FIRST SEMESTER

SUBJECTS

Course Name : Basic Electronics Engineering

Course Code :

Credits : 2 (L-T-P : 2-0-0)

Syllabus:

Module I: Analog Electronics

Diode Circuits: Introduction to diodes, Current components in diode, Zener diode and applications. Half -wave and full -wave rectifiers & their analysis, comparison of bridge and center -tap rectifier, clipping & clamping circuits. (7)

Transistors: Bipolar Junction Transistor, Current components in transistor, transistor construction, various configurations (CE, CB. CC) and characteristics (Input and Output) of BJT configurations. The transistor as an amplifier and switch, Introduction to MOSFETs, Construction, characteristics and working principles of MOSFETs (depletion type MOSFET and Enhancement type MOSFET). (7)

Operational Amplifiers: Introduction, ideal and practical operational amplifiers, open and closed loop configurations, Applications of operational amplifiers. (4)

Module II: Digital Electronics

Digital Gates and Functions: Introduction to number systems and binary arithmetic, Logic Gates and universal gates, Boolean algebra, SOP & POS forms of a Boolean function, simplification of logical functions using Karnaugh map. (4)

Digital Circuits: Half and full adder, subtractor, multiplier, encoders, decoders, multiplexers, demultiplexers. (4)

Important Text Books/ References

Basic Electronics and linear Circuits, N N Bhagava, TMH

Integrated Electronics, Millman Halkias, TMH.

Electronic Devices and Circuit, David A. Bell, Oxford

Electronic Devices and Circuit Theory, R. L. Boylestad, Pearson Education

Digital Circuits and Design, S Salivahanan, Vikas Publishers

Digital Electronics, Moris-Mano, PHI

Course Code: ECP102

Course Title: Electronics Engineering Lab

Credits: 1 (0 0 2)

PREREQUISITE

None

COURSE OBJECTIVE(s)

To know about the working and operation of Multimeter, DSO, Function Generator and Power Supply.

To experimentally verify the diode characteristics

To analyze various diode applications and outputs of related circuits.

COURSE OUTCOMES :

CO1 To be able to know about various electronic instruments

CO2 To be able to generate and analyze the various waveforms on DSO

CO3 To be able to verify and analyze the diode characteristic

CO4 To be able to analyze the applications of diode

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No. Component Weightage

a) Continuous lab-based evaluation 50%

b) Mid-semester evaluation 20%

c) End-semester evaluation 30%

LIST OF EXPERIMENTS

1. Study of various electronic instruments such as Multimeter, DSO, Function Generator and Power Supply.

2. To observe sine, square and triangular waveforms on the DSO and to measure amplitude and frequency of the waveforms.

3. Familiarization of Electronics Components such as: - Resistor, Capacitor, Diode, Transistor, LED, Photodiode, Phototransistor, IC and also test them with the help of Multimeter.

4. To obtain V-I characteristics of PN junction diode.

5. To obtain V-I characteristics of Zener diode.

6. To observe waveform at the output of half wave rectifier with and without capacitor filter and also measure its DC voltage, DC current and ripple factor.

7. To observe waveform at the output of center tapped full wave rectifier with and without capacitor filter and also measure its DC voltage, DC current and ripple factor.

8. To observe waveform at the output of full wave bridge rectifier with and without capacitor filter and also measure its DC voltage, DC current and ripple factor.

9. To observe waveforms at the output of various clipper circuits.

10. To observe waveforms at the output of various positive and negative clamper circuits.

Course Name : Circuits and Networks

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Methods of Network Analysis: Mesh and node variable analysis; Star Delta transformation; Steady state analysis of AC circuits, Characteristics of the sinusoid: Average, peak and effective values, Impedance concept, Active, reactive and complex power, Power factor, Q of coils and capacitors, Series and parallel resonances, Series Parallel reduction of AC/DC circuits, Network Theorems (Superposition, Thevenin's, Norton's, Maximum Power Transfer, Reciprocity, Compensation, Tellegen's) in AC/DC circuits.

Two Port Networks Parameters: Open circuit impedance Z parameters, short circuit admittance Y parameters, Hybrid h parameters, Chain parameters ABCD and g parameters, Image Impedances,

T and pie network, Relationship between different two port network, Interconnection of two-port network: cascade, series, parallel, series-parallel and parallel-series connections, Indefinite admittance matrix and applications.

Steady State & Transient Analysis: DC and sinusoidal response of R-L-C circuits, Laplace transforms and its properties, inverse transforms, initial and final value theorems, use of transfer

function in network analysis. State Equations for Networks: Basic consideration in writing state equations, order of complexity, Formulation of state equations, Solutions of state equations, State

transition matrix. Frequency domain analysis of RLC circuits, Poles & Zeros, Driving Point Function, Amplitude and Phase Response.

Passive Filters: Classification, Constant-K filters, m-Derived T-Section, Band pass filter, Band elimination filter, Tunable filter realization.

Network Graphs: Network Matrices, Incidence and Reduced Incidence matrix, Loop Matrix, Fundamental loop matrix, Cut set and cut set matrix, Fundamental cut set matrix, Relationship between network Matrices.

Course Outcomes :

CO1- Is able to understand different networking theorem.

CO2- Is able to understand methods of network matrixes, Incidence and reduced incidence matrix,

loop matrix etc.

CO3- Is able to perform two port networks as Z parameter, ABCD parameter, T parameter, Y parameter etc.

CO4- Is able to know about state equation and solution of state equations.

References:

1) M. E. Valkenburg, Network Analysis, PHI, 1995

2) S. Ghosh, Network Theory: Analysis and Synthesis, PHI, 2005

3) T. S. K. Iyear, Circuit Theory, TMG Hill, 1985

4) Del Toro, Principles of Electrical Engg, PHI, 1994

5) A. Sudhakar & Shyammohan S. Palli, Circuits & Networks: Analysis & Synthesis, McGraw Hill, 2015

Course Name : Electronic Measurements and Instrumentation

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Measurements: Errors & classification.

Analog Ammeters and Voltmeters: PMMC and MI Instruments, Construction, Torque Equation, Range Extension, Effect of temperature,

Analog Wattmeters and Power Factor Meters: Electrodynamometer type wattmeter, power factor

meter, Construction, torque equation, active and reactive power measurement in single phase and in

three phase.

