Shivaji University, Kolhapur.

Syllabus / Structure

[Revised from June-2009]

(T.E. Electronics Engineering)

Semester V and VI

SEMESTER – V

Sr. No	Name of the Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Microprocessor Peripherals & Interfacing	4	-	2	6	100	25	50	-	175
2	Analog Integrated Circuits & Applications	4	-	2	6	100	25	50	-	175
3	Digital System Design	4	-	2	6	100	25	-	50	175
4	Electromagnetic Engineering	3	1	-	4	100	25	-	-	125
5	Control System Engineering	3		2	5	100	25	-	-	125
6	MATLAB Programming	2	-	2	4	-	25	-	-	25
	Total	20	1	10	31	500	150	100	50	800

SEMISTER – VI

Sr. No	Name of the Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Microcontrollers	4	-	2	6	100	25	50	-	175
2	Digital Communication	4	-	2	5	100	25	-	-	125
3	Power Electronics	4	-	2	6	100	25	50	-	175
4	Digital Signal Processing	4	-	2	6	100	25	-	-	125
5	Industrial Management & Operation Research	3	1	-	4	100	25	-	-	125
6	Mini Project	-	-	2	2	-	25	-	50	75
	Total	19	1	10	30	500	150	100	50	800

A) Term Work Assessment Scheme

The term work of concerned subjects shall be assessed on the basis of Tutorials (if applicable), assignments, class tests and practical performance of the student.

B) Guidelines for Nature of Question Paper for T.E (Electronics) Part-I & II.

1. There shall be total six questions in each paper, all being compulsory with internal options.
2. Each question paper shall consists of two sections(Section I & Section II).
3. Duration of each paper shall be of Three Hours Carrying of Maximum 100 Marks.

C) Industrial Visits in T.E (Electronics) Part-II are Compulsory.

T.E. (Electronics Engineering) Semester -V

Microprocessor Peripherals and Interfacing

Teaching Scheme		**Examination Scheme**	
Theory	: 4 Hours/Week	Theory	: 100 Marks
Practical	: 2 Hours/Week	Term work	: 25 Marks
		POE	: 50 Marks

SECTION – I

Unit – I: Memory and decoding logic: (6 Hrs)
Review of flip flop, 74LS373 latch, concept of tri-state buffer, 74LS244, 74LS 245, 74LS138, Concept of memory, Types of memory, Memory organization, Memory expansion with appropriate decoding logic.

Unit – II: Fundamentals of Microprocessor: (12 Hrs)
8085 architecture, programming model: Addressing modes, Instruction set, Assembly language programming, pin functions, Timing diagram and instruction cycles, State transition diagram, Single machine cycle execution, stack and subroutines, Interrupt structure and classification.

Unit – III: I/O Interfacing Techniques: (6 Hrs)
Concept of I/O port, I/O mapped I/O, Memory mapped I/O Polling and interrupt driven I/O, 8255 PPI: mode 0, Mode 1, Mode 2.

SECTION – II

Unit – IV: Parallel I/O Interfacing using 8255: . (8 Hrs)
Keyboard and display interface (Static and Dynamic), Multiplexed thumbwheel switch interfacing, steeper motor Interfacing, Centronic type printer interfacing, ADC (0809) & DAC (0808) interfacing.

Unit – V: Study of 8279 and 8253: (8 Hrs)
Basic block Diagram, Various operating modes, interfacing with 8085

Unit – VI: Study of 8259 and 8251: (8 Hrs)
Basic block Diagram, Various operating modes, Interfacing with 8085

Text Books:-

1. Douglas V.Hall, "Microprocessors and Digital Systems", 2nd Edition , Tata Mc-Graw Hill.
2. Ramesh Gaonkar, "Microprocessor Architecture Programming and Application with 8085", 5th Edition, Penram International Publishing India.
3. K. Udaya Kumar, B.S. Umashankar, "The 8085 Microprocessor Architecture, Programming and Interfacing", Pearson

Reference:-

1. Intel data sheet

2. S. P. Chowdhary, Sunetra Chowdhary, "Microprocessor and Peripherals", Scitech Pub.

3. Keneeth Short, "Microprocessor Logic"

LIST OF EXPERIMENTS

Minimum 12 Experiments to be conducted
Note: Use of Assembler directives & cross compiler is essential

Software Experiments:- Minimum 4 Experiments to be conducted.

1. **Experiment Based on Arrays:- (Minimum one)**
   Exchange, Addition, Finding Minimum / Maximum, Ascending / Descending, Reverse, Average, etc.

2. **Experiment Based on Arithmetic and Logical Operation:- (Minimum one)**
   Multidigit Addition, Multiplication / Division, Finding Even / Odd Numbers, Factorial, Fibonacci Series.

3. **Experiment Based on Code Conversion:- (Minimum one)**
   Binary to BCD, BCD to Binary,
   Binary to Gray, Gray to Binary, etc.

4. **Experiment Based on above with use of subroutines from monitor Program:- (Minimum one)**

   a) Simulation of up / down counter changing mode with key press.
   b) Finding and displaying the factorial for key Entry from keyboard.
   c) Addition of two numbers entered from keyboard & display the result.
   d) Generation of different frequency square wave on SOD pin using key stroke.
   e) Study of interrupts.

Hardware Experiments:- Minimum 8 Experiments to be conducted.

8255 Based Experiments: (Minimum Three)

1. Multiplexed Display interface using 8255.
2. Multiplexed Thumbwheel Switch interface using 8255.
3. Simulation of Boolean Expression on 8255 ports.
4. Simulation of multiplexer / De-multiplexer.
5. Simulation of presetable up-down counter on 8255 port only.
6. Stepper motor interface.
7. ADC interface.
8. DAC interface.
9. Centronics Printer interface mode-I (8255).

