Shivaji University, Kolhapur

SYLLIBUS/ STRUCTURE (REVISED from June- 2009)

T.E. Electronics & Telecommunication Engineering (Semester – V)

Sr. No.	Name Of Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	Th.	TW	OE	POE	Total
1.	Microcontroller	4	-	2	6	100	25	-	50	175
2.	Signals& Systems	3	1	-	4	100	25			125
3.	Antennas and wave propagation	4	-	2	6	100	25		50	175
4.	Linear Integrated Circuits	3	-	2	5	100	25	-	50	175
5.	Optical communication & Networks	3	-	2	5	100	25	-	-	125
6.	Programming Techniques (MATLAB)	2	-	2	4	-	25	-	-	25
	Total	19	1	10	30	500	150		150	800

(Semester – VI)

Sr. No.	Name Of Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	Th.	TW	OE	POE	Total
1.	Digital Signal Processing	4	-	2	6	100	25	-	50	175
2.	Digital Communication	3	-	2	5	100	25		50	175
3.	VLSI Design	3	-	2	5	100	25		-	125
4.	Industrial & Power Electronics	4	-	2	6	100	25	-	-	125
5.	Industrial Management	3	-	-	3	100	25	-	-	125
6.	Electronic System Design	3	-	2	5		25	50	-	75
	Total	20		10	30	500	150	50	100	800

TE (Electronics & Telecommunication Engineering) Semester -V

1. Microcontrollers

Teaching Scheme :
Lectures: 4 Hrs/Week
Practical: 2Hrs/week

Examination Scheme:
Paper: 100 Marks
TW: 25 Marks
POE: 50 Marks

Section –I

Chapter 1: Introduction to MCS 51 (08)

Introduction to MCS 51 Family, Architecture, Functional Pin out diagram, Programming Model, Memory Organization, Addressing Modes, Instruction Set: Classification, Reset Circuit, Machine Cycle, Oscillator Circuit, Introduction to Assembly Language Programming.

Chapter 2: Hardware overview: (06)

Input/Output Ports, Counters & Timers, Serial Communication, Interrupt.

Note: Structure of Above, Related S.F.R, Instruction, Associated Programs.

Chapter 3: Interfacing & Application (06)

Interfacing: RAM, ROM, LCD, ADC, DAC, Key board. Minimum System Design & Application: Interfacing of Temperature Sensor (LM 35) 8051 Connection to RS 232.

Note: Assembly Language Programming to be done using Keil or Pinnacle Simulator

Section-II

Chapter 4: Introduction to PIC family (08)

CPU Architecture: Harvard architecture & pipelining, program memory considerations Register file structure, Instruction set, addressing modes: Immediate, Direct, Indirect CPU Registers: Status, W, FSR. INDF, PCLATH, PCL, Programming of above

Chapter 5: Hardware Overview: (06)

a. I/O ports &TRIS registers.

b. External Interrupts, Timers, CCP Module: Programmable period scalar, Event Counter, Sleep Mode, PWM mode

c. ADC: Features, ADC use.

[**Note:** Structure related to above, SFR's Simple programs]

Chapter 6: Special features: (06)

Configuration word, Oscillator configuration, Reset alternatives, low power operation, concept if I^2C & associated Hardware

[**Note**: Syllabus need to be covered with reference to PIC 16FX]

Note: Programming of PIC to be done using MPLAB or similar software.

Text Books:

1. The 8051 Microcontroller By Ayala 3rd Edition
2. The 8051 Microcontroller & Embedded Systems
   By Muhammad Ali Mazidi & Janice Gillispie Mazidi Pearson Edition L.P.E.
3. Design with PIC Microcontroller by John B. Peatman, Person Education.
4. Microchip PIC 16FX family microcontroller data sheet

Reference Books:

1. Architecture Programming, Interfacing & System design
   By Rajkamal Pearson edition.
2. The 8051 Microcontroller & Embedded Systems

By Muhammad Ali Mazidi & Janice Gillispie Mazidi Pearson Second Edition

3. Programming the PIC microcontroller with MBASIC By Jack R. Smith

Term Work:

Minimum 10 experiments should be conducted
5 experiments on MCS 51 family Microcontroller & 5 experiments on Microchip PIC Microcontroller should be performed. Minimum 50% experiments to be performed on microcontroller kits.

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2. Signals & Systems

Teaching Scheme :
Lecturers : 3 hr/week:
Tutorial : 1hr/week

Examination Scheme:
Theory : 100 Marks
Term Work: 25 Marks

Section-I

Unit-I: Introduction to Signals: (06)

Definition of signals, classification of signals: continuous time signals & discrete time signals, even & odd signals, periodic & non-periodic , deterministic & non-deterministic, energy & power,elementary signals: unit impulse, unit step, unit ramp, exponential & sinusoidal , basic operations on signals.

Unit-II. Linear time- invariant systems: (08)

The representation of signals in term of impulses, discrete time LTI systems, the convolution sum, continuous time-LTI systems, The convolution integral, properties of linear time invariant systems, Systems described by differential, difference equations, block diagram representation of LTI systems described by differential difference equations, Singularity functions.