Analog Energy Meter: Single phase induction type energy meters, construction, Operation, lag adjustments, Max Demand meters/indicators, Measurement of VAH and VARh.

DC and AC Bridges: Measurement of resistance (Wheatstone Bridge, Kelvin's Bridge, Kelvin's Double Bridge), Measurement of inductance, Capacitance (Maxwell's Bridge, Desauty Bridge, Anderson Bridge, Schering Bridge, Wien Bridge).

Instrument Transformers: Current Transformer and Potential Transformer - construction, operation,

phasor diagram, errors, testing and applications.

Transducers: Measurement of Temperature, RTD, Thermistors, LVDT, Strain Gauge, Piezoelectric Transducers, Tachometer.

Electronic Instruments: Electronic Display Device, Digital Millimeters, CRO/DSO, measurement of

voltage and frequency, Wave Analyzers, Harmonic Distortion Analyzer.

Course Outcomes:

CO1: To understand the working principle of different measuring instruments.

CO2: Analyse the MC, MI and Dynamometer types of measuring instruments, Watt-meters and Energy-meters

CO3: Determine the values of components of circuits using AC and DC bridges

CO4: To know about transformers and transducers for the measurement of temperature, strain and speed

References:

1) J. B. Gupta: A course in Electrical and Electronic Measurements and Instrumentation, 13/E, Kataria and Sons, 2009.

2) U. A. Bakshi, A. V. Bakshi: Electrical Measurements and Instrumentation, Technical Publications, 2009.

3) A. K. Sawhney: A course in Electrical Measurements Electronic Measurements Instrumentation, Edition 11, Dhanpat Rai and Sons, 1996.

4) W.D. Coopers and Helfrick, Modern Electronic instrumentation and Measurements Techniques, Prentice Hall of India Pvt. Ltd, 2002.

5) E.W. Gowlding and F.C.Widdis, Electrical Measurements and Measuring Instruments 5/e, Wheeler Publications 1998.

SECOND SEMESTER

SUBJECTS

Course Name : Signals & Systems

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

● Representation of Signals and Systems: Continuous & discrete time signals, LTI systems and their

classification, System modelling using differential and difference equations

● Convolution, Transmission of signals through linear systems

● Analysis of signals: Fourier series, Fourier transforms and their properties

● Fourier Analysis for DTS: Discrete time Fourier series, Discrete time Fourier transform and their

properties, DFT and its properties, Fast Fourier Transform

● Laplace transforms, Z-transforms & its properties, ROC, Inversion of Z-transform, application to

System Analysis.

Course Outcomes :

CO1. Understand the handling of signals in different domains- time and frequency -through

Fourier transforms. Analysis and synthesis of different basic signals to be used in the

communication systems.

CO2. Acquire the basic mathematical understanding of the probability theory; methods of

converting these results of the probability theory into different form of expressions-distribution

and density functions, so as to be useful in the analysis of signals.

CO3. Extend the concepts of probability theory to random processes. Learn to evaluate the

different type of estimates generated through the probabilistic methods for use in the analysis

of noise.

CO4. After undergoing this course, the student will be able to analyze the different type of

signals and noises in communication systems.

References:

1. Oppenheim A.V., Willsky A.S. and Nawab S.H..: Signals and Systems, 2/e, Prentice Hall of

India, 1997

2.B.P. Lathi, Modern Digital and Analog. Communication Systems, 3rd ed., Oxford. University

Press, 1998

Course Name : Electronic Devices & Circuits

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Transistor at low frequencies: Graphical Analysis of the CE configuration, Two-Port devices and the

hybrid Model, Transistor hybrid model, The h-parameter, Conversion formulas for the parameters of

the three transistor Configuration, Analysis of a transistor Amplifier Circuit using h parameters, The

Emitter follower, Comparison of transistor amplifier configurations, Linear Analysis of a Transistor

Circuit, Cascading Transistor Amplifiers, Simplified Common-Emitter Hybrid Model, Simplified

calculations for the Common Collector Configuration, The Common-Emitter Amplifier with an emitter

resistance, High input resistance transistor circuits, Multistage amplifier analysis.

Field Effect Transistors: The FET and MOSFET Small-Signal model, The Low-Frequency Common

Source and Common-Drain Amplifiers, The FET as a Voltage-variable Resistor (VVR). High frequency

model of BJT: High frequency hybrid-π model of BJT, Common emitter and common collector

configurations, Cascade configuration.

Feedback Amplifiers: General Feedback structure, Properties of negative Feedback, Four basic

Feedback Topologies, Voltage series, Voltage shunt, Current series, Current Shunt, Effect of Feedback

connection on various parameters. Analysis of above topology for BJT and FET. Oscillators: Basic

principle of sinusoidal oscillator (phase shift, wein bridge), Hartley & Colpitts, Crystal Oscillator,

nonlinear/pulse oscillator.

Course Outcomes:

CO1-Understand the modelling of bipolar junction transistors (BJTs), analyse the different amplifier

configurations using these transistors models, learn to simplify these models and analyse the different transistor configurations.

CO2-Acquire the basic understanding of the Field effect transistor (FET) and its small signal model,

analyse the low frequency configurations of the amplifier using FET. (I/3)

CO3-Understand the high frequency model of the bipolar junction transistors (BJTs) for the different

configurations.

CO4-Learn the concept of feedback to stabilize the amplifiers, analyse the different topologies and

synthesise the same using BJTs and FETs (II/3)

CO5-Learn the principles of sinusoidal oscillators. (III/3)

References:

1. Electronic principles, Bolysted.
2. Millman, Halkias, Integrated Electronics- Analog & digital circuits, TMH.
3. Millman, Halkias & S. Jit. Electronics Devices & Circuits, TMH, 2009.
4. Microelectronic Circuits, Sedra Smith, Oxford press, India.
5. Electronic Devices and Circuits, David-A-Bell, Oxford Univ. Press 2008.

SECOND SEMESTER

LABORATORIES

Course Name :Signals & Systems Lab

Course Code :

Credits : 1 (L-T-P : 0-0-2)

List of Experiments

1. Introduction to MATLAB working environment and language fundamentals to create matrices

and to do basic mathematical operations.