8279 Based Experiments: (Minimum Two)

1. Encoded scan keyboard display mode
2. Decoded scan keyboard display mode
3. Multiplexed Thumbwheel Switch using sensor matrix mode

4. Dynamic (rotating) display
5. Flashing of message

8253 Based Experiments: (Minimum one)

1. Real time clock
2. Frequency Counter
3. Duty cycle control using 8253 (Application such as DC motor speed control or lamp intensity control)

8251 Based Experiments: (Minimum one)

1. Synchronous Transmitter / Receiver
2. Asynchronous Transmitter / Receiver

8259 Based Experiments: (Minimum one)

1. Fully nested structure with single / master slave
2. Rotating Priority Structure
3. Special Mask Mode
4. Special Fully Nested Mode (SFNM)

Guidelines for Paper Setter :

Theory Question Paper should include 25 to 40% Programming Problems.

T.E. (Electronics Engineering)

Semester -V

Analog Integrated Circuits & Applications

Teaching Scheme		**Examination Scheme**	
Teaching	: 4 Hours/Week	Theory	: 100 Marks
Practical	: 2 Hours/Week	Term work	: 25 Marks
		POE	: 50 Marks

SECTION – I

Unit – I: Differential Amplifiers (5 Hrs.)

Differential Amplifier- Configuration, DC & AC Analysis of Dual Input Balanced Output Configuration. Comparative study of other configuration of Differential amplifiers, Constant Current Bias, Current Mirror, DC coupling & Cascade differential stages, Level Translator & its need. (Numericals are expected).

Unit- II: OP-Amp Characteristics (6 Hrs.)

Block Diagram of Op-Amp, Ideal & Practical Op-amp specifications, Transfer characteristics of Op-amp, Op-amp parameters & measurement: Input & output offset voltages, Input & output offset currents, Input Bias current, slew rate, CMRR, PSRR, Thermal drift. Comparative study of Data Sheets – μA 741, OP 07, LM 324, LM 311, LM 308, LM380, CA 3140.

U**nit- III: Op-Amps Configuration (8 Hrs.)**

Open Loop & Closed Loop- Inverting, Non-Inverting and Differential (Using one op-amp). Analysis for Av, Ri, Ro, Bandwidth, and Total output offset voltage. AC & DC amplifiers – all configurations. (Numericals are expected).

Unit- IV: Frequency Response & Compensation Techniques (5 Hrs.)

Open loop frequency Response, Closed loop frequency response, circuit stability, slew rate. Input offset voltage and Input offset current compensation networks. Frequency compensation- Lead-Lag compensation. Pole- Zero compensation.

SECTION – II

Unit- V: Linear Applications (5 Hrs.)

Summing amplifier (Inverting & Non-Inverting), Sub tractor, Integrator, Differentiator, Instrumentation Amplifier (3 op-amps), Instrumentation amplifier using transducer bridge, I-V & V-I converter. (Numericals are expected).

Unit- VI: Non-Linear Applications (5 Hrs.)

Comparators, Zero Crossing Detector, Window detector, Schmitt trigger, peak detector, log and anti-log amplifier, precision rectifier, sample and hold circuit.

Unit- VII: Active Filters (6 Hrs.)

First & Second Order Butterworth Low Pass, High Pass, Band Pass, Band Reject, & All Pass Filters, State Variable, Bi-Quad, KRC-Filters (Analysis & Numericals are Expected).

Unit- VIII: Monolithic IC Applications (8 Hrs.)

Sine wave generator- RC phase Shift, Weins Bridge,& Quadrature oscillator. Square wave (Astable Multivibrator), Monostable Multivibrator, & Triangular Wave generator, V-F, F-V converter using op-amp.

IC 555 (Timer): Block Diagram, Multivibrators and Applications. IC 566 VCO, PLL- Introduction, Block Diagram, Principles & description of individual blocks, IC 565 PLL & Applications. IC 8038 Waveform generator (Numericals are expected).

Text Books:

1. Ramakant. A.Gayakwad, "Op-Amps & Linear Integrated Circuits", 3rd Edition, PHI.
2. S.Salivahanan & Bhaaskaran, "Linear Integrated Circuits", 1st Edition, Tata McGraw Hill.

Reference Books:

1. National Analog & Interface products Data book—National Semiconductors
2. T.R Ganesh Babu, "Linear Integrated Circuits", 3rd Edition, Scitech Publication.
3. Sergio Franco, "Design with op-amp & Analog Integrated Circuits", 3rd Edition, Tata McGraw Hill.
4. David. A. John & Ken Martin, "Analog Integrated Circuit Design", Student Edition, Wiley.
5. Rashid, "Microelectronics Circuits Analysis & Design", 1st Edition, Cengage Learning.
6. J. Michael. Jacob, "Application & Design with Analog Integrated Circuits", 2nd Edition, PHI.
7. Roy Choudhury & Shail. B. Jain, "Linear Integrated Circuits", 2nd Edition, New Age Publishers.

List of Experiments

Minimum 12 Experiments:

1. Study of Data sheets of following IC's (Compulsory)

   μA 741, OP 07, LM324, LM 308, LM380, CA 3140, LM 311.

2. Measurement of op-amp parameters Using IC 741

   a) Input offset voltage b) Input offset current c) slew rate d) CMRR.

3. Study of Inverting amplifier for DC & AC inputs using IC 741

4. Study of Non-Inverting amplifier for DC & AC inputs using IC 741

5. Frequency Response of Inverting & Non-Inverting amplifier using IC 741

6. Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308

7. Study of Instrumentation Amplifier using LM 324

8. Study of V-I & I-V Converter using IC 741

9. Study of Schmitt Trigger using IC 741 & Window detector using LM 311
10. Study of Comparator & ZCD using LM324/OP 07
11. Study of Precision Rectifier using IC 741
12. Study of Butterworth Filter (Any Two) using IC 741
13. Study of Triangular & square wave generator using IC 741
14. Study of IC 555 Timer as Astable & Monostable Multivibrator(NE/SE 555)
15. Study of IC NE 565 PLL
16. Study of V-F converter using LM311
17. Study of Weins Bridge Oscillator using IC 741
18. Study of Function Generator using IC 8038.