Unit-III: Z transform: (08)

Introduction of Z-transform, ROC, properties of ROC, Unilateral Z-transform, properties of Z transform:linearity, time shifting, time reversal, time scaling, convolution, differentiation, multiplication, Parsevals theorem, initial value & final value theorem. Inverse Z-transform: PFE method, long division method, residue method, convolution method. Transfer function(Poles & Zeros), stability and causality. Representation of system via difference equation and solution of it.

Section-II

Unit-IV: Fourier Series for Continuous Time & Discrete Time: (08)

Continuous time & discrete time Fourier series: development Fourier of Series, derivation,properties of Fourier series: linearity, time shifting, frequency shifting, time reversal, time scaling,time differentiation & time integration, multiplication , convolution.

Unit-V: Continuous Time & Discrete Time Fourier Transform: (08)

Basic concept of Fourier transform of functions: rectangular, impulse, signum. Properties of Fourier transform: linearity, time shifting, frequency scaling, time scaling, multiplication, and convolution.

Unit-VI:. Sampling: (04)

Representation of continuous time signals by its samples, The sampling theorem, Reconstruction of signals from its samples using interpolation, The effect of under sampling, aliasing, Discrete time processing of continuous time signals, Sampling in the frequency domain.

Text Books:

1. Simon Haykin, Barry Van Veen- ‘Signals & system’ - IInd Edition Wiley publication
2. Michael J. Roberts.-‘Fundamentals of signals & systems’- Tata McGraw Hill, 2007.

Reference Book:

1. Alan V. Oppenheim, Alan S. Wilsky, S. Hamid Nawab -‘Signals & system’ -IInd Edition - Pearson Education.
2. H.A HSU, ‘Signals & system’ (Schaum’s out lines), Tata McGraw Hill
3. Smarajit Ghosh, ‘Signals & system’ Pearson Education.

4. Charles L. Philips, John M. Parr, Eve A. Rislein ‘Signals, system & transform’ , IIIrd Edition, Pearson Education.
5. Ramesh Babu ‘Signals & system’ , SciTech Publication.
6. Benoit Boulet ‘Fundamentals of signals & System’ Thomsan Learning

Term work:

Term work shall consist of minimum 12 assignments, out of which minimum 05 problems to be solved on graph paper.

TE (Electronics & Telecommunication Engineering)
Semester -V

3. Antenna And Wave Propogation

Teaching Scheme :
Lectures: 4 Hrs/Week
Practical: 2Hrs/week

Examination Scheme:
Paper: 100 Marks
TW: 25 Marks
POE: 50 Marks

Section I

UNIT 1: INTRODUCTION TO ANTENNA (06)

Basic antenna parameters, pattern, beam area, radiation inversity, beam efficiency, directivity , gain and resolution, antenna aperture, effective height the radio communication link, field from oscillating dipole, antenna field zone, shape-impendance consideration, linear elliptical polarization poynting vector for elliptically and circularly polarized waves, The polarization ellipse & the poincare sphere, loops, dipoles and slots, opened-out coaxial line antennas, opened-out-2conductor antennas, opened out waveguide antennas, flat-sheet reflector antennas, parabolic dish and dielectric lens antennas, end fire antennas, Broad bandwidth antennas, the patch antennas.

UNIT 2: ANTENNA ARRAYS: **(05)**

Array of two isotropic point sources, nonisotropic but similar point source and the principle of pattern multiplication, examples of pattern synthesis by pattern multiplication, nonisotropic and dissimilar point sources, linear array of n isotropic point source of equal amplitude and spacing, null directions for array of n isotropics point sources of equal amplitude and spacing effect .

UNIT 3: BROADBAND & FREQUENCY INDEPENDENT ANTENNA : **(05)**

Broadband basics, infinite and finite biconical antennas, directional biconicals, conicals, disk cones and bow ties, the frequency-independent concept: rumesay's principle, the Illinois story, the frequency independent planner log-spiral antenna, frequency independent conical-spiral antenna, the log periodic antenna, the composite yagi-uda corner-log-periodic array.

UNIT 4: ANTENNA FOR SPECIFIC APPLICATIONS (05)

Electrically small antenna, physically small antennas, antenna siting and the effect of typical(Imperfect) ground, ground plane antennas, sleeve antennas, turnstile antennas, superturnstile antennas, other omnidirectional antennas, circularly polarized antennas, the high gain omni, submerged antennas, surface wave and leaky wave antennas, antenna design consideration for satellite communication, receiving versus transmitting considerations, bandwidth considerations, architecturally acceptable antennas, ILS(Instrument Landing System), The LEO satellite link antenna.

Section II

UNIT 5: RADIATION (05)

Potential functions and the electromagnetic field, potential functions for sinusoidal oscillations, the alternating current element, power radiated by current element, application to short antennas, assumed current distribution, radiation from a quarter wave monopole and the half wave dipole, sine integral and cosine integral, electromagnetic field close to an antenna, solution of the potential equations, far field approximation.

UNIT 6: GROUND WAVE PROPOGATION (05)

Plane earth reflection, space wave and the surface wave, the surface wave, elevated dipole antennas above a plane earth, wave tilt of the surface wave, spherical earth propagation, tropospheric wave.

UNIT 7: IONOSPHERIC PROPOGATION (05)

The ionosphere, effective permittivity and conductivity of an ionized gas, reflection and refraction of the waves by the ionosphere, regular and irregular variations of ionosphere, attenuation factor, sky wave transmission calculations, effect of earth magnetic field. wave propagation in ionosphere, Faraday rotation and measurement of total electron content, other ionospheric phenomena.