2. To study the shifting, time reversal and scaling of a signal.

3. To find convolution of two continuous time signals.

4. To generate a periodic square wave using Fourier series.

5. To generate a periodic Triangular waveform using Fourier series.

6. To compute the Fourier Transform of a continuous non-periodic signal (rectangular pulse).

7. To compute the inverse Fourier Transform of a continuous signal defined in frequency

domain.

8. To compute the Discrete Time Fourier Transform of a discrete time signal.

9. To perform basic mathematical operations using symbolic computation.

10. To find inverse Z transform of a transfer function.

Course Name : Electronic Devices and Circuits Lab

Course Code :

Credits : 1 (L-T-P : 0-0-2)

List of Experiments

1. To study the Digital Storage Oscilloscope.

2. To observe and draw the Forward and Reverse bias V-I Characteristics of a P-N Junction diode.

3. Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the

effect of load changes and determine load limits of the voltage regulator.

4. Application of Diode as clipper & clamper.

5. Study half wave rectifier and effect of filters on wave. Also calculate theoretical & practical ripple

factor, with Filter and without Filter

6. Study center tap rectifier and measure the effect of filter network on D.C. voltage output & ripple

factor.

7. Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple

factor.

8. To study Wein Bridge Oscillator and observe the frequency effect of Variation in R and C.

9. Study of R.C. phase shift oscillator and observe the effect in R and C oscillator frequency and

obtain theoretical and practical value.

10. Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.

11. To draw the input and output characteristics of transistor connected in CE configuration and find

h-parameters.

SYLLABUS SECOND YEAR

THIRD SEMESTER

SUBJECTS

Course Name : Analog Communication

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

● Amplitude Modulation: AM, Double Side Band Suppressed Carrier modulation, Single Side Band

modulation, Vestigial Side Band modulation, AM receivers, Noise in AM receivers using envelope detection, SNR for coherent reception with SSB and DSBSC modulations, Frequency Division Multiplexing.

● Angle modulation: Frequency modulated & Phase modulated signals, NBFM/WBFM, Multitone

FM, De-emphasis in FM, Noise in FM reception.

● Pulse Analog Modulation: Pulse Amplitude Modulation, Pulse time Modulation, Time Division multiplexing, Elements of Pulse Code modulation , Differential PCM, Delta Modulation, Adaptive Delta Modulation.

● Probability Theory & Random Variables : Self, joint & conditional probabilities, Statistically dependent & independent events, Discrete and continuous Random Variables (RV's) , their CDF's and PDF's, Functions of random variables, Joint RVs, Mean values and moments of some pdf's (Binomial, Poisson, Gaussian, Rayleigh, Maxwell), Correlation function and their properties, Random processes.

● Noise Analysis of Communication Systems.

Course Outcomes:

CO1-To familiarize the students about different analog modulation and demodulation schemes

CO2- To understand analog-digital conversion techniques.

CO3- To analyze the performance of different modulation techniques under noise.

CO4- To apply the concept of probability and random processes in analysis of communication systems.

CO5- To perform noise analysis of communication systems

References:

1. Haykin S.: Communication Systems, 2/e, Student Edition, Wiley India, 2007.

2. Oppenheim A.V., Willsky A.S. and Nawab S.H..: Signals and Systems, 2/e, Prentice Hall of India, 1997

3. Tan: Digital Signal Processing; Fundamentals and application, Elsevier

4. B.P. Lathi, Modern Digital and Analog. Communication Systems, 3rd ed., Oxford. University Press, 1998

5. Proakis and M. Salehi, Communication Systems Engineering, 2nd Edition

Course Name : Digital Logic Design

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Number System and Codes:

Weighted Codes/Non Weighted codes, Error

Correction/Detection Codes, BCD codes, Fixed point & floating point Number System

Boolean Algebra and Logic Gates: SOP and POS for Truth Table, K'Maps, Tabular method, NAND/NOR Universal Gates, Introduction to logic families

Combination Circuits: Adders, Subtractors, Magnitude comparators, Encoder/Decoders, Muxes/DeMuxes, BCD Adder, Logic Implementation using combinational blocks

Sequential

Circuits:

FlipFlops,

Master-Slave

FlipFlop,

Type of Counters

(Synchronous/Asynchronous), Types Registers, FSM concept, Examples of FSM

PLD Concept and Implementation: Basics of HDL (VHDL/Verilog) , Syntax and Semantics of HDL, Design Style using HDL, Basics of PAL,PLA, PROM, CPLD, FPGA

Course Outcomes:

At the end of the course the student will be able to:

CO1: Understand the concept and design of combinational and sequential (synchronous and asynchronous) digital logic circuits (knowledge)

CO2: Understand the concept of Testing and Testability of digital circuits (Knowledge)

CO3: Design and Implement Algorithmic State Machines (skills)

CO4 : Understand Symmetric and Iterative Circuits (Knowledge)

References:

1. Digital Design by Morris Mano

2. Switching Theory and Finite Automata by Zvi Kohvi

Course Name : Linear Integrated Circuits

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Operational Amplifiers and its applications: Op-amp and its parameters, Applications of Op-amps as integrator, differentiator, comparator, oscillators, digital-to-analog, analog-to digital converter, log and antilog, rectifiers etc.

Active Filters: High pass filter, low pass filter, band pass filter, band stop filter, notch filter.

Waveform Generators: Astable Multivibrator, Monostable Multivibrator, Bistable Multivibrator, Schmitt trigger.

Power Amplifiers: Power Amplifier Circuits: Class A, Class B and Class AB output stages, Class A, Class B Push pull amplifiers with and without Transformers.

PLL and 555 Timer: Phase locked loop (PLL): Block diagram, working and its various applications; 555 Timer: Block diagram, working principle and its applications as Bistable, Monostable, and Astable mode.