T.E. (Electronics Engineering)

Semester –V

Digital System Design

Teaching Scheme		**Examination Scheme**	
Lectures	: 4 Hours/Week	Theory	: 100 Marks
Practical	: 2 Hours/Week	Term work	: 25 Marks
		OE	**: 50 Marks**

SECTION – I

Unit 1: Introduction to VHDL **(5 hrs.)**

Levels 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 **(6hrs)**

Adder, subtractor, decoder, encoder, tristate buffer, multiplexer, parity generator, parity checker, comparator, using Concurrent & Sequential statements.

Unit 3: FSM Design Using VHDL **(9 hrs)**

Impediments to synchronous design, clock jitter, skew, gating the clock, asynchronous inputs, meta-stability and synchronizer failure. VHDL implementation of counter, shift register, LFSR, Serial adder. Bus arbiter, Single port RAM, Dual port RAM, FIFO,

SECTION – II

Unit 4: VHDL Features (6hrs)
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 (7hrs)
Design of General purposes processor 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 (7hrs)
Xillnx 9500 series CPLD (XC9572), Spartan II FPGA (XCS 2s30)
Testing: Fault models, path sensitizing, random test, design for testability, Built-in self test and Boundary scan.

Text books:

1. Enoch O. Hwang "Digital logic and microprocessor design with VHDL", Thomson Publication
2. Roth John "Principals of Digital System Design using VHDL", 2nd Edition, Cengage Learning

Reference Books :

1. K. C. Chang "Digital Systems Design with VHDL and Synthesis An Integrated Approach", 1st Wiley- India.
2. Stephen Brown and Zvonko Vranesic "Fundamentals of Digital Logic with VHDL design", Tata- McGraw Hill
3. Xilinx data manual " The Programmable Logic data Book"
4. S. S. Limaye "VHDL a Design Oriented approach" , Mc-Graw Hill .

Practicals:

Experiments: Minimum 10 experiments based on following designs. Each design must be tested through VHDL test bench.

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

1. Combinational Logic: Decoder, priority encoder, comparator, adder, barrel shifter.
2. Sequential logic: Counters with synchronous/ asynchronous reset signal, universal shift registers, sequence detector, Arbiter, LFSR.
3. Single port RAM, Dual port RAM, FIFO.
4. General purpose processor.

Lab Requirement:
Model Technology, Modelsim simulator and Xilinx Web pack.
VLSI universal trainer for FPGA and CPLD of Xilinx.

Guidelines for Paper Setter:

Theory Question Paper should include 25 to 40% Programming Problems.

T.E. (Electronics Engineering)

Semester –V

Electromagnetic Engineering

Teaching Scheme		**Examination Scheme**	
Lectures	: 3 Hours/Week	Theory	: 100 Marks
Tutorial	: 1 Hour/Week	Term work	: 25 Marks

SECTION– I

UNIT-I: Electrostatics **(8 Hrs.)**

Review of vector Analysis and coordinate systems, Coulomb's law & electric field, field due to distributed charges, Flux density, Gauss's law and its applications, divergence theorem, Electrostatic potential, potential gradient, electric dipole, Electrostatic energy density, Boundary conditions for electrostatic field.

UNIT-II: **Steady Magnetic Field** **(7 Hrs.)**

Biot Savarts law, Ampere's circuital law, Stoke's Theorem, Magnetic flux density & Vector magnetic potential, Current carrying conductors in magnetic fields, Torque on loop, Energy stored in magnetic field, Boundary conditions for magneto static field.

UNIT-III: Maxwell's Equations **(3 Hrs.)**

Inconsistency of Ampere's law, Faraday's law, Maxwell's equations for static field, time varying field & harmonically varying fields, Comparison of field & circuit theory.

SECTION – II

UNIT-IV: Electromagnetic Waves **(7 Hrs.)**

Wave propagation in dielectric & conducting media, Modification in wave equations for sinusoidal time variations, Characteristics of plane wave in a) pure dielectric media, b) Conducting media, Reflection of electromagnetic wave for normal incidence, Polarization.

UNIT-V: Poynting Theorem **(3 Hrs.)**

Poynting theorem, Power flow in uniform plane wave, Circuit applications of the Poynting vector.

UNIT-VI: Transmission Lines **(8 Hrs.)**

Transmission line equations, Transmission line parameters, Infinite line, terminated uniform transmission line, Reflection coefficient, VSWR, group velocity, phase velocity, Applications of Smith chart for Impedance matching Technique a) Single stub b) Double stub.

Term Work: Minimum 8 Tutorials based on the above units.

Text Books:

1. John D. Kraus, "Electromagnetics", Mc Graw Hill.
2. William Hayt, Buck, "Engineering Electromagnetics", Mc Graw Hill.
3. G.S.N. Raju, "Electromagnetic field theory & Transmission lines", 1st edition, Pearson Education.
4. Nanna Paneni Narayana Rao, "Elements of Engineering Electromagnetics", 6th edition, Pearson Education.

Reference Books:

1. Jordan & Balmain, "Electromagnetic Fields & Radiation Systems", 2nd edition, PHI.
2. David K Cheng, "Field & Wave Electromagnetics", 2nd edition, Pearson Education.
3. Sadiku, "Elements of Electromagnetics" 4th edition, Oxford University Press.
4. R K Shevgaonkar, "Electromagnetic Waves", 1st Edition, Tata McGraw Hill.

Guidelines for Paper Setter:

Theory Question Paper should include 40% Theory & 60% Numerical Problems.

T.E. (Electronics Engineering)

Semester -V

Control Systems Engineering

Teaching Scheme		**Examination Scheme**	
Lectures	: 3 Hours/Week	Theory	: 100 Marks
Practical	: 2 Hours/Week	Term work	: 25 Marks

SECTION – I

UNIT-I: Introduction to Feedback Control System (7 Hrs.)

Classification of control System, Mathematical models of physical system- Electrical & Mechanical System , Transfer function, Deriving transfer function of physical system - field controlled and armature controlled DC servo motors, Block diagrams and reduction techniques including signal flow graphs.

