etching Drilling and Component mounting of PCB
19. Temperature controller using AD 590/ LM 35.
20. Construction of Emergency Lamp.
21. Phase Control Circuit
22. Cycloconverter
23. Thyristor protection circuit

SEM – V & VI

Core Practical – VIII

ELECTRONIC COMMUNICATION LAB

(ANY 16 EXPERIMENTS)

1. Pulse Amplitude Modulation (PAM) and Detection
2. Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM)
3. Generation and Detection of PCM
4. Generation of delta and Adaptive delta modulation
5. Amplitude Shift Keying
6. Frequency Shift Keying
7. Phase Shift Keying
8. QPSK
9. DPSK
10. Study of TDM/FDM
11. Full duplex communication model
12. Alignment of satellite receiver
13. Study of GPS Handset
14. Study of GSM Module
15. PIN Diode Characteristics
16. Laser Diode Characteristics
17. Fiber Optics T_X and Rx
18. Signal Sampling and Reconstruction
19. GUNN diode Oscillator
20. Reflex Klystron Characteristics using microwave bench
21. Radiation pattern of HORN antenna.
22. Radiation pattern of Dipole & Yagi Uda antennas
23. Radiation pattern Loop & array antennas

SEM – VI

Skill based Subject - IV

VISUAL AND JAVA PROGRAMMING LAB

VISUAL PROGRAMMING (ANY 8 EXPERIMENTS)

1. Building Simple Applications using Basic Tools.
2. Working with Intrinsic Control and Active X controls.
3. Create an Application with multiple forms and dialogs.
4. Write a VB program to design an e-mail registration form.
5. Create an Application with Menu editor.
6. Create an Application with DAO controls
7. Create an Application using Common dialogs.
8. Write a program for Drag and Drop Events.
9. Create a Database for library management using ADD controls.
10. Creating an application using Active X control.
11. Create a Scientific calculator in VB.
12. Develop a VB application to either link or embed MS Word document to an OLE control.
13. Display Student information using Grid control.
14. Create an Application using RDO controls.
15. Develop an application to perform the following operation in the Employee table using DAO.
    i) Add a new Record.
    ii) Delete a Record.
    iii) Modify a Record.

JAVA PROGRAMMING (ANY 8 EXPERIMENTS)

1. Program to print the following triangle of numbers
   1
   12
   123
   1234

2. Defining a class with the following attributes 1. xname 2. Date of Birth 3. Date on which leg injection has to be given (sixty days from date of birth) 4. xdate on which polio drops is to be given (45 days from Date of birth). Write a constructor to construct the baby object. The constructor must find out the leg and polio drops dates from the date of birth. In the main program define a baby and display its details.

3. Program to create and display a message on the window.

4. Program to draw several shapes in the created window.

5. Program to create an applet and draw gridlines.

6. Java program to create a frame with two buttons called father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother appear.

7. Java program to create a frame with four text fields for name, age and qualification and a text field of multiple lines for address.

8. Program to draw circle, ellipse, square and rectangle at the mouse click position.

9. Java program to create four text fields for the name, street, city and pin code with suitable labels. Also add a button called my details, when you click the button your name, street, city and pin code must appear in the text fields.

10. Java program to demonstrate the multiple selection list boxes.

11. Program to create a canvas which displays a clock with hour hand and a minute hand depending upon an int variable minutes. Write another program with a frame, which displays the clock canvas. It must also have three buttons, tick, reset and close. When we click reset, the clock must reset to 12 hrs.When we click close, the frame closes.

12. Java program to create a menu bar and pull down menus.

13. Java program to create a window when we press M or m the window displays Good Morning A or a the window displays Good Afternoon E or e the window displays Good Evening N or n the window displays Good Night.

14. Java program to move different shapes (Circle, Ellipse, Square, and Rectangle) according to the arrow key pressed.

15. Program to handle the divide by zero exception.

16. Program to explain the multithreading with the use of multiplication tables. Three threads must be defined and each one must create one multiplication table; they are 5 tables, 7 tables and 13 table.