Course Outcomes:

At the end of the course the student will be able to:

CO1: Understanding different modes of Schmitt trigger

CO2: Implementing circuits with Operational amplifier

CO3: Understanding different types of power amplifiers

CO4: Applying the voltage regulator in different configuration

CO5: Understanding PLL and its usage

References:

1. Sedra/Smith, Microelectronic Circuits, Oxford University Press.

2. L. Schilling and C. Belove, Electronic Circuits, McGraw-Hill.

3. S. Soclof, Applications & Design with analog IC’s PH1

4. Jacob-Applications & Design with analog IC’s, PH1

5. Coughlin Driscol-Operational Amplifiers & Linear IC’s Pearson Education.

6. Millman, Halkias & Parikh. Integrated Electronics- Analog & digital circuits, TMH, 2009.

7. Current literature from reputed journals

Course Name : Data Structures & Algorithms

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Introduction to data structures: Static and dynamic aspects of memory allocation. Recursion and its

applications. Introduction to complexity

analysis, measure and representation.

Algorithms for searching and Sorting: Non-recursive and recursive implementation of searching.

Non-recursive and recursive sorting algorithms.

Creation and manipulation of data structures: arrays, stacks, queues and linked lists with static and

dynamic memory allocation. Applications.

Creation, manipulation and analysis of trees. Binary search tree algorithms.

Graph problems: Shortest path implementation. Introduction to Max Flow-Min Cut and travelling

salesman problem.

Introduction to height balanced trees: AVL and B Trees.

Course Outcomes:

CO1- Is able to grasp core concepts of space & time complexity analysis (knowledge)

CO2- Is able to analyze & design basic algorithms for sorting, searching etc. (knowledge)

CO3- Is able to analyze & solve for computing the order of time complexity of algorithms

(Knowledge, skill)

CO4- Is able to learn and code for various search algorithms like divide & conquer, branch &

bound, greedy (skills)

References:

1) Kruse R.L., Data Structure and Program Design, PHI.

2) Rivest, Cormen, Introduction to Algorithms, MIT Press

3) Horowitz and Sahni: Data Structure in C++ , Glagotia

4) Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures

5) Aaron M. Tenenbaum, Y. Langsam, Moshe J. Augenstein, Data Structures Using C

Course Name : Operating System Concepts

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Introduction: H/W, S/W and Firmware, Process concepts, operations on processes, suspend and

resume, System calls, Interrupts and Signals.

Deadlock and Indefinite Postponement:- Conditions of deadlock, deadlock prevention and

avoidance, deadlock detection and deadlock recovery.

Process Scheduling and Synchronization:- Job and Process scheduling, Preemptive and

Non-preemptive scheduling, FIFO, RR, SJF, SRT, HRN, etc scheduling techniques.

Synchronization: Concepts, locks, and semaphores

Storage management:- Storage management & hierarchy, various strategies, storage allocation,

Fixed and variable partitioning, Virtual storage concepts, Block mapping, Paging, Segmentation,

Virtual storage management, Page replacement strategies, locality, Demand Paging, Program

behaviour.

Case Studies:- UNIX systems, MS-DOS systems and Windows Architecture.

Course Outcomes:

CO1-To understand the objectives , structures and functions of modern operating systems

CO2- To understand the working of processes and threads and their scheduling algorithms

CO3-:To understand the problems of synchronization and deadlock in OS and its various solutions

CO4- To understand the memory and storage handling/allocation methods

CO5-To understand files, its structures, implementation and protection issues

References:

1. Operating system concept--Silberschatz and Galvin- John wiley

2. Operating system - Stalling by phi /pearson

3. Operating system -Tannenbaum by phi /pearsoned

4. An introduction to Operating Systems - H.M. Deitel ,Addison-Wesley Operating system -

Godbole (TMH)

Course Name :Electro-magnetic Field Theory

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Unit I Introduction: Vector Relation in rectangular, cylindrical and spherical coordinate system.

Concept and physical interpretation of gradient, Divergence and curl. Green's and Stokes theorems.

Unit II Steady Electric Field: Coulomb's Law, units, Electric field intensity, Relation between E and

V, Electric flux and flux density, Gauss law, Boundary conditions: Dielectric-dielectric, Conductor –

dielectric, Conductor-free space, scalar and vector potential, electric field in dielectric and conductor,

Laplace and Poisson's equations, continuity equation, uniqueness theorem, energy stored in electric

fields, equivalence theorem, method of image and numerical solution, energy storage and their

applications

Unit III Magnetic field due to steady currents, force between current carrying wires, Ampere's circuit

law, Bio-Savart's Law, Magnetic flux density, Stokes theorem, Magnetic static and Vector potential,

magnetization vector and its relation to magnetic field, Magnetic boundary condition. Analogy between

electric and magnetic fields

Unit IV Time Varying Fields, Faraday's law, Displacement currents and equation of continuity, their

physical interpretation, Maxwell's equations, integral & differential form of Maxwell's equation, Time

varying fields.

Unit V Uniform plane wave in free space, dielectrics and conductors, skin effect sinusoidal time

variations, reflection of UPW, standing wave ratio. Potentials vector and power considerations.

Course Outcomes:

CO1- Apply vector calculus to static electro-magnetic fields in different engineering situation.

CO2- Describe static and dynamic electric and magnetic fields.

CO3- Use boundary conditions for electric and magnetic fields.

CO4- Understand Maxwell equations in different form and apply them to diverse engineering problems.

CO5- Analyze the behaviour of plane waves in different media. Examine the phenomenon of wave

propagation and reflection in different media.

References:

1. Elements of Electromagnetics- Matthew N.O. Sadiku, Oxford University Press.
2. Electromagnetics- J.D. Kraus,Tata McGraw Hill
3. Electromagnetic Waves & Radiating Systems- E.C. Jordan & K.G. Balmain, Prentice Hall.
4. Fields and Wave Electromagnetics- David K. Cheng, Pearson.
5. Engineering Electromagnetics-W. H. Haytt, Tata McGraw Hill

THIRD SEMESTER

LABORATORIES

Course Name : Analog Communication Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1. Basic commands and understanding of MATLAB.

2. To perform amplitude modulation using MATLAB.

3. To study Frequency Modulation (FM).

4. To perform DSB-SC amplitude modulation using MATLAB.

5. To perform Single Side Band Suppressed Carrier (SSB-SC) modulation.

6. Theoretical study of the receiver.

7. To study and analyze the Electromagnetic Spectrum.

8. To design different types of Analog filters and implement the design using MATLAB.

9. To study modulation and demodulation.

10. To study the different communication channels and signals.

11. To perform Frequency Division multiplexing (FDM).

12. To study and generate pulse amplitude modulation (PAM), pulse width modulation (PWM), and

pulse position modulation (PPM).