UNIT-II: Feedback characteristics of Control system (4 Hrs.)

Feed back & Non-feedback systems, Reduction of parameter variations by use of feedback, control over system dynamics by use of feedback, control of effect of disturbance signals by use of feedback, linearizing effect of feedback, Regenerative feedback.

UNIT-III: Time Domain Analysis (7 Hrs.)

Time response of first order & second order system using standard test signal, steady state errors and error constants, Root locus techniques- Basic concept, rules of root locus, application of root locus techniques for control system.

SECTION – II

UNIT-IV: Frequency Domain Analysis (9 Hrs.)

Introduction, correlation between time & frequency domain, Bode plots, gain margin, phase margin, effect of addition of poles & zeros on bode plots, Polar plots, Nyquist stability.

UNIT-V: Analysis of control system in state space (4 Hrs.)

Basic concepts of state, state variable & state models, controllability, observability, Derivation of Transfer Function from state model for continuous time system.

UNIT-VI: Compensators & controllers (5 Hrs.)

a. Compensators- Need of compensation, lead compensation, lag compensation, Lead-lag compensation.
b. Controllers- Introduction, Proportional, Integral, derivative & PID controllers. Introduction to PLC controllers.

Text Books:

1. I.J. Nagrath, M.Gopal "Control Systems Engineering", 5th Edition, New Age International Publication
2. Schaum's Series book "Feed back Control Systems".
3. Les Fenical "Control Systems", 1st Edition, Cengage Learning India.
4. R. Anandanatarajan, P. Ramesh Babu , "Control Systems Engineering", Scitech Publications

Reference Books:

1. Norman S. Nise "Control Systems Engineering", 4th edition, Wiley edition.
2. Samarjeet Ghosh, "Control Systems Theory & Applications", 1st edition, Pearson education.
3. S.K. Bhattacharya, "Control Systems Engineering", 1st edition, Pearson education.
4. Hackworth, "Programmable Logic Controller", 1st edition, Pearson education.

Practical List:

1. Determination of transfer functions of physical system.
2. Transient response of second order system for a step input.
3. Verification of Bode plot using Lead Network.
4. Verification of Bode plot using Lag Network.
5. Frequency response of control system.
6. Response of PID controller.
7. Study of PLC.

Software based experiments using MATLAB.

1. Transient response of second order system by using standard test signals.
2. Draw a root locus of any system.
3. Draw a Bode Plot.
4. Draw a Polar Plot.
5. Draw a Nyquist Plot.
6. Obtain a transfer function from state space model.
7. Check the controllability and observability of system.

Note: Any five experiments from Hardware based practical & all software based practical.

Guidelines for Paper Setter :

Theory Question Paper should include 50% Numerical Problems.

T.E. (Electronics Engineering)

Semester -V

MATLAB Programming

Teaching Scheme **Examination Scheme**

Lectures : 2 Hours/Week

Practical : 2 Hours/Week Term work : 25 Marks

SECTION – I

UNIT- I **(5 Hrs.)**

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 **(4 Hrs.)**

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

UNIT- III **(5 Hrs.)**

User-defined & I/O functions, introduction to matlab functions, Variable passing in matlab, Three 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 **(3 Hrs.)**

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 **(3 Hrs.)**

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) Stephen J. Chapman “MATLAB programming for engineers”, 3rd Edition, Cengage Learning
2) Rajkumar Bansal, Ashokkumar Good, Manojkumar Sharma, “MATLAB & its application in engineering”, 1st Edition, Person Education.
3) Amos Gilant “MATLAB & Introduction with application”, Wiley India.

Reference Books:

1) Duane Hansel man, Bruce Littlefiele "Master in MATLAB-7" Person Education.
2) MATLAB programming manual by Mathworks Inc.
3) Partha S.Mallick "MATLAB & simulink – Introduction to applications", 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 Practical Turns)

T.E. (Electronics Engineering)

Semester -VI

MICROCONTROLLERS

Teaching Scheme		**Examination Scheme**	
Lectures	: 4 Hours/Week	Theory	: 100 Marks
Tutorial	: 2 Hours/Week	Term work	: 25 Marks
		POE	: 50 Marks

SECTION-I

UNIT-I: 8 Bit Microcontrollers (6Hrs.)

Introduction to Microcontrollers, 8051 architecture, functional pin description , memory organization, SFRS & ON-CHIP resources of 8051, External program & data memory interface, comparative study between different family members (80s52,89c51RD2,89c420,ADuC812).

UNIT-II: Programming 8051 (8 Hrs.)

Addressing modes, instruction set, Assembly language programming.

UNIT-III: On-chip Resource Programming & Interfacing (8 Hrs.)

Interrupt structure, port structure & operation, Timer/Counters (internal structure & various modes), serial port & it's modes (hardware details of mode-1 only)
Interfacing keypad, seven-segment display, ADC, DAC, LCD interfacing.

SECTION-II

UNIT-IV: Introduction to PIC Microcontrollers (6 Hrs.)
Introduction to RISC and CISC Architectures, Introduction to Microchip PIC family
PIC 16F877 architecture, RESET, memory organization, Register file structure, CPU registers.

UNIT V: PIC Programming (4 Hrs.)
Instruction set, Assembly language programming.

UNIT VI: On chip Resources and Programming (12 Hrs.)
Overview of: I/O ports, Timers, CCP module, Comparator, ADC, Interrupt structure, WDT, Sleep timer, SSP.

Text Books:

1) Mazidi, "8051 microcontroller and embedded systems using assembly and C", 2nd edition, Pearson education.
2) Ajay Deshmukh, "Microcontrollers theory and applications", Tata McGraw Hill

Reference Books:

1) Kenneth Ayala, "The 8051 Microcontroller", Cengage Learning.
2) PIC microchip mid range MCU family reference manual
3) I. Scott Mackenzie, Raphael C, "The 8051 microcontroller", 4th edition, Pearson education.
4) J.B. Peatman, "Design with PIC microcontrollers", Pearson education.
5) Intel Handbook on 8 bit & 16 bit embedded controllers –Intel

Practicals:

Minimum Ten Experiments (Five each -from section I, and section II)

NOTE: Use of Assemblers, Simulator and development boards for MCS51 and PIC is recommended.