17. Program to illustrate thread priority. Create three threads and assign three different priorities.

SEM – V

Elective I - A

ASIC DESIGN

UNIT – I: INTRODUCTION TO ASICS

Types of ASICS: Full-custom ASIC – Standard cell-based ASIC – Gate array based ASIC – Channeled gate array - Structured gate array – Programmable logic devices – FPGA, Design flow – Case study.

UNIT – II: CMOS LOGIC

CMOS transistors –Design rules – Combinational logic cells: Pushing Bubbles – Drive strength – Transmission gates – EX-OR cell, Sequential logic cells: FF –clocked Inverter, Data path logic cells: Datapath elements.

UNIT – III: ASIC DESIGN

Programmable ASICS: The Antifuse – Static RAM – EPROM and EEPROM technology, Programmable ASIC logic cells: Actel ACT, Xilinx LCA and Altera FLEX architectures, Programmable ASIC I/O cells: DC output – DC input, Programmable ASIC design software: Logic synthesis – FPGA synthesis.

UNIT II VHDL

Introduction to VHDL – Behavioral, Data Flow and Structural Model - Operators – Data objects - Data types - Design examples.

UNIT III VERILOG

Introduction- Language elements- Gate-level modeling- data flow- Behavioral- structural modeling – Modeling examples

T

EXT BOOKS

1. Michael John Sebastian Smith , "Application specific Integrated Circuits", Addition-Wesley, 2nd reprint, 2000.
2. Bhasker. J, "VHDL primer", BS Publications, 2001
3. Bhasker.J. "A Verilog HDL Primer", BS Publications, 2001

REFERENCES

1. Charles .J.Roth, "Digital system design using VHDL", PWS Publishing (Thomson learning), 2002.
2. Stephen Brown, Zvonko Vranesic "Fundaments of Digital Logic with VHDL design" Tata McGraw-Hill, 2002
3. Peter .J. Ashenden, "The Designer's Guide to VHDL", Morgan Kaufmann Publishers, San Francisco, 2001
4. www-ee.eng.hawaii.edu/~msmith/ASICs/HTML/ASICs.htm

SEM – V Elective I - B

REMOTE SENSING

UNIT I PRINCIPLES OF REMOTE SENSING

Remote sensing system and its components, Electromagnetic spectrum, definition of emissivity, reflectance, absorbance and transmittance. Spectral signature, atmospheric window, active and passive remote sensing systems, Interaction of electromagnetic energy with atmosphere and earth features, factors affecting the reflectance

UNIT II PLATFORMS AND SENSORS

Airborne and space platforms, Advantages and disadvantages of each, principle and functioning of camera, films, multi-spectral, thermal & line scanners, side looking air borne radars, and hyperspectral sensors, Different satellite and sensor combinations: LANDSAT, SPOT, IRS series of satellites and sensors. Their important characteristics such as flight altitude, IFOV, spatial resolution, swath, spectral bands, and repetivity.

UNIT III IMAGE CHARACTERISTICS AND INTERPRETATION

Differences between aerial and space borne imagery, Elements of visual interpretation of images, radiometric processing including correction of instrumental artifacts and atmospheric corrections; geometric corrections and registration. Geometric enhancement including spatial filtering, edge detection and enhancement.

UNIT IV DIGITAL IMAGE PROCESSING

Image Transformations such as subtraction, rationing, NDVI and PCA, Thematic classification and clustering to include unsupervised and supervised classification based on minimum distance and maximum likelihood classification; accuracy assessment of classification. Concepts of hyderspectral image analysis.

UNIT V ANCILLARY DATA SOURCES AND INTEGRATION

Ground truth, Geographic and Radiometric, Introduction of GIS, Integration of Remote sensing and GIS, Digital terrain models, GPS and its role to remote sensing data.