Course Name : Digital Logic Design Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1. Study of the Digital trainer kit and multi-output power supply.
2. Verify the truth table of AND, OR, NOT, NAND, NOR gates.
3. To derive all basic logic gates using NAND/NOR gates only.
4. To verify the truth table of half-adder and full-adder circuits.
5. To design a 2-bit multiplier and implement it.
6. To design and implement a latch using two NOR gates and verify its truth table.
7. Verify the operation of S-R, D, J-K and T flip-flops.
8. To implement a synchronous up/down counter.
9. To realize the following shift registers using IC7474. (a) SISO (b) SIPO (c) PISO.

10. To realize (a) 4:1 Multiplexer using gates (b) 3-variable function using IC 74151(8:1 MUX).

11. Realize 1:8 Demultiplexer and 3:8 Decoder using IC74138.

Course Name : Linear Integrated Circuits Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1.

To design op-amp in (a) Inverting mode (b)Non-inverting mode

2. To design op-amp as (a) Scalar (b) Summer (c) Voltage follower.

3. To design op-amp as integrator and differentiator.

4. To design opamp as voltage limiter and clipper.

5. To Design low pass filter using op-amp 741 IC

6. To Design high pass filter using op-amp 741 IC

7. To Design oscillator using op-amp- Wein Bridge Oscillator

8. To Design oscillator using op-amp- RC phase shift oscillator

9. To design opamp as log and antilog amplifier.

10. To Design astable multivibrators using 555 timer

11. To Design monostable multivibrators using 555 timer

12. To Design square wave generator using op-amp-741

13. To Design triangular wave generator using op-amp-741

14. Mini projects

All the experiments are performed using Breadboard and LT Spice simulator.

Course Name : Data Structures & Algorithms Lab

Course Code :

Credits : 2 (L-T-P : 0-0-4)

List of Experiments:

Using C language, implement the following programs/ data structures:

1. To find the roots of a quadratic equation for all cases.

2. To find the largest of N integers.

3. To find the factorial of an integer using a) non-recursive b) recursive functions.

4. To calculate the value of nCr.

5. To find the sum and difference of two integers in a single function.

6. To generate first N terms of a Fibonacci series using

(a) non-recursive (b) recursive functions.

7. To multiply two matrices using a function.

8. To find the transpose of a matrix.

9. To make a structure for students in a class and use it.

10. To implement the problem of Tower of Hanoi.

11. To implement Linear search using a) non-recursive b) recursive functions.

12. To implement Binary search using a) non-recursive b) recursive functions.

13. To implement following sorting algorithms using functions:

a) Selection b) Insertion c) Bubble

14. To implement functions of a stack using array.

15. To implement Infix to Postfix conversion.

16. To implement functions of a queue using array. (Linear and circular)

17. To implement functions of Linear Linked list using arrays.

18. Implement linked list using Dynamic Memory Allocation

(a) linear (b) circular (c) doubly (d) multiply-linked

19. To implement quick sort.

20. To implement merge sort.

21. To implement the functions of a binary search tree.

22. To implement Heapsort.

23. To implement functions of string manipulation.

24. To implement the shortest path algorithm.

Course Name : Operating System Concepts Lab

Course Code :

Credits : 1 (L-T-P : 0-0-2)

List of Experiments:

1. To learn the basic commands of Linux- part 1 - file creation, paths, sub-directory, move copy,

delete, access rights etc.

2. Learn of editor nano.
3. Learning of editor vi.
4. To learn Windows/ MS-DOS basic commands- file creation, paths, sub-directory, move copy,

delete, file attributes etc.

5. To learn Linux commands- part II
6. To learn process creation part-I using system cell fork()
7. To learn process creation part-II - execution of a (new) programme (process) using system cell

exec()

8. To learn interprocess communication using pipe, shared memory and implementation of process

synchronization algorithms

9. To learn process synchronization- using open MP/ IPC

10. To learn signal handling system calls in Linux

11. To learn concurrent programming in Linux using threads

12. To write solution of a classical synchronization problem using thread and semaphores

SYLLABUS SECOND YEAR

FOURTH SEMESTER

SUBJECTS

Course Name :: Digital Communication Systems

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Line Codes: On-Off (RZ), Polar (RZ), Bipolar (RZ), on-off (NRZ),-Polar (NRZ) & their Power spectrum density (PSD), HDB coding, B8ZS signaling.

Baseband Pulse transmission: Inter-symbol Interference (ISI) & its Reduction. Techniques, Nyquist

criterion for distortionless baseband binary transmission, correlative coding, eye pattern.

Digital Passband transmission: BPSK, BFSK, QPSK, QAM, MSK and M-ary, PSK, M-ary FSK

transmitter and receiving systems and their detection , Probability of error, Power spectra, Matched

filter. Introduction to Link Budget Analysis.

Spread spectrum Techniques: Spread Spectrum Overview, PN Sequences, DS-spread spectrum &

Frequency- hop spread spectrum systems and their analysis, Introduction to W-CDMA and multiuser

detection.

Course Outcomes:

Co1- Understanding of different types of modulation and demodulation techniques for digital

communication

Co2- To learn the ISI and equalization techniques.

Co3-To analyse different types of channel coding schemes.

Co4-Understanding the performance of different digital communication systems

References:

1) Modern Digital & Analog Comm. systems 3/e B.P. Lathi; Oxford

2) Principles of Comm. Systems., Taub & Schilling, McGraw Hill publications.

3) Digital Comm.- By Proakis (TATA McGraw Hill) publications.

4) Digital Comm.-By Sklar (Pearson Education)

5) Comm. System 3/e Simon Haykin, Wiley Eastern Ltd.

Course Name :: Computer Architecture

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Single processor- basics of microprocessors,CPU control unit, Register Transfer and Micro

operations, assembler and Instruction set pipeline architecture.

16-bit, 32-bit /64-bit RISC and CISC processors ISA and assembly programming.

Memory organization- memory hierarchy, main memory, associative memory, cache memory, virtual memory, memory management .

Input-output organization- peripheral devices . Bus interface. Data transfer techniques. Direct memory access. I/O interrupts.