UNIT 8: RADAR SYSTEM (04)

Fundamentals, RADAR performance factors, basic pulsed radar system, antennas and scanning, display methods, pulsed radar systems, moving target indication, radar beacons, CW Doppler radar, frequency modulated CW radar, phase array radars, plannar array radars.

Text Book:

1)Antenna for all Application- John D Kraus,third edition- TMH publication
2)Electronics Communication System- Keneddy Davis- 4th edition TMH publication
3) Electromagnetic Waves and Radiation Systems - Jordan and Balmain PHI publ.

Reference Books:

1) Microwave Devices and circuits – Samuel Liao (Pearson)
2) Networks, Lines and fields – John Rider (PHI)
3) Foundations of Antenna Theory and Techniques – Vincent F. Fusco (Pearson)
4) Antennas and Wave Propagation – G. S. N. Raju (Pearson)

Term Work:

Minimum 08 experiments should be conducted.

TE (Electronics & Telecommunication Engineering) Semester -V

4. Linear Integrated Circuits

Teaching Scheme :
Lectures: 3 hours/ Week
Practical: 2 hours/Week

Examination Scheme:
Theory:100marks
Termwork:25 Marks
POE : 50 Marks

Section-I

Unit1: Introduction to op-amp (08)

Introduction to op-amp: definition, symbol, block diagram, ideal characteristics of Op-amp, AC & DC analysis of dual input balanced output type differential amplifier. Comparative study of other configurations of differential amplifiers, Analysis of typical op-amp, equivalent circuit, op-amp parameters, equivalent circuit of op-amp, study of IC 741, CA3140

Unit 2: Op-amp configurations & frequency response: (04)

Open loop configuration, closed loop configurations, frequency Response, Stability considerations, Frequency Compensation, Slew Rate.

Unit 3: Applications of Op-amp (08)

Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtract or Circuit, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Log & Anti-log Amplifiers, Study of comparator, Schmitt Trigger, Window Detector, Clippers & Clampers, Peak Detectors, Sample & Hold Circuits.

Section-II

Unit 4: Active Filters (08)

Introduction of filters, Analysis & Design of following filters, First & Second order High Pass filter, First & Second order Low Pass filter, Band Pass filter (Narrowband & Wideband), Band Reject filter (Narrowband & Wideband), All Pass Filter, Sallen & Key Filter Structure (First & Second order), Chebyshev Filter.

Unit 5: Waveform Generators (08)

Analysis & Design of Square wave generator, Triangular wave generator, Sawtooth wave generator. Analysis & Design of RC phase shift oscillator, RC wein bridge oscillator, Colpitts oscillator, Hartley oscillator, Crystal oscillator, Multivibrator using op-amp.
IC 555 Timer, Block Diagram, Multivibrator using IC 555.

Unit 6: PLL (04)

Operating Principles, VCO-IC 566, PLL IC 565, PLL IC 565 applications, IC 4046

Text Books:

1. Op-amp & Linear Integrated Circuits by Ramakant Gaykwad. 4th ed. Pearson Publications.

Reference Books:

1. Microelectronic Circuits Analysis & Design by Rashid
2. Linear Integrated Circuits Analysis , Design & Applications by Nair
3. linear integrated circuits-GANESH BABU(SCITECH PUB)
4. Op-amp & LIC-K.LAL KISHOR

Term Work: Minimum 08 experiments should be conducted.

TE (Electronics & Telecommunication Engineering) Semester -V

5. Optical Communication & Networks

Teaching Scheme :
Lectures: 3 Hrs/Week
Practical: 2Hrs/week

Examination Scheme:
Paper: 100 Marks
TW: 25 Marks

Section - I

Unit – I: **Overview of Optical Fiber Communication** **(3)**
Basic Network Information Rates, The evolution of Optic System, Elements of Optical Fiber Transmission Link, Simulation and Modeling tools.

Unit – II: **Optical Fibers: Structures, Waveguiding and Fabrication** **(6)**
The nature of Light, Basic Optical Laws and Definations, Optical Fiber Modes and Configurations, Mode theory for waveguides, Single Mode Fibers, Graded Index Fiber Structures, Fiber Materials, Fiber Fabrication, Mechanical Properties of Fibers, Fiber Optic cables.

Unit – III: **Signal Degradation in Optical Fibers** **(4)**
Attenuation, Signal Distortion in Optical Waveguides, Pulse Broadenning in Graded-Index Waveguides, Mode Coupling, Design Optimization of Single Mode Fibers.

Unit – IV: **Optical Sources** **(5)**
Topics from Semiconductor Physics, Light-Emitting Diodes (LEDs), Laser Diodes, Light Source Linearity, Modal, Partition and Reflection Noise, Reliability Considerations.

Section - II

Unit – V: **Photodetectors** **(4)**
Physical Principal of Photodiodes, Photodetector Noise, Detectors Response Time, Avalanche Multiplication Noise, Structure for InGaAs APDs, Temperature effect of Avalanche Gain, Comparision of Photodetectors

Unit – VI: **Optical Receiver Operation** **(4)**
Fundamental Receiver Operation, Digital Receiver Performance, Detailed Performance Calculations, Preamplifier Types, Analog Receivers.