TEXT BOOKS

1. Lillesand, T.M. and Kiefer, R.W., Remote Sensing and Image Interpretation.
2. Curran, Paul J., Principles of Remote sensing
3. Campbell, J.B., Introduction of Remote Sensing
4. Sabins,F.F., Remote Sensing: Principles and Interpretations
5. Reddy, M. Anji, Remote sensing and Geographic Information System

SEM – V

Elective I - C

MOBILE COMPUTING

UNIT I INTRODUCTION

Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmissions – Multiplexing – Spread Spectrum and Cellular Systems – Medium Access Control – SDMA- FDMA- TDMA- CDMA- Comparison of Access mechanisms

UNIT II WIRELESS NETWORKS

Wireless LAN: Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks- IEEE 802.11 – HIPERLAN – Bluetooth- Wireless ATM: Working Group- Services- Reference Model – Functions – Radio Access Layer – Handover- Location Management- Addressing Mobile Quality of Service- Access Point Control Protocol

UNIT III MOBILE NETWORK LAYER

Mobile IP : Goals – Assumptions and Requirement – Entities – IP packet Delivery- Agent Advertisement and Discovery – Registration – Tunneling and Encapsulation – Optimization – Reverse Tunneling – IPv6 – DHCP- Ad hoc Networks

UNIT IV MOBILE TRANSPORT LAYER

Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP- Fast retransmit/ Fast Recovery- Transmission/Timeout Freezing – Selective Retransmission- Transaction Oriented TCP

UNIT V WAP

Architecture – Datagram Protocol- Transport Layer Security- Transaction Protocol- Session Protocol- ApplicationEnvironment-Wireless Telephony Application

TEXT BOOKS

1. J.Schiller, Mobile Communication , Addison Wesley, 2000.
2. William Stallings, Wireless Communication and Networks, Pearson Education, 2003.
3. William C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.
4. Singhal, WAP-Wireless Application Protocol, Pearson Education,2003.

SEM – VI

ROBOTICS AND AUTOMATION

UNIT I CLASSIFICATION OF ROBOTIC SYSTEMS

Basic structure of a robot - Classification of robots: Cartesian, Cylindrical, Spherical, Articulated, SCARA. Accuracy, resolution and repeatability of robots. Robot application in manufacturing: Material transfers - Machine loading and unloading - Processing operations - Assembly and inspection. **DRIVES AND CONTROL SYSTEMS:** Hydraulic and Pneumatic systems: cylinders, control valves, hydro motor. Types of mechanical power drive, rotary to linear motion conversion mechanisms. Robot end effectors. Servomotors – operation, stepper motors - control loops using current and voltage amplifier. Robot controllers - configuration of robot controller.

UNIT II SENSORS AND VISION SYSTEMS

Types of sensors, tactile sensors, proximity sensors and speed sensors – Encoder, resolvers. Vision systems: Image processing and analysis, Segmentation, Feature extraction, Object Recognition.

UNIT III ROBOT PROGRAMMING & AUTOMATION

Lead through programming - Textual programming, programming examples - Social and Economical Aspects of Robots - Typical layouts of robots in Industries. **AUTOMATION:** Advantages of automation, building blocks of automation. Automatic feeding lines, material-handling devices, ASRS, transfer lines, automatic inspection, intelligent automation.

UNIT IV PROGRAMMABLE LOGIC CONTROLLERS (PLC)

Basics of PLC, Architecture of PLC, Advantages, Types of PLC, Types of Programming - Simple process control program's using Relay Ladder Logic. Introduction to PLC networking. Introduction to HMI, DCS and SCADA systems.

UNIT V COMPUTER NUMERICAL CONTROL (CNC)

Block diagram of a CNC control system, Advantages, Power supply, CPU. CNC and PLC interfacing, Control loops. Feed back devices in CNC machine, analog and digital CNC systems. Introduction to FMS.

TEXT BOOK

1. Mikell P.Groover, "Automation Production systems and Computer Integrated Manufacturing", Prentice-Hall India, New Delhi, 1987. / Pearson Education, New Delhi .

REFERENCES

1. W. Bolton, "Mechatronics", Pearson Education Asia, 2002.
2. K.S. Fu, R.C. Gonzalez and C S G Lee, "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, New Delhi, 1987.
3. Mikell P. Groover, "Industrial Robotics - Technology, Programming and Applications", McGraw Hill, New Delhi, 1986.