Multiprocessors- characteristics of microprocessors. Interconnection structures. Interprocessor arbitration. Digital computer arithmetic- fixed point addition,subtraction, multiplication and division. Decimal arithmetic. Floating point arithmetic.

Course Outcomes:

CO1-To understand the working of basic processor

CO2-To describe the 16,32,64-bit processors ISA (CISC and RISC)

CO3-To understand the memory and its management in computer system

CO4-To understand I/O interface and multiprocessor interconnect and other issues

CO5-To learn the arithmetic(fixed and floating point) algorithms and equivalent circuits

CO6-To write assembly programmes and design memory and arithmetic ckts. (analytically and design issues)

References:

1) Computer System Architecture-M. Morris Mano (PHI)

2) Computer Architecture- A quantitative approach (ARM ed) -Hennessy , Patterson (PHI) Computer

Organization -V. Carl. Hamacher (TMH)

3) Computer Organization and Architecture -John P Hayes (McGraw -Hill) Computer Organization and

Architecture – William Stallings (Pearson)

4) Computer System Organization-A. S. Tanenbaum (PHI).

Course Name : MICROWAVE ENGINEERING

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Unit I Introduction of Microwave Electromagnetic spectrum. Microwave signal propagation, Applications of Microwave and Microwave hazards. Transmission line, smith chart

Unit II Review of Maxwell’s equation, Rectangular waveguides, characteristics of TE and TM wave in rectangular wave guides, Dominant mode in rectangular waveguide, Introduction to Cylindrical

waveguides, waveguide excitation.

Unit III Microwave resonator, Microwave Network representations. Scattering matrix. S-Matrix for

two, three & four port networks such as E-plane tee, H-plane tee, Magic tee, directional coupler and

other microwave components.

Unit IV Transit time effect, Tubes for very high frequency limitation of conventional tubes, Reflex

klystron, two cavity klystron, Magnetron, Travelling Wave Tube.

Unit V Measurement of VSWR, impedance, frequency, dielectric constant power, attenuation and

phase shift.

Course Outcomes :

CO1- Evaluate various parameters of transmission lines

CO2- Analyze modes and dominant mode in rectangular waveguide and cylindrical waveguide.

CO3- Explain and evaluate performance of multiport microwave networks

CO4- Design isolator, basic microwave amplifiers, particularly klystrons, magnetron, basic RF

oscillator and mixer models.

CO5- Compute the measurement parameters such as VSWR, impedance, frequency, dielectric constant

power, attenuation and phase shift etc related to microwave circuits

References:

1) Introduction to Microwaves -Wheeler G.J., Prentice-Hall

2) Microwave circuits & passive devices- Sisodia and Raghuvanshi, New Age International.

3) Microwave engineering-David M. Pozar, John Wiley & Sons, Inc.

4) Microwave Devices and Circuits- Samuel Y. Liao, Prentice Hall

5) Microwave and Radar Engineering- Kulkarni, McGraw Hill Education

Course Name : Control Systems Engineering

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Fundamentals of Control System: Concept of open loop and closed loop control systems.

Applications of open loop and closed loop systems, Representation of physical system.

Transfer Function: Determination of transfer function by block diagram reduction technique and signal flow graph method.

Time domain Analysis: Time response analysis of first order and second order system: Transient response analysis, steady state error and error constants. Absolute and relative stability, Routh's stability criterion, Root locus method of analysis.

Frequency domain method: Bode plot, Polar plot, Compensator and Nyquist stability criterion.

State variable Approach: Representation of state equations, Relationship between state and differential equations, solution of state equations, state transition matrix. Controllability and observability of control systems.

Course Outcomes:

At the end of the course the student will be able to:

CO1- Ability to analyze the operation and modeling of closed loop feedback systems

CO2- Ability to analyze and compensate the steady- state and transient response of the systems.

CO3- Ability to investigate the stability of control systems

CO4- Ability to analyze control system using state variable technique.

References:

1) I.J. Nagrath & M. Gopal : Control Systems Engineering, III Edition, NAI Pub.

2) Katshuhiko Ogata : Modern Control Engineering, III Edition, PHI.

3) Banjamin C. Kuo : Automatic Control Systems, VII Edition, PHI.

Course Name : Analog CMOS IC

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Physics of MOS Transistors: Review of current equation, regions of operation, small signal model.

Amplifiers: Common Source, Source follower, Common Gate and Cascode amplifiers, Biasing Techniques.

Current Mirror: Basic Current Mirrors, Cascode Current mirror.

Differential Amplifier: Basic differential Pair, common mode response, CMRR, Differential

Pair with MOS load, Active load, Cascode differential amplifier.

Frequency Response of Amplifiers: Miller Effect, Association of Poles with nodes,

Frequency Response of all single stage amplifiers.

Feedback: Topologies, Stability and Compensation.

Two Stage OpAmp

Course Outcomes :

CO1-Understand the operation of MOSFET and its small signal model. (Cognitive-Understanding)

CO2-Analyze and design amplifiers, current mirrors and differential amplifiers. (Skills- Analyze)

CO3-Understand the significance of different biasing techniques and apply them aptly to different

circuits. (Cognitive- Understanding)

CO4- Comparatively evaluate the frequency response of different single stage amplifiers (Cognitive-

Analyze)

CO5- Analyze & design the compensation method of amplifiers for stability.(Skills- Evaluate)

References:

1. Behzad Razavi, Fundamentals of Microelectronics, Second edition, Wiley, 2013,

2. Sedra and Smith, Microelectronics Circuits, Oxford Univ. Press, 2004, Johns and Martin,

Analog Integrated Circuit Design, John Wiley & Sons, 2002 AND Allen Holberg, CMOS

Analog Integrated Circuit Design: Oxford University Press, 2002.

Course Name : Digital Signal Processing

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Z-Transform, Inverse Z-Transform, Properties of the Z-Transform, Inversion of the Z-Transforms (by

Power Series Expansion, by Partial-Fraction Expansion), Analysis of Linear Time-Invariant Systems

in the z-Domain, Response of Systems with rational System Functions, Transient and Steady-State

Responses, Causality and Stability.