Unit – VII: **WDM Concepts and Components** **(4)**
Operational Principles of WDM, Passive Components, Tunable Sources, Tunable Filters

Unit – VIII: **Optical Networks** **(6)**
Basic Networks, SONET/SDH, Broadcast-and –Select WDM Networks, Wavelength Routed Networks, Nonlinear Effects on Network Performance, Performance of WDM + EDFA Systems, Solitons, optical CDMA, Ultrahigh capacity Networks.

Note: Termwork shall consist of minimum 8 experiments based on above topics.

Text Books : 1) Optical Fiber Communication – Gerd Keiser. Third Edition (TMH)

Ref. Books: 1) Optical Communication – Senior
2) Optical Fiber Communication – Agarwal (Wiley)
3) Optical Fiber Communication - Grover
4) Optical Networks - Ramaswamy (ELSEVIER INDIA)

TE (Electronics & Telecommunication Engineering) Semester -V

6. Programming Techniques (MATLAB)

Teaching Scheme		Examination Scheme	
Lectures	: 2 hours/week		
Practical	: 2 hour/week	Term work	: 25 marks

UNIT- I **(05)**

Matlab basics variables, arrays , Multidimensional subarrays , Special values, displaying output data, data files, scalar and array operations, Hierarchy of operations built-in matlab functions, introduction to plotting, Debugging matlab programs.

UNIT- II **(04)**

Branching, Statements and logical data type, Branches, write & for loop logical arrays and vectorization

UNIT- III **(05)**

User-defined& i/o functions, introduction to matlab functions, Variable passing in matlab, 3 optional arguments, Sharing data using global memory, Preserving data between calls to a function, function functions, subfunctions, Private functions, Nested functions . complex data , string functions , textread function, load and save commands, an introduction to matlab file processing, file opening and closing , binary i/o functions, formatted i/o functions, comparing formatted and binary i/o function, file positioning and status functions

UNIT- IV **(03)**

Handle graphics & gui , the matlab graphics system, Object handles, examining and changing object properties, Using set to list possible property values, user-defined data, finding objects, selecting objects with the mouse, creating and displaying a graphical user interface, object properties, graphical user interface components, dialog boxes , menus..

UNIT- V **(03)**

Simulink basics introduction, simulink, modeling, solvers, simulating model using variables from matlab, data import/export , state space modeling & simulation, creation of subsystems,& Mass subsystem.

Text Books-

1) MATLAB programming for engineers- IIIrd edition- Stephen J. Chapman-Cenage Learning
2) MATLAB & its application in engineering Rajkumar Bansal, Ashokkumar Good, Manojkumar Sharma- Person Education
3) MATLAB & Introduction with application Amos Gilat-Wiley

Reference Books-

1) Master in MATLAB-7 Duane Hanselman, Bruce Littlefiele- Person Education
2) MATLAB programming manual by Mathworks Inc
3) MATLAB & simulink Introduction to applications.- Partha S.Mallick-Scitech publications.

List of MATLAB programs

1) Program using branching statement
2) Program using looping statement
3) Program for matrix manipulation
4) Program using user defined function
5) Program for handling complex data
6) Program for File handling & string manipulation (Any two)
7) Program for creating & Displaying GUI (Any two)
8) Mini project based on any Engineering applications.(It should be completed within Two or Three terms

TE (Electronics & Telecommunication Engineering) Semester -VI

1. Digital Signal Processing

Teaching Scheme		Examination Scheme	
Lectures	: 4 hours/week	Theory	:100 marks
Practical	: 2 hour/week	Term work	:25 marks
		POE	: 50 Marks

Section I

UNIT-I:The Discrete Fourier Transform and FFT **(08)**

Introduction to DSP system, DFT, Relation between DFT and Z Transform. Properties of DFT, Circular convolution, DFT. & IDFT

FFT algorithms (DIT FFT & DIF FFT) implementation aspects, fast convolution signal, segmentation (overlap save & overlap-add algorithm) correlation circular correlation, IFFT,DFT properties of circular correlation.

UNIT-II : FIR Filter Design **(06)**

Characteristics of FIR filter, properties of FIR filter, digital N/W for FIR filter, frequency sampling ,Fourier series & windowing method, filter design using Kaiser window, Realization of FIR direct form structures cascade, parallel

UNIT-III : IIR Filter Design. **(06)**

Impulse invariant Tech. Bilinear transformation, Placement of poles & zeros, frequency band transformation, analog filter approximation (Butterworth) quantization and rounding problems, Effect of finite word length on stability and frequency response., Realization of IIR direct form structures cascade, parallel

Section II

UNIT-IV: Adaptive filters **(04)**

Introduction to adaptive signal processing, Adaptive direct form FIR filters- LMS algorithm

UNIT-V: DCT & wavelet Transform **(10)**

Forward DCT, Inverse DCT, DCT as a orthogonal transformation.

Introduction to wavelets, time frequency representations, continues time wavelet, Continues wavelet transform (CWT), Inverse CWT, Properties of CWT, Discrete wavelet transform, STFT, Comparison of Fourier transform & wavelet transform ,Application of wavelets transforms .