SEM – VI

PROGRAMMABLE LOGIC CONTROL

UNIT I

Programmable Logic Introduction, programmable Logic structures Programmable Logic Arrays (PLAs), Programmable Array Logic (PALs), Programmable Gate Arrays (PGAs), Field Programmable Gate Arrays (FPGAs) Sequential network design with Programmable Logic Devices (PLDs) Design of sequential networks using ROMs and PLAs Traffic light controller using PAL.

UNIT II

Programmable Logic Controllers (PLCs) Introduction Parts of PLC Principles of operation PLC sizes PLC hardware components I/O section Analog I/O section Analog I/O modules, digital I/O modules CPU Processor memory module Programming devices Diagnostics of PLCs with Computers.

UNIT III

PLC programming Simple instructions Programming EXAMINE ON and EXAMINE OFF instructions Electromagnetic control relays Motor starters Manually operated switches Mechanically operated and Proximity switches Output control devices Latching relays PLC ladder diagram Converting simple relay ladder diagram in to PLC relay ladder diagram.

UNIT IV

Timer instructions ON DELAY timer and OFF DELAY timer counter instructions Up/Down counters Timer and Counter applications program control instructions Data manipulating instructions math instructions.

UNIT V

Applications of PLC Simple materials handling applications Automatic control of warehouse door Automatic lubricating oil supplier Conveyor belt motor control Automatic car washing machine Bottle label detection Process control application.

Text Books

1. Charles H. Roth, Jr “Fundamentals of Logic Design ", Fourth Edition, Jaico Publishing house, 1999,
2. Frank D. Petruzella " Programmable Logic Controllers ", McGraw- Hill book, company, 1989
3. Siemens “PLC Handbook ".

Reference

1. William I. Fletcher “An Engineering Approach to Digital Design ", Prentice, Hall of India Ltd., New Delhi, 1999.

SEM – VI

Elective II - C

AUTOMOTIVE ELECTRONICS

UNIT I

Introduction: Automotive component, operation, Electrical wiring terminals and switching, multiplexed wiring systems, Circuit diagrams and symbols. Charging Systems and Starting Systems: Charging systems principles, alternations and charging circuits, New developments, requirements of the starting system, Basic starting circuit.

UNIT II

Ignition systems: Ignition fundamental, Electronic ignition systems. Programmed ignition, distribution less ignition, direct ignition, spark plugs. Electronic Fuel Control: Basics of combustion, Engine fuelling and exhaust emissions, Electronic control of carburetion Petrol fuel injection, Diesel fuel injection.

UNIT III

Instrumentation Systems: Introduction to instrumentation systems, various sensors used for different parameters, sensing Driver instrumentation systems, vehicle condition monitoring trip computer, different types of visual display

UNIT IV

Electronic control of braking and traction: introduction and description control elements and control methodology, Electronic control of Automatic Transmission: Introduction and description Control of gear shift and torque converter lockup, Electric power steering, Electronic clutch.

UNIT V

Engine Management Systems: Combined ignition and fuel management systems, Exhaust emission control, Digital control techniques, complete vehicle control systems, Artificial intelligence and engine management, Automotive Microprocessor uses. Lighting and Security Systems: Vehicles lighting Circuits, Signaling Circuit, Central locking and electric windows security systems, Airbags and seat belt tensioners, Miscellaneous safety and comfort systems

TEXT BOOK

1. TOM DENTON, Automobile Electrical and Electronic Systems, Edward Arnold pb., 1995

REFERENCES

1.DON KNOWLES, Automotive Electronic and Computer controlled Ignition Systems, Don Knowles, Prentice Hall, Englewood Cliffs, New Jersey 1988.
2. WILLIAM, T.M., Automotive Mechanics, McGraw Hill Book Co.,
3. WILLIAM, T.M., Automotive Electronic Systems, Heiemann Ltd., London, 1978.
4. Ronald K Jurgen, Automotive Electronics Handbook, McGraw Hill, Inc, 1999.