Frequency-Domain Sampling and Reconstruction of Discrete-Time Signals, The Discrete Fourier Transform, The DFT as a Linear Transformation, Relationship of the DFT to other Transforms, Properties of the DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs and Circular Convolution, Additional DFT Properties, Linear Filtering Based on DFT.

FFT Algorithms, Direct Computation of the DFT, Radix-2 FFT Algorithms: Decimation-In-Time (DIT), Decimation-In-Time (DIF); Applications of FFT Algorithms: Use of the FFT Algorithm in Linear Filtering and Correlation.

Structure for the Realization of Discrete-Time Systems, Structure for FIR Systems: Direct-Form Structure, Cascade-Form Structures, Structure for IIR Systems: Direct-Form Structures, Signal Flow Graphs and Transposed Structures, Cascade-Form Structures, Parallel-Form Structures.

Design of FIR Filters, Symmetric and Antisymmetric FIR Filters, Design of Linear-Phase FIR Filters by using Windows, Design of Linear-Phase FIR Filters by the Frequency-Sampling Method; Design of IIR Filters from Analog Filters: IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation

Course Outcomes:

CO1- The basic objective of the course is to introduce and familiarize some important & useful signal processing techniques such as convolution, Fourier & Z-transform, filter design, structures for FIR and IIR systems. SYLLABUS SECOND YEAR

FOURTH SEMESTER

SUBJECTS

Course Name :: Digital Communication Systems

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Line Codes: On-Off (RZ), Polar (RZ), Bipolar (RZ), on-off (NRZ),-Polar (NRZ) & their Power spectrum density (PSD), HDB coding, B8ZS signaling.

Baseband Pulse transmission: Inter-symbol Interference (ISI) & its Reduction. Techniques, Nyquist

criterion for distortionless baseband binary transmission, correlative coding, eye pattern.

Digital Passband transmission: BPSK, BFSK, QPSK, QAM, MSK and M-ary, PSK, M-ary FSK

transmitter and receiving systems and their detection , Probability of error, Power spectra, Matched

filter. Introduction to Link Budget Analysis.

Spread spectrum Techniques: Spread Spectrum Overview, PN Sequences, DS-spread spectrum &

Frequency- hop spread spectrum systems and their analysis, Introduction to W-CDMA and multiuser

detection.

Course Outcomes:

Co1- Understanding of different types of modulation and demodulation techniques for digital

communication

Co2- To learn the ISI and equalization techniques.

Co3-To analyse different types of channel coding schemes.

Co4-Understanding the performance of different digital communication systems

References:

1) Modern Digital & Analog Comm. systems 3/e B.P. Lathi; Oxford

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3) Digital Comm.- By Proakis (TATA McGraw Hill) publications.

4) Digital Comm.-By Sklar (Pearson Education)

5) Comm. System 3/e Simon Haykin, Wiley Eastern Ltd.

Course Name :: Computer Architecture

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Single processor- basics of microprocessors,CPU control unit, Register Transfer and Micro

operations, assembler and Instruction set pipeline architecture.

16-bit, 32-bit /64-bit RISC and CISC processors ISA and assembly programming.

Memory organization- memory hierarchy, main memory, associative memory, cache memory, virtual memory, memory management .

Input-output organization- peripheral devices . Bus interface. Data transfer techniques.

Direct memory access. I/O interrupts.

Multiprocessors- characteristics of microprocessors. Interconnection structures.

Interprocessor arbitration. Digital computer arithmetic- fixed point addition,subtraction,

multiplication and division. Decimal arithmetic. Floating point arithmetic.

Course Outcomes:

CO1-To understand the working of basic processor

CO2-To describe the 16,32,64-bit processors ISA (CISC and RISC)

CO3-To understand the memory and its management in computer system

CO4-To understand I/O interface and multiprocessor interconnect and other issues

CO5-To learn the arithmetic(fixed and floating point) algorithms and equivalent circuits

CO6-To write assembly programmes and design memory and arithmetic ckts. (analytically

and design issues)

References:

1) Computer System Architecture-M. Morris Mano (PHI)

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Organization -V. Carl. Hamacher (TMH)

3) Computer Organization and Architecture -John P Hayes (McGraw -Hill) Computer Organization and

Architecture – William Stallings (Pearson)

4) Computer System Organization-A. S. Tanenbaum (PHI).

Course Name : MICROWAVE ENGINEERING

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Unit I Introduction of Microwave Electromagnetic spectrum. Microwave signal propagation,

Applications of Microwave and Microwave hazards. Transmission line, smith chart

Unit II Review of Maxwell’s equation, Rectangular waveguides, characteristics of TE and TM wave in rectangular wave guides, Dominant mode in rectangular waveguide, Introduction to Cylindrical

waveguides, waveguide excitation.

Unit III Microwave resonator, Microwave Network representations. Scattering matrix. S-Matrix for

two, three & four port networks such as E-plane tee, H-plane tee, Magic tee, directional coupler and

other microwave components.

Unit IV Transit time effect, Tubes for very high frequency limitation of conventional tubes, Reflex

klystron, two cavity klystron, Magnetron, Travelling Wave Tube.

Unit V Measurement of VSWR, impedance, frequency, dielectric constant power, attenuation and

phase shift.

Course Outcomes :

CO1- Evaluate various parameters of transmission lines

CO2- Analyze modes and dominant mode in rectangular waveguide and cylindrical waveguide.

CO3- Explain and evaluate performance of multiport microwave networks

CO4- Design isolator, basic microwave amplifiers, particularly klystrons, magnetron, basic RF

oscillator and mixer models.

CO5- Compute the measurement parameters such as VSWR, impedance, frequency, dielectric constant

power, attenuation and phase shift etc related to microwave circuits

References:

1) Introduction to Microwaves -Wheeler G.J., Prentice-Hall

2) Microwave circuits & passive devices- Sisodia and Raghuvanshi, New Age International.

3) Microwave engineering-David M. Pozar, John Wiley & Sons, Inc.

4) Microwave Devices and Circuits- Samuel Y. Liao, Prentice Hall

5) Microwave and Radar Engineering- Kulkarni, McGraw Hill Education

Course Name : Control Systems Engineering

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Fundamentals of Control System: Concept of open loop and closed loop control systems.

Applications of open loop and closed loop systems, Representation of physical system.