Guidelines for Paper Setter:

Theory Question Paper should include 25% programming problems based on above syllabus.

T.E. (Electronics Engineering)

Semester -VI

DIGITAL COMMUNICATION

Teaching Scheme		**Examination Scheme**	
Theory	: 4 Hours/Week	Theory	: 100 Marks
Practical	: 2 Hours/Week	Term work	: 25 Marks

SECTION – I

Unit – I: Random Variables Theory & Processes (9 Hrs.)

Probability, Properties of Probability, Joint & Conditional Probability. Random Variables: Cumulative Distribution Function(CDF), Probability Mass Function, Probability Density Function(PDF), Joint CDF & joint PDF, Statistical Averages, uniform distribution, Rayleigh distribution & Gaussian PDF. Random Process, Time averaging & Ergodicity, Auto correlation, Power spectral density of stationary random process. Noise in communication system, white noise..

UNIT-II: Source Coding (8 Hrs.)

Quantization- Uniform Quantization, Non uniform Quantization, Companding, Pulse Code Modulation (PCM), Effect of noise, Bandwidth, Differential Pulse code modulation (DPCM), Delta modulation, Noise in delta modulation, Adaptive delta modulation(ADM), CVSD. Performance of all coding schemes based on SNR.

Unit-III: Digital Signaling Formats (5 Hrs.)

Introduction, Non Return to zero(NRZ) codes, Return to Zero, Phase Encoding, M-array format, Synchronization- Bit or Symbol Synchronization, Frame Synchronization, Carrier recovery circuits, scramblers & unscramblers.

SECTION – II

UNIT –IV: Digital Modulation Techniques (10 Hrs.)

Amplitude Shift Keying (ASK), Phase Shift Keying (PSK), Frequency Shift Keying (FSK), Coherent & Non-coherent detection, Binary Phase Shift Keying (BPSK), Quadrature Phase Shift Keying (QPSK) , Differential Phase Shift Keying (DPSK), Differentially Encoded Phase Shift Keying (DEPSK), Minimum Shift Keying (MSK), Gaussian Minimum Shift Keying (GMSK), Quadrature Amplitude Modulator (QAM). Bandwidth, Signal Space representation, Probability of bit error of all Schemes.

UNIT –V: Baseband Transmission & Optimum Detection (6 Hrs.)

Baseband transmission of binary data, Inter symbol Interference (ISI) & its minimization, NYQUIST Pulse Shaping Criterion, Pulse Shaping by Digital Methods, Eye Pattern, M-ary signaling, Correlative coding- Duo-binary signaling.

Optimum Receiver-Matched Filter& its Properties, Correlation receiver, Adaptive equalization & Schemes.

UNIT – VI: SPREAD SPECTRUM MODULATION (6 Hrs.)

Introduction, Direct Sequence (DS) Spread Spectrum, Use of Spread Spectrum with Code Division Multiple Access(CDMA), Ranging Using DS Spread Spectrum, Frequency Hopping (FH) Spread Spectrum, Generation & Characteristics of PN Sequences

Text Books:

1) Simon Haykin "Digital Communication" Wiley India Edition
2) Taub & Schiling "Principles of communication System"IInd Edition, Tata McGRAW Hill
3) Bernard Sklar "Digital Communication-Fundamentals and Applications" IInd Edition , Pearson Education

Reference Books:

1) B.P. Lathi "Modern Digital & Analog Communication System"
2) Singh & Sapre "Communication Systems"
3) Glover & Grant "Digital Communication" IInd Edition, Pearson Education
4) John Prokis "Digital Communication" Pearson Education.
5) K.Sam Shanmugan "Digital & Analog Communication Systems" Wiley India Edition
6) M.S. Roden "Analog & Digital Communication Systems", 5th Edition, Shroff Publications.

Practicals:

Minimum Ten Experiments should be performed.

EXPERIMENT LIST:

1) Study of Pulse Code Modulation
2) Study of Delta Modulation
3) Study of Adaptive Delta Modulation
4) Study of Data format
5) Study of Amplitude Shift Keying
6) Study of Frequency Shift Keying
7) Study of Phase Shift Keying
8) Study of Quadrature Phase Shift Keying
9) Study of any modulation technique using MATLAB
10) MATLAB practicals on Random signals
11) Study of Standard Random Variables Density Distribution Function

Guidelines for Paper Setter:

Theory Question Paper should include 15% Numericals and 85% Theory.

T.E. (Electronics Engineering)

Semester -VI

Power Electronics

Teaching Scheme		**Examination Scheme**	
Lectures	: 4 Hours/Week	Theory	: 100 Marks
Practicals	: 2 Hours/Week	Term work	: 25 Marks
		POE	: 50 Marks

SECTION – I

UNIT-I: Silicon Controlled Rectifier **(9 Hrs.)**

Construction- **: V-**I Characteristics, Dynamic Characteristics during turn on, turn off, gate triggering Characteristics, Rating & specifications, SCR triggering methods- R, RC,UJT triggering (using pulse transformer), PUT,SUS,SBS triggering methods. SCR Turn off method, Class A, Class B, Class C, Class D, Class E, & Class F, dv/dt & di/dt protection circuits. Heat sink design.

UNIT-II: Power Devices & Driving Circuits **(6 Hrs.)**

Construction, working, V-I Characteristics, Driving Circuit of :Diac, Triac, GTO, MOSFET, IGBT.

UNIT-III: 1 Φ Controlled Converter **(9 Hrs.)**

1 Φ Half Wave Controlled Rectifier, 1 Φ Full Wave Controlled Rectifier, Midpoint configuration & bridge configuration with R,RL & Battery with & without Free wheeling Diode, 1 Φ semi converter, Full Converter & dual converter. (Derivations & Numericals expected).