SEM – VI Elective III - A

INDUSTRIAL MANAGEMENT

UNIT I

PRINCIPLES OF MANAGEMENT: Meaning, definition and significance of management, basic functions of management - planning, organizing, staffing, directing and controlling. Engineers and organizational environment - social, economic, technological and political. Social responsibility of Engineers.

MANAGEMENT CONCEPTS: MBO, Theory Z, Kaizen, Six Sigma, Quality Circles and TQM.

UNIT II

BUSINESS PROCESS REENGINEERING: Need for BPR, various phases of BPR, production and productivity - factors influencing productivity.

ORGANIZATIONAL BEHAVIOUR: Significance of OB, role of leadership, personality and motivation. Attitudes, values and perceptions at work.

UNIT III

INDUSTRIAL AND BUSINESS ORGANISATION: Growth of industries (Small scale, medium scale and large scale industries). Forms of business organizations. Resource management – Internal and external sources.

MATERIALS MANAGEMENT: Importance and scope of materials management, purchase procedure, inventory control and systems for inventory control – ROL, EOQ, MRP, ABC Analysis, VED, FSN and Value Analysis.

UNIT IV

MARKETING MANAGEMENT: Definition and approaches to marketing management - marketing environment. The marketing process. Marketing mix, advertising, sales promotion and consumer behavior.

HUMAN RESOURCE MANAGEMENT: Importance, objectives and functions, job analysis and recruitment, selection and placement, training and development - case discussion.

UNIT V

JOB EVALUATION: Meaning and methods of job evaluation. Performance appraisal - meaning and methods of performance appraisal.

WELFARE IN INDUSTRY: Working condition, service facilities, legal legislation - Factories Act, 1948 and Workmen's Compensation Act.

TEXT BOOKS

1. Harold Koontz, Heinz Weihrich and Ramachandra Aryasri, "Principles of Management", Tata McGraw Hill, New Delhi, 2004.
2. Mamoria C B, "Personnel Management", Sultan Chand and Sons, New Delhi, 2002.

REFERENCES

1. John W Newstrom and Keith Davis, "Organizational Behavior", Tata McGraw Hill, New Delhi, 2002.
2. Philip Kotler, "Marketing Management", Pearson Education Asia, New Delhi, 2003.
3. Khanna O P, "Industrial Engineering and Management", Dhanpat Rai Publications, New Delhi, 2003.

SEM – VI

Elective III - B

VIRTUAL INSTRUMENTATION

UNIT I INTRODUCTION

General functional description of a digital instrument - Block diagram of a Virtual Instrument - Physical quantities and Analog interfaces - Hardware and Software - User interfaces - Advantages of Virtual instruments over conventional instruments - Architecture of a Virtual instrument and its relation to the operating system.

UNIT II SOFTWARE OVERVIEW

LabVIEW - Graphical user interfaces - Controls and Indicators - 'G' programming - Labels and Text - Shape, Size and Color - Owned and free labels - Data type, Format, Precision and representation - Data types - Data flow programming - Editing - Debugging and Running a Virtual instrument - Graphical programming palettes and tools - Front panel objects - Functions and Libraries.

UNIT III PROGRAMMING STRUCTURE

FOR loops, WHILE loops, CASE structure, formula nodes, Sequence structures - Arrays and Clusters - Array operations - Bundle - Bundle/Unbundle by name, graphs and charts - String and file I/O - High level and Low level file I/O's - Attribute modes Local and Global variables. **OPERATING SYSTEM AND HARDWARE OVERVIEW:** PC architecture, current trends, Operating system requirements, Drivers – Interface Buses – PCI Bus – Interface cards – specification – Analog and Digital interfaces – Power, Speed and timing considerations.

UNIT IV HARDWARE ASPECTS

Installing hardware, Installing drivers - Configuring the hardware - Addressing the hardware in LabVIEW - Digital and Analog I/O function - Data Acquisition - Buffered I/O - Real time Data Acquisition.