Transfer Function: Determination of transfer function by block diagram reduction technique and signal flow graph method.

Time domain Analysis: Time response analysis of first order and second order system: Transient response analysis, steady state error and error constants. Absolute and relative stability, Routh's stability criterion, Root locus method of analysis.

Frequency domain method: Bode plot, Polar plot, Compensator and Nyquist stability criterion.

State variable Approach: Representation of state equations, Relationship between state and differential equations, solution of state equations, state transition matrix. Controllability and observability of control systems.

Course Outcomes:

At the end of the course the student will be able to:

CO1- Ability to analyze the operation and modeling of closed loop feedback systems

CO2- Ability to analyze and compensate the steady- state and transient response of the systems.

CO3- Ability to investigate the stability of control systems

CO4- Ability to analyze control system using state variable technique.

References:

1) I.J. Nagrath & M. Gopal : Control Systems Engineering, III Edition, NAI Pub.

2) Katshuhiko Ogata : Modern Control Engineering, III Edition, PHI.

3) Banjamin C. Kuo : Automatic Control Systems, VII Edition, PHI.

Course Name : Analog CMOS IC

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Physics of MOS Transistors: Review of current equation, regions of operation, small signal model.

Amplifiers: Common Source, Source follower, Common Gate and Cascode amplifiers, Biasing Techniques.

Current Mirror: Basic Current Mirrors, Cascode Current mirror.

Differential Amplifier: Basic differential Pair, common mode response, CMRR, Differential

Pair with MOS load, Active load, Cascode differential amplifier.

Frequency Response of Amplifiers: Miller Effect, Association of Poles with nodes,

Frequency Response of all single stage amplifiers.

Feedback: Topologies, Stability and Compensation.

Two Stage OpAmp

Course Outcomes :

CO1-Understand the operation of MOSFET and its small signal model. (Cognitive-Understanding)

CO2-Analyze and design amplifiers, current mirrors and differential amplifiers. (Skills- Analyze)

CO3-Understand the significance of different biasing techniques and apply them aptly to different

circuits. (Cognitive- Understanding)

CO4- Comparatively evaluate the frequency response of different single stage amplifiers (Cognitive-

Analyze)

CO5- Analyze & design the compensation method of amplifiers for stability.(Skills- Evaluate)

References:

1. Behzad Razavi, Fundamentals of Microelectronics, Second edition, Wiley, 2013,

2. Sedra and Smith, Microelectronics Circuits, Oxford Univ. Press, 2004, Johns and Martin,

Analog Integrated Circuit Design, John Wiley & Sons, 2002 AND Allen Holberg, CMOS

Analog Integrated Circuit Design: Oxford University Press, 2002.

Course Name : Digital Signal Processing

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Z-Transform, Inverse Z-Transform, Properties of the Z-Transform, Inversion of the Z-Transforms (by

Power Series Expansion, by Partial-Fraction Expansion), Analysis of Linear Time-Invariant Systems

in the z-Domain, Response of Systems with rational System Functions, Transient and Steady-State

Responses, Causality and Stability.

Frequency-Domain Sampling and Reconstruction of Discrete-Time Signals, The Discrete Fourier

Transform, The DFT as a Linear Transformation, Relationship of the DFT to other Transforms,

Properties of the DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs

and Circular Convolution, Additional DFT Properties, Linear Filtering Based on DFT.

FFT Algorithms, Direct Computation of the DFT, Radix-2 FFT Algorithms: Decimation-In-Time

(DIT), Decimation-In-Time (DIF); Applications of FFT Algorithms: Use of the FFT Algorithm in

Linear Filtering and Correlation.

Structure for the Realization of Discrete-Time Systems, Structure for FIR Systems: Direct-Form

Structure, Cascade-Form Structures, Structure for IIR Systems: Direct-Form Structures, Signal Flow

Graphs and Transposed Structures, Cascade-Form Structures, Parallel-Form Structures.

Design of FIR Filters, Symmetric and Antisymmetric FIR Filters, Design of Linear-Phase FIR Filters

by using Windows, Design of Linear-Phase FIR Filters by the Frequency-Sampling Method; Design of

IIR Filters from Analog Filters: IIR Filter Design by Impulse Invariance, IIR Filter Design by the

Bilinear Transformation

Course Outcomes:

CO1- The basic objective of the course is to introduce and familiarize some important & useful signal

processing techniques such as convolution, Fourier & Z-transform, filter design, structures for FIR and

IIR systems.

CO2- Students will develop programming skills for implementing signal processing algorithms using

MATLAB.

References:

1) Digital Signal Processing – Principles, Algorithms and Applications by J. G. Proakis and D. G.

Manolakis, 4th Edition, Pearson.

2) Digital Signal Processing by A. V. Oppenheim and R. W. Schafer, PHI.

3) Principles of Signal Processing and Linear Systems by B.P. Lathi, Oxford.

4) Digital Signal Processing: A MATLAB-Based Approach by Vinay K. Ingle and John G. Proakis,

Cengage Learning.

5) Fundamentals of Digital Signal Processing using MATLAB by Robert J. Schilling and Sandra L.

Harris, Cengage Learning.

Course Name : Soft Skills & Personality Development (Audit)

Course Code :

Credits : 3 (L-T-P : 2-1-0)

CO2- Students will develop programming skills for implementing signal processing algorithms using

MATLAB.

References:

1) Digital Signal Processing – Principles, Algorithms and Applications by J. G. Proakis and D. G.

Manolakis, 4th Edition, Pearson.

2) Digital Signal Processing by A. V. Oppenheim and R. W. Schafer, PHI.

3) Principles of Signal Processing and Linear Systems by B.P. Lathi, Oxford.

4) Digital Signal Processing: A MATLAB-Based Approach by Vinay K. Ingle and John G. Proakis,

Cengage Learning.

5) Fundamentals of Digital Signal Processing using MATLAB by Robert J. Schilling and Sandra L.

Harris, Cengage Learning.

Course Name : Soft Skills & Personality Development (Audit)

Course Code :

Credits : 3 (L-T-P : 2-1-0)

FOURTH SEMESTER

LABORATORIES

Course Name : Digital Communication Systems Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1. Study of BPSK Modulation and Demodulation

2. Study of DPSK Modulation and Demodulation

3