SECTION – II

UNIT-IV: Chopper Circuits **(9 Hrs.)**

Introduction to Choppers, classification, control techniques of choppers, series turn off chopper, parallel Capacitor Turn off chopper, Jones & Morgan's Chopper; step up chopper, Multi Phase chopper (Circuits based on SCR & IGBT).

UNIT-V: A.C. Voltage Regulator **(6 Hrs.)**

Switch mode AC power supplies, Resonant AC power supply, Bidirectional AC power supply, Control circuits of SMPS. AC voltage Stabilizer- Relay type, Servo type, Constant Voltage Transformer.

UNIT-VI: Power circuits & Systems **(9 Hrs.)**

AC power flasher using Triac, light dimmer using Triac and Diac, Liquid level controller, 1 Φ preventer, burglar Alarm, Product counter, SCR driving circuit using optocoupler, battery charger, proximity detector circuit.

Note: Industrial Visit is compulsory & Visit report is expected.

Text Books:

1. P.C. Sen, "Power Electronics", 1st Edition, Tata McGraw Hill.

2. M.H. Rashid, “Power Electronics”, 3rd Edition, Pearson.
3. G.E. SCR Manual.

Reference Books:

1. Mohan, Undeland, Riobbins, “Power Electronics” 3rd Edition, Wiley.
2. Dubey, Doralda, Joshi,Sinha, “Thyristorised Power Controllers”, 1st Edition, New Age International Edition.
3. M.D. Singh, K.B. Khanchandani, “Power Electronics”, 2nd Edition, Tata- McGraw Hill.

Practical List:

1. VI Characteristics of SCR.
2. SCR as Half wave controlled rectifier.
3. Triac as light dimmer.
4. A.C. Power Flasher.
5. SCR Triggering Circuits.
6. SCR Commutation Circuits.
7. Liquid level controller.
8. Single phase preventer.
9. AC voltage regulator.
10. SCR step down chopper.
11. Single phase semi- converter.
12. Single phase Full- converter.
13. Burglar Alarm.
14. Batch counter.

Guidelines for Paper Setter:

Theory Question Paper should include 15% Numericals and 85% Theory.

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Semester -VI

Digital Signal Processing

Teaching Scheme		**Examination Scheme**	
Lectures	: 4 Hours/Week	Theory	: 100 Marks
Practical	: 2 Hours/Week	Term work	: 25 Marks

SECTION – I

UNIT-I: The Discrete Fourier Transform and FFT (10 Hrs.)

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 (5 Hrs.)

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 by direct form structures, cascade, parallel form.

UNIT-III: IIR Filter Design (6 Hrs.)

Impulse invariant technique, 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 by direct form structures, cascade & parallel form.

SECTION – II

UNIT-IV: Adaptive filter (6 Hrs.)

Introduction to adaptive signal processing, Adaptive direct form FIR filters- Least Mean Square (LMS) algorithm.

UNIT-V: DCT & Wavelet Transform (10 Hrs.)

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

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 (5 Hrs.)

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. John G Prokis, Manolakis, “Digital Signal Processing – Principles, Algorithms and Application”, 4th

Edition, Pearson Education Publication.
2. Salivahanam, A Vallavaraj, C. Guanapriya, "Digital Signal Processing", 1st Edition, Tata McGraw Hill.

Reference Books:

1. P.Ramesh Babu, "Digital Signal Processing", 4th Edition, Scitech Publication.
2 .Sanjeet Mitra, "Digital Signal Processing", McGraw Hill Publication.
3. Vinay Ingle, John G Prokis, ,"Digital Signal Processing-A MATLAB Based Approach",India Edition,Cengage Learning.
4. E.C.Ifeachor Barrie,W.Jervis,"Digital Signal Processing"
5. Ashok Ambardar, "Digital Signal Processing" India Edition,Cengage Learning.
6. S.D.Apte India,"Digital Signal Processing" Wiley India.
7. Robert J. Schilling, Sandra L. Harris, "Fundamentals of Digital Signal Processing using MATLAB", 1st Edition, Cengage Learning.

List of Experiments:

Minimum 10 Experiments Based on the above Syllabus.
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

Guidelines for Paper Setter:

Theory Question Paper should include 40 to 50% Numerical Problems.

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Semester -VI

INDUSTRIAL MANAGEMENT & OPERATION RESEARCH

Teaching Scheme		**Examination Scheme**	
Lectures	: 3 Hours/Week	Theory	: 100 Marks
Tutorial	: 1 Hour/Week	Term work	: 25 Marks

SECTION – I

UNIT-I: Function of Management **(6 Hrs.)**

1) Planning – Nature, Types, Improvement, Forecasting methods and importance
2) Organization –Importance and Principles,
3) Staffing –Procedure of staffing, performance, appraisal methods.
4) Directing – Leadership styles
5) Motivation – Theeries-Maslow's, Herzberg's, Mc Greqor's.
6) Communication – Process types, Barriers and Remedies.
7) Controlling- process.

UNIT-II: Marketing **(6 Hrs.)**

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

UNIT-III: Costing **(6 Hrs.)**

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: **(6 Hrs.)**

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

UNIT- V: **(6 Hrs.)**

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 Voget's Approximation method.

UNIT- VI: **(6 Hrs.)**

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.

TERM WORK:-

1) Case studies on unit no- 1
2) Numerical on EOQ, ABC analysis.
3) Project proposal for SSI.
4) Numerical on Unit no. 4
5) Numerical on Unit no. 5
6) Numerical on Unit no. 6

[**NOTE**: Any One numerical of above assignment must be solved using Computer.]

Reference Books:-

Industrial management

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

Operation Research

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

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Semester -VI

Mini project

Teaching Scheme	**Examination Scheme**
Practical : 2 Hours/Week	Term work : 25 Marks
	OE : 50 Marks

Mini project work should consist of following steps.