UNIT-VI : Application of Digital Signal Processing **(06)**

Voice processing Analysis of speech signal, Speech analysis, Synthesis, System compression and coding channel vocoder, Sub band and coding

Image processing, Biomedical signal processing - ECG

Text Books-

1. Digital Signal Processing Principles, Algorithms and Application
By John G Prokis, Manolakis, Pearson Education publication
2) Digital Signal Processing Salivahanam, A Vallavaraj, C. Guanapriya, TMH

Ref. Books
1) Digital Signal Processing P. Ramesh Babu, Scitech publication
2) Digital Signal Processing Sanjeet Mitra, MGH
3) Digital Signal Processing- E.C. Ifeachor, Barrie W. Jervis
4) Digital Signal Processing- Ashok Ambardar, (Cengage learning)
5) Digital Signal Processing- Dr. S.D.Apte, Willey India

List of Experiments.

Minimum 10 experiments

Experiments may be performs using Matlab/DSP simulator

1. Generation of DT signals
2. Convolution and correlation of signals
3. Computation of DFT & IDFT using standard formula
4. Computation of DFT using FFT algorithms
5. Computation of circular convolution
6. Design of FIR LPF,HPF,BPF,BRF filter using Fourier series method
7. Design of FIR LPF,HPF,BPF,BRF filter using frequency sampling method
8. Design of FIR filter using Kaiser window
9. Design of IIR LPF,HPF,BPF,BRF filter using impulse invariance method
10. Design of FIR LPF,HPF,BPF,BRF filter using bilinear transformation method
11. Design IIR filter using placement of poles & zeros.
12. Computation of DCT
13. Computation of wavelet transform

TE (Electronics & Telecommunication Engineering) Semester -VI

2. Digital Communication

Teaching Scheme :
Lectures – 3/week
Practical – 2/week

Examination Scheme:
Theory – 100
POE – 50
TW - 25

Section - I

Unit – I: Random Signal Theory: (06)

Probability, Joint & conditional Probability, Probability mass function, statistical averages, continuous random variables- PDF & Statistical averages, Random Processes, Time average, Ergodicity, Power Spectral density of Stationary random processes.

Unit – II: Information Theory: (06)

Entropy, Information Rate, Shannon's encoding theorem, communication channels- Discrete & Continuous, Rate of information transmission over a discrete channel, Shannon–Hartly theorem, implication of Shannon's Theorem, Huffman's coding & Shannon-Fanno Coding techniques.

Unit – III: Source Coding: (06)

Quantization – Uniform, Non- Uniform, PCM, DPCM, ADPCM, Bandwidth Requirement, SNR, DM, ADM, CVSD.

Section – II

Unit – IV: Digital Modulation Techniques and data formats: (06)

Unipolar, Bipolar ,RZ , NRZ, Transmission modes
ASK, FSK, PSK - coherent, Non- coherent, BPSK, DPSK, QAM. Comparision.

Unit – V: Baseband Transmission: (05)

Baseband pulse Shaping, Duobinary, M-ary Signalling, Pulse Shaping by digital methods, eye diagram, ISI, scrambler, Unscrambler.

Optimum Receivers- Matched Filters, Correlation receivers, equalizers, Symbols & frame synchronization.

Unit –VI: Channel Coding (07)

Types of Erros & codes, linear block codes, error detection & correction, Hamming codes, Look-up table decoding., Binary Cyclic codes, Encoding using (n-k) bit shift registers, Syndrome calculation. BCH, Burst codes, Convolution codes, Encoders, Decoders, Code tree.

Books:

1) K. Sam Shanmugam – Digital & Analog Communication (John Wiley)
2) Simon Haykin – Digital Communication (Wiley)

EXPERIMENT LIST : (Minimum 10 Experiments)

1. Study of PCM –TDM.
2. Study of Compander.
3. Study of DPCM.
4. Study of ADPCM.
5. Study of DM .

6. Study of ADM.
7. Study of CVSD.
8. Study of ASK, FSK & PSK.
9. Study of QPSK.
10. Measurement of bit error rate.
11. Study of Hamming Code.
12. Study of generation of cyclic codes.
13. Study of Eye Diagram using oscilloscope
14. Study of any digital modulation scheme using Matlab communication tool
15. Matlab practicals on random signals (Study of Continuous Random Variable- probability, variance)

TE (Electronics & Telecommunication Engineering) Semester -VI

3. VLSI Design

Teaching Scheme :
Lecture:- 3 hrs/ week .
Practical :- 2hrs/ week .

Examination Scheme:
Theory- 100 marks
TW - 25 marks

Section- I

Unit 1 :- **Introduction to VHDL** **(04)**

Level of abstraction. Need of HDL, VLSI Design flow, Features and capabilities of VHDL, Elements of VHDL (Entity Architecture , Library, Package, Configuration) , Identifiers, literals, data types,operators.

Unit 2 :- **Combinational logic design using VHDL** **(07)**

Adder, subtractor, decoder, encoder, tristate buffer, multiplexer, parity generator, Parity checker, comparator, using Concurrent & Sequential statements, wait statement, VHDL design of encoder & decoder - for Huffman code, Shannon-fano code, Hamming code, BCH code, Design for ALU.

Unit 3:- **FSM Design Using VHDL** **(07)**

Impediments to synchronous design, clock jitter, skew, gating the clock, asynchronous inputs, meta-stability and synchronizer failure, VHDL implementation of counter, sequence detector, Design of content addressable memory CAB.