UNIT V LABVIEW APPLICATIONS

IMAQ - Motion Control: General Applications - Feedback devices, Motor Drives - Instrument Connectivity - GPIB, Serial Communication - General, GPIB Hardware & Software specifications - PX1 / PC1: Controller and Chassis Configuration and Installation.

TEXT BOOKS

1. Garry M Johnson, "Labview Graphical Programming", Tata McGraw Hill, New Delhi, 2nd Edition, 1996.
2. Labview : Basics I & II Manual, National Instruments, 2005.

REFERENCES

1. Lisa K Wells, "Labview for Everyone", Prentice Hall of India, New Delhi, 1996.
2. Barry Paron, "Sensor, Transducers and Labview", Prentice Hall, New Delhi, 2000.

SEM – VI Elective III - C

BIOMEDICAL INSTRUMENTATION

Subject Description : This subject presents various bio-potentials and working principles of medical instruments.
Goals : To enable the students to learn about bio-potentials and medical instruments.
Objectives : On successful completion of the course the students should have : Understood the concept of bio-potential, Understood the concept of medical instruments and Develop the troubleshooting skills of medical instruments.

UNIT I BASIC PHYSIOLOGY

Cells and their structures - Transport of ions through cell membrane - Resting and excited state transmembrane potential - Action potential - Propagation of Bioelectric potential - Nervous system - Physiology of muscles - Heart and Blood circulation.

UNIT II ELECTRODES AND TRANSDUCERS

Basic electrode theory - Micro electrodes - Skin surface electrodes - Needle electrodes - Equivalent circuit - Electrode materials - Chemical electrodes - Reference electrodes - The pH electrode - Blood gas electrode - Active transducers and passive transducers - Strain gauges – Thermistor.

UNIT III SIGNAL CONDITIONERS & DIAGNOSTIC EQUIPMENTS

Instrumentation amplifiers - Current Amplifiers - Isolation Amplifier - Need for filters - low pass, high pass and band pass active filters - Notch filters - Heated stylus and ink pen recorders. **DIAGNOSTIC EQUIPMENTS:** Typical Electrocardiogram (ECG) - Electrocardiograph - Bipolar and unipolar leads - Einthoven triangle - Electrical activities of the brain - Electroencephalogram (EEG) - Muscle response - Electromyograph (EMG).

UNIT IV DIAGNOSTIC EQUIPMENTS & BIOTELEMETRY

X-ray imaging - Radio fluoroscopy - Image Intensifiers - Angiography - Endoscopy – Diathermy. **BIOTELEMETRY AND PATIENT SAFETY**: Need for biotelemetry - Elements of telemetry system - Radio telemetry system - Physiological signals used in telemetry - TDM and FDM - Implantable units.

UNIT V PHYSIOLOGICAL ASSIST DEVICES

Need for pacemakers - Pacemaker parameters and circuits - Different modes of operation - DC defibrillator - Artificial heart valves - Heart lung machines - Artificial lung machines - Artificial kidney machine - Nerve and Muscle stimulator. **COMPUTER APPLICATIONS**: Data acquisition systems - Analysis of ECG signals - Computerized Axial Tomography (CAT) Scanner - Ultrasonic scanner - Magnetic resonance imaging - Computer based patient monitoring system.

TEXT BOOKS

1. Joseph J. Carr and John M. Brown, "Introduction to Biomedical Equipment Technology", Pearson Education Asia, New Delhi, 4th Education, 2001.
2. Leslie Cromwell., Fred J. Webell., Erich A. Pfeffer., "Bio-medical Instrumentation and Measurements",PrenticeHall of India, New Delhi, 1990.

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1. Khandpur, "Handbook on Biomedical Instrumentation", Tata McGraw Hill Company, New Delhi, 1989
2. ohn G Webster, Ed., "Medical Instrumentation Application and Design", Third edition, John Wiley & Sons, Singapore, 1999
3. Arumugam. M, "Biomedical Instrumentation", Anuradha Agencies Publishers, Chennai, 1992