1. Project Idea : Students should propose project ideas & finalize the project idea in consultation with guide.
2. Students should submit implementation plan in the form of PERT/CPM chart. Which will cover weekly activity of project report.
3. Problem definition and specification development in the form of synopsis.
4. Design of circuit with calculation & should include
   a) Analog part b) digital part c) Power supply d) Test strategy
   if firmware is required produce flow chart.
5. Simulation of design using tools like OrCAD, Matlab, etc.
6. Design of enclosure & PCB.
7. Fabrication & assembly of PCB & enclosure.
8. Testing & calibration.
9. Measurement of specifications.

Note:-

1. Project report should include report of all above steps and conclusion.
2. Project group should demonstrate and deliver seminar on project.
3. A mini project should not exceed three students per group.

Guidelines for selection of project ideas:-

1. B**attery charger:** Voltage & current indication
   Specification like
   a) Over voltage protection b)Charging current rating
   c) Accuracy d) With all annunciations

2. **Capacitance meter:**
   Specifications a) Ranges b) Resolution c) Accuracy

3. **Temperature indicator / ON-OFF controller:**
   Specifications a) Sensor selection b) Range c) Resolution d) Accuracy

4. **Angular displacement measurement using rotary encoder:**
   Specifications a) Range b) Resolution c) Accuracy

5. **Resistance meter (milliohms):**
   Specifications a) Range b) Resolution c) Accuracy

6. **DC motor speed controller using power devices with indicator:**

Specifications a) Range b) Resolution c) Accuracy

7. **FSM based digital design**
   Development of timing diagram & Design of FSM using MSI, LSI PLDs ROM for application like sequence detector, sequence generator, counters, glass scale, industrial timers

   a) Sequence generator: A typical PN sequence generator, Six stage MLS counters using shift register (maximum length sequencer),Gray code generator

   b) Sequence detectors:, A combinational lock, Flag detection in synchronous communications,

ASM based digital design:

ASM technique- vending Machine, Lift controller, traffic controller, Washing machine & Micro oven, Automatic bottle filling plant.

8. **Micro controller Based Data Acquisition System:**
   Temperature measurement systems, Flow measurement system, Level Measurement System, Design a Microcontroller based weigh scale using load cell, Design an alarm annunciator for pressure measurement system, Design an ECG amplifier with 1 mV calibration facility.

References:

Students are advised to refer Application Notes, research publications & data sheet of various electronics devices. from Motorola, National Semiconductors, Analog devices, Texas instruments, Fairchild, Cypress Semiconductors, Microchips, International Rectifiers, ST Microelectronics, Maxim, Philips, NXP, IEEE.

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Semester –V

COMPUTER ORGANIZATION AND PROCESSOR DESIGN

Teaching Scheme		**Examination Scheme**	
Lectures	: 3 Hours/Week	Theory	: 100 Marks
Tutorial	: 1 Hours/Week	Term work	: 25 Marks

SECTION – I

UNIT-I: Evolution of Electronic Computers (2 Hrs.)

Introduction and History,IAS Computer architecture,IBM 360 model,stack passed computer and polish notation

UNIT-II: Design Methodology (7 Hrs.)

Design levels: Gate level and register level, processor level, programmable logic devices, performance measurement, state machine design, Melay machine, Moore machine

UNIT-III: Processor Basic (6 Hrs.)

CPU organization fundamental, Data representation, Basic formats, Floating point numbers, Instruction sets: Instruction formats, Instruction type, Programming consideration, Introduction to RISC and CISC.

UNIT-IV: Arithmetic Unit Design. (8 Hrs.)

Fixed point arithmetic: Byte and word , Adders, Subtracters, Multipliers: Booth's algorithm, Robertson's algorithms, combinational array multiplier. 32/64 bit floating point arithmetic: (IEEE 754 format), introduction to pipeline processing.

SECTION – II

UNIT-V: Control Design (10 Hrs.)

Introduction, Hard wired control, Micro programmed control, GCD processor Design, Design of Control unit for accumulator based CPU, DMA controller, control unit design, Micro Instruction format, Interrupt and Branch, Micro Instruction processing, Instruction sequencing and Interruption.

UNIT-VI: Memory Organizanition (7 Hrs.)

Memory Systems, Multilevel memories, Address Translation, Memory allocation schemes FIFO, LRU, OPT, etc. Virtual Memory, Cache memory.

UNIT-VII: Memory Organizanition (4 Hrs)

Processor programmed I/O architecture, DMA architecture, Interrupt I/O hardware,

Text Books:

1. J.P. Hayes "Computer Architecture and Organization" McGraw Hill publication.

Reference Books:

1. Hamacher Zaki **"**Computer Organization" McGraw Hill publication

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Semester -VI

ANALOG AND DIGITAL COMMUNICATION

Teaching Scheme		**Examination Scheme**	
Theory	: 4 Hours/Week	Theory	: 100 Marks
Practical	: 2 Hours/Week	Term work	: 25 Marks

SECTION – I

Unit – I:Pulse Analog Modulation (7 Hrs.)

Pulse Amplitude Modulation (PAM),Sampling Theorem and Type : Natural and Flat top,PAM modulator Circuit,Pam Demodulator Circuit,TDM and FDM,Pulse Time Modulation,Generation of PTM signals(direct and Indirect), PWM modulator,PPM modulator and PPM Modulator and Demodulator.

Unit – II: Random Variables & Processes (6 Hrs.)

Random Variables: Cumulative Distribution Function(CDF), Probability Density Function(PDF), Joint CDF & joint PDF, uniform distribution, Rayleigh distribution & Gaussian PDF.

Random Process: Mathematical definition of random process, Stationary process, Ergodic process, Power spectral density of stationary random process. Noise in communication system, white noise, Thermal noise, Noise equivalent Bandwidth, Noise Figure.

UNIT-II:Pulse Digital Modulation (9 Hrs.)