Section- II

Unit 4:- **VHDL Features** **(04)**

Attributes (type, signal, signal value, array, block), wait statement, Simulators,
Event based simulator, Cycle based simulator, Flow chart for Event scheduling and delays, inertial delay, Transport delay.

Unit 5:- **Processor Design** **(07)**

Design of General purpose processors- having instructions like LOAD, STORE, ADD, SUB, IN, JZ, JPOS, HALT. Design of Data path, design of control unit, test bench using text IO.

Unit 6:- **PLD Architectures and Testing** **(07)**

Xillnx 9500 series CPLD (XC 9572), Spartan II FPGA (XCS 2 s30), Testing : Fault models, path sensitizing random test design for testability, Built-in self test and Boundary scan.

Referances Books:-

1. Fundamentals of Digital Logic with VHDL design , Tata – Mcgraw Hill- Stephen Brown and Zvonko Vranesic
2. Principals of Digital System Design using VHDL, Cengage Learning -Roth John.
3. Digital Systems Design with VHDL and Synthesis An Integrated Approach, Wiley-India Editio - K.C. Chang.
4. Xilinx data manual " The Programmable Logic data Book"
5. VHDL a Design Oriented approach , Mcgraw-hill Compnies - S.S.Limaye.
6. Digital logic and microprocessor design with VHDL - Thomson Publication- Enoch O. Hwang.

Practicals :

LAB Setup :

Model Tech. Modelsim simulator and Xillinx Web pack, Xilinx ISE Simulator VLSI universal trainer for FPGA and CPLD of Xilinx

Experiments :

Minimum 08 experiments based on following design . Each design must be tested through VHDL test bench.

Simulation, Synthesis, and Implementations using FPGA and CPLD Trainers:

1. Combinational logic : comparator, adder, barrel shifter, encoder & decoder for communication codes.
2. Sequential logic : Counters withsync./async. Reset signal, universal shift registers,sequence detector, arbiter, LFSR.
3. Singal port RAM Dual port RAM, Singal port RAM , FIFO
4. General purpose processor, ALU.

TE (Electronics & Telecommunication Engineering) Semester -VI

4. Subject : Industrial & Power Electronics.

Teaching Scheme :
Lectures: 4 Hrs/week
Practicals: 2 Hrs/week

Examination Scheme:
Theory: 100 marks.
TW : 25 marks

Section-I

1. Semiconductor Power Devices : - **(06)**
Characteristics of power diodes, power transistors, power MOSFET, IGBT, SCRs, TRIACs, DIAC and GTO. Rating of power devices, series and parallel connections of SCRs, SCR protections- dv/dt, di/dt, over voltage and over current protection.

2. Firing circuits : - **(04)**
Turn ON Methods- study of single phase firing circuits using UJT, PUT, Diac, Triac, op amp. **Turn OFF Methods** - Forced commutation circuits - Parallel Capacitance, resonant turn off, external pulse commutation, auxillary thyristors/IGBT/ MOSEFT and load commutation. (Class A to F)

3. Applications of Thyristors : - **(03)**
Static circuit breakers, over voltage protectors, zero voltage switch, integral cycle triggering, time delay method, soft start method.

4. Controlled Rectifier Circuits : - **(07)**
a) Single Phase : - Half wave, full wave, half controlled and full controlled converters with R & RL Load, effect of Freewheeling Diode. Calculations of performance parameters expected.
b) Three Phase: - Half wave, full wave, fully controlled converters with Resistive Load only.

Section-II

5. Inverters using MOSFET/IGBT's: - **(04)**
Single phase bridge inverters, principle and operation of three phase inverters, Voltage control techniques, harmonic elimination methods -PWM Technique IGBT MOSFET based (Analytical treatment not expected)

6. AC and DC Drives : - **(04)**
a) DC Motor control- using single phase bridge converters, dual converters and choppers
b) 3-phase AC motor control- speed control of Induction Motor using Inverter, Study of modern 3 – φ drives.

7. Programmable Logic controllers (PLC's) - Ladder diagram, **(06)**
Fundamentals, symbol, PLC configurations, Block diagram, Fundamentals, PLC programming – physical components vs. program components, Discrete position sensors, Encoders, transducers and advanced sensors, switches.

8. Miscellaneous applications : - **(06)**
Non-drive applications such as induction heating and Dielectric heating, Switched mode power supply (SMPS), Uninterrupted power supply (UPS), Industrial Ultrasonic- generators, detectors and applications. Introduction to SCADA.

Text Books: -

1. P.C.Sen : Power electronics ; TMH
2. Chute and Chute : Electronics in industry ; MGH
3. General Electric : SCR manual, PH
4. Ned Mohan : Power electronics; John Willey Pub.
5. John R.Hackworth,
   Federick D. Hackworth : Programmable Logic Controllers ; Pearson Education

Experiment List: -

Minimum 8 experiments out of following-
1 - 2 experiments on Topic 1 & 2
2 - 3 experiments on Topic 4
2 - 3 experiments on Topic 5 & 6
3 - 4 experiments on Topic 3, 7 & 8

TE (Electronics & Telecommunication Engineering) Semester -VI

5. Industrial Management & Operation Research

Teaching Scheme :
Lectures :3 hours/week

Examination Scheme:
Theory :100 marks
Term work :25 marks

Section - I

UNIT-I Function of management **(06)**

Planning Nature, Types, Improvement, Forecasting methods and importance, Organization Importance and Principles, Staffing Procedure of staffing, performance, appraisal methods. Directing Leadership styles, Motivation Theeries-Maslows, Herzbergs, Mc Greqors. Communication Process types, Barriers and Remedies. Controlling- process.

UNIT-II Marketing **(06)**

Marketing and selling concept, marketing mix, Advertising- needs, types, advantages and limitations. Material Management - Purchase and its importance, policies and procedure, Five Rs of purchasing. Inventory Control - Inventory costs, EOG analysis, ABC analysis.

UNIT-III Costing **(06)**

Elements of cost, cost estimation procedure, Entrepreneurship- importance, Qualities, function of entrepreneur, small scale industries procedure of starting SSI unit, Difference Schemes for SSI. Forms of Business Organization Single, partnership, Joint stock, co-operative and state and central Govt. Social responsibilities and business ethics- introduction.

Section II

UNIT IV (**06)**

-Operations Research Definition, methodology, Scope and limitations.
-Linear programming Concept, Formulation of LPP, Graphical method, Simplex Method.

UNIT- V **(06)**

Assignment Problems Introduction Balanced, Unbalanced, Prohibitive type of assignments, Hungarian methods

Transportation Problems For finding basic feasible solution by Northwest corner method, Least cost method and Vogets Approximation method.

UNIT- VI **(06)**

-project Management Programmed Evaluation and review technique, CPERTI, critical path method (CPM), Network Analysis, Identifying critical path, Probability of completing the project within the given time.

Reference Books:-

Industrial management

1) Management for Businesses and Industry C.S. George
2) Industrial Organization Bethel Atwater, Smithy, Stackman and Riggs
3) Essential of Management Koontz , Odonell
4) Management Stoner
5) Industrial Organization and management O.P. Khanna.
6) Industrial and Business management Telsan.
7) Principles of management- Tripathy and Reddy
8) Industrial management Tata McGraw Hill

Operation Research

1) Qualitative Techniques Vol. I & II, L.C.Jhamb sharma and Banga.
2) Operation Research W.L. Winston, Cengage Learning
3) Problems in OR Hira and Gupta
4) Operation Research H.A. Taha and A.M. Nafarajuan, Pearson Education
5) Operation Research A. Ravindra and D.T. Phillipos , Wiley , India
6) Introduction to Operation Research- Gillet Tata Mc graw Hill
7) Quantitative Analysis N.d. Vara Tata Mcgraw Hill
8) PERT and CPM (principles and Application)- L.S. Srinath
9) Fundamentals of OR Ac Koff Sasieni.

TERM WORK:-

1) Numerical on EOQ, ABC analysis.
2) Numerical on Unit no. 4
3) Numerical on Unit no. 5
4) Numerical on Unit no. 6
5) Case studies & Project proposal for SSI will be based upon following guidelines

Students are supposed to conduct survey of any small scale industry, submit report and give presentation on the same.

a) type of industry
b) Location, area, vision, mission & quality policies of industry.
c) Products.
d) Production process, detailed flow diagram.
e) Organization structure.
f) Innovative systems in industry.
g) Fulfillment of community needs.
h) Pollution control techniques, care taken for control.
i) Technical Requirement- Man power, Consultancy, Expertise available in industry, View of industry for enhancing industry institute interaction.

[**NOTE**: Numerical of above assignment must be solved using Computer.]

TE (Electronics & Telecommunication Engineering) Semester -VI

6. Electronic System Design

Teaching Scheme :
Lectures: 3 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:
Term Work: 25 Marks
OE : 50 Marks

1 DIGITAL VOLTMETER: (3)

Design of 4-digit numeric display circuit, Design of 3 ½ digit DVM, Study of IC 7107/7106.

2 PHASE LOCKED LOOP: (3)

Design of digital phase locked loops (cd 4046 & 565), It's use in frequency synthesizer, frequency & phase demodulation, Amplitude modulation, Dual Tone Multi Frequency Encoder (DTMF).

3 AUDIO & VIDEO AMPLIFIERS: (6)

Audio amplifier: audio op-amp applications mike pre-amplifier with tone control, study of LM 386 Video amplifier: Theory, voltage gain, cover code o/p voltage, wiring precautions, oscilloscope counter pre-amplifier, NE 592, filter applications.

4 TIMERS: (6)

Fundamentals of IC timers, CMOS timer & 2240 Binary Programmable Timer/counter, use of timers for event or interval timing, pulse generation & shaping, design of frequency counter using IC 74C926 for the time & event Counting.

5) Sensor Signal Conditioning : (10)

for sensors to get output in standard range

1) Temperature – RTD, Thermocouple, Semiconductor LM 35, AD549 and 1N4148
2) Strain gauge type transducers of 350 ohm/120 ohm bridge configuration
3) Variable capacitor transducer signal conditioning using Voltage to Time and Voltage to Frequency conversion.
4) V to I and I to V converters for std input and output Standard input output ranges – 0 to 2V (DVM), 0 to 5 V(Micro controller), 4 to 20 mA (Industrial)
5) Optical encoders

process controllers using above transducers ON/OFF proportional PID controller
Algorithm implementation only for any 8-bit Micro controller based process controllers.