Pulse Code Modulation (PCM): PCM generation and reconstruction,Quantization- Uniform Quantization, Non uniform Quantization, Companding, , Effect of noise, Bandwidth, Differential Pulse code modulation (DPCM), Delta modulation, Noise in delta modulation, Adaptive delta modulation(ADM), CVSD. Performance of all coding schemes based on SNR.

SECTION – II

Unit-IV: Digital Signaling Formats and Base Band Transmission (6 Hrs.)

Introduction, Data format: Non Return to zero(NRZ) codes, Return to Zero, Bipolar,Manchester, Phase Encoding, Synchronization- Bit or Symbol Synchronization, Frame Synchronization, Carrier recovery circuits, scramblers & unscramblers, Inter symbol Interference (ISI) & its minimization, Eye Pattern

SECTION – II

UNIT –V: Digital Modulation Techniques (10 Hrs.)

Amplitude Shift Keying (ASK), Phase Shift Keying (PSK), Frequency Shift Keying (FSK), Coherent & Non-coherent detection, Binary Phase Shift Keying (BPSK), Quadrature Phase Shift Keying (QPSK) , Differential Phase Shift Keying (DPSK), Differentially Encoded Phase Shift Keying (DEPSK), Minimum Shift Keying (MSK), Gaussian Minimum Shift Keying (GMSK), Quadrature Amplitude Modulator (QAM). Bandwidth, Signal Space representation, Probability of bit error of all Schemes.

UNIT – VI: SPREAD SPECTRUM MODULATION (6 Hrs.)

Introduction, Direct Sequence (DS) Spread Spectrum, Use of Spread Spectrum with Code Division Multiple Access(CDMA), Ranging Using DS Spread Spectrum, Frequency Hopping (FH) Spread Spectrum, Generation & Characteristics of PN Sequences

Text Books:

1) Simon Haykin "Digital Communication" Wiley India Edition
2) Taub & Schiling "Principles of communication System"IInd Edition, Tata McGRAW Hill
3) Bernard Sklar "Digital Communication-Fundamentals and Applications" IInd Edition , Pearson Education

Reference Books:

1) B.P. Lathi "Modern Digital & Analog Communication System"
2) Singh & Sapre "Communication Systems"
3) Glover & Grant "Digital Communication" IInd Edition, Pearson Education
4) John Prokis "Digital Communication" Pearson Education.
5) K.Sam Shanmugan "Digital & Analog Communication Systems" Wiley India Edition
6) M.S. Roden "Analog & Digital Communication Systems", 5th Edition, Shroff Publications.
7) Das, Mullick,Chatterjee " Principles of Digital Communication" New Age International.

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Semester -VI

ELECTRONIC DESIGN TECHNOLOGY

Teaching Scheme		**Examination Scheme**	
Theory	: 4 Hours/Week	Theory	: 100 Marks
Practical	: 2 Hours/Week	Term work	: 25 Marks

SECTION – I

Unit – I: Switch Mode Power Supplies (SMPS) **(7 Hrs.)**

frequency ferrite core transformer design, Selection of ferrite core. Selection of major SMPS topologies (Step up, Step down, Push pull, Negative converter), SPMS controller ICs: 3524 TL 494, Design of SMPS for industrial application: Battery chargers, Computer power supply, MOPS with current limit protection. The design should include high components e.g. Power transistor filter capacitor, rectifiers.

Unit – II: Signal Conditioners **(8 Hrs.)**

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

UNIT-III: Analog process controllers **(9 Hrs.)**

Analog process controllers using above transducers: ON/OFF, proportional, PID controller Algorithm implementation only for any 8-bit Microprocessor/ Micro controller based process controllers. (No up H/W to be designed).

SECTION – II

Unit-IV: Discrete I.C design **(6 Hrs.)**

) Discrete I.C design of 3, 3½, 3 ¼ digits – DVM design with reference voltage of 1,2, 4 volts. Attenuator circuit design for voltage current dc only .)

UNIT –V: Control circuit design **(6 Hrs.)**

Control circuit design for frequency time measurement. Design of clock divider, Reset, Load pulses. Output requirement of latch and counters depending upon resolution

UNIT – VI: Industrial TIMERS and counters **(6 Hrs.)**

Fundamentals of IC timers, CMOS timer & 2240 Binary Programmable Timer/counter, use of timers for event or interval timing ,Design of counter using IC 7226 & 74C926 for the event counting, frequency and period measurement

UNIT – VII: Design of frequency synthesizer **(6 Hrs.)**

Design of frequency synthesizer using 4046 and 565, EPROM based synthesizer, line frequency monitor using PLL 565 with resolution of 0.01 Hz.

Reference Books:

1. National Semiconductor Manual
2. Linear IC Manual
3. AK Ghosh, " Introduction to instrumentation control". Prentice Hall India.
4. A J Bouwens, "Digital Instrumentation" McGraw Hill.
5. W Bolton, "Industrial Control and Instrumentation" Oriental Logman.
6. J.Michael Jacob, "Industrial Control Electronics- Applications and Design" Prentice Hall of International Inc.
7. George Chrysies, " High-Frequency switching power supplies- Theory and Design" McGraw Hill.

Shivaji University, Kolhapur

Equivalences of T.E. Electronics for repeater students

(Semester-V)

Sr.No	T.E Part-I (Pre- Revised)	Equivalent Subject/ Replacement Subject
1	Control Systems	Control System Engineering (Revised)
2	Microprocessor-I	Microprocessor Peripherals & Interfacing (Revised)
3	Electro Magnetic Engineering	Electro Magnetic Engineering (Revised)
4	Computer Organization	Computer Organization and Processor Design) (Replacement
5	Communication Engineering-II	Analog and Digital Communication (Replacement)
6	Mini Project	Mini Project

(Semester-VI)

Sr.No	T.E Part-II (Pre- Revised)	T.E Part-II (Revised)
1	VLSI Design	Digital System Design
2	Industrial Electronics	Power Electronics
3	Electronics System Design	Electronic Design Technology (Replacement)
4	Microprocessor-II	Microcontrollers
5	Industrial Management & Operation Research	Industrial Management & Operation Research