6. SWITCHED MODE POWER SUPPLY: (4)

Introduction to SMPS, IC LM3524, Design of SMPS using LM 3521,Step up, Step down , Invert mode.

7. Micro Controller Based Design: (4)

Design of process controllers PID
Standard bus interface design.

Text Books.:-

1. Industrial Control Electronics :- Mickel Jacob.Prentice Hall (for ch,5) (Applications and Design)
2. Intersil Data Manual –(for Ch 1 & 4)
3. Electronic System Design – B.S.Sonde (Ch 1)
4. Operation Amplifier & LIC – Ramakant Gaikwad ,Pearson (ch 2)
5. Linear Data Manual – National (Ch 6),

Ref. Books.

1. Electronics Design – Goyal Khetan, Khanna Publications

Term work :

Term work should consist of minimum 6 designs and one group of three students will do the mini project on any one of the following list.

1. Design of 3 ½ digit DVM using TTL Ics.
2. Study of 7107/7106.
3. Design of frequency synthesizer using 565 PLL.
4. Design of frequency synthesizer using CD 4046 PLL.
5. Frequency measurement using 74C926
6. Interval measurement using 74c926.
7. Study of proportional controller.
8. Study of microcontroller based controller.
9. Study of LM3524 SMPS.
10. Study of audio & video amplifiers.
11. Study of PID Controller
12. Study & I to V & V to I converters.

Design experiments should be conducted as

1) Design of Hardware
2) Simulation of the Circuits.

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T.E (Electronics and Telecommunication Engineering)
Semester - V
Replace Paper for Repeater Students only.

ELECTONIC COMMUNICATION ENGINEERING

Lectures 4 Hrs /Week Theory 100 Marks
Practical 2 Hrs/week TW 25 Marks
POE 50 Marks

Section-1

1) Frequency Modulation: (6)
Overview of Frequency Modulation, Frequency spectrum of FM, Frequency deviation, modulation index, FM wave equation, Bandwidth, power, phase modulation, equivalence between phase and frequency modulation, noise triangle, pre-emphasis, de-emphasis, comparison of noise in AM and FM.

2) FM modulated transmitters and Receivers: (7)
Carrier oscillators, frequency changers, reactance modulators, Modulation of stereo signal, power amplifiers. FM receivers: FM detectors, RF amplifiers, noise in RF amplifiers, IF amplifiers, mixers, FM stereo receivers, FM receiver alignments.

3) Pulse modulation: (6)
Sampling theorem, types of sample, pulse amplitude modulation, pulse code modulation, pulse position modulation, Introduction to Synchronous and Asynchronous TDM .

4) Facsimile transmission (3)
Facsimile analog and digital transmission and reception, MODEM, Document scanning and printing.

Section –II

5) Data formats: (6)
Unipolar, Bipolar, RZ, NRZ, Transmission modes, simplex, Half duplex, full duplex, Asynchronous transmission. Amplitude shift keying, Frequency shift keying, Phase shift keying, Differential phase shift keying.

6) Radar: (7)
Basic principals, Rader performance, factors, pulsed system, MIT, Radar beacons, CW radar, Doppler radar, FM/CW radar, phased array radar, planar array radar.

7) Spread spectrum modulation: (8)
Introduction, direct sequence spread spectrum, use of spread spectrum with code division multiple access (CDMA).

Text Books:

1) Communication System, Analog and Digital
R.P. Singh and S.D. Sapre (THM)
2) Electronic Telecommunication System (4th Edition)
George Kennedy and Bernard Devise (MGH)

Reference Books:

1. Introduction to Analog and Digital Communication
Simon Haykin
2. Principle of Digital Communication
Das, Mullik, Chattergy
3. Digital Communication
Sirnon Haykin
4. Principles of communication
Taub & Schilling (MGH)
5. Digital Communication
Prokias (MGH)

Term work should consist of minimum 8 experiments based on above syllabus.

List of Practicals

1) Amplitude Modulation
2) Frequency Modulation
3) Pulse Amplitude Modulation
4) Pulse width Modulation
5) Pulse position Modulation
6) Pulse Amplitude Modulation - TDM
7) PCM-TDM
8) FSK (freq. Shift keying)
9) PSK (Phase Shift keying)
10) Study of data format

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Equivalences of T.E. E&TC for repeater students

Semester-V

E&TC (old)	E&TC (new)
Transmission Lines & Antennas	**Antennas & Wave Propagation (TE-I)**
Signals & Systems	**Signals & Systems (TE-I)**
Electronic Communication Engineering.	**Electronic Communication System (Replace paper for repeater students only)**
Industrial & Information Management	**Industrial Management (TE-II)**
Microprocessor & Peripherals	**Microprocessor & Peripherals (SE-II)**
Programming Techniques-II	**Programming Techniques (MATLAB) (TE-I)**

Semester-VI

E&TC (old)	E&TC (new)
Digital Signal Processing	**Digital Signal Processing(TE-II)**
Microwave Engineering	**Digital Communication(TE-II)**
Electronic System Design	**VLSI Design (TE-II)**
Optical Communication	**Optical Communication & Networks(TE-I)**
Microcontrollers	**Microcontrollers (TE-I)**
Hardware Mini Project	**Electronic System Design (Mini Project) (TE-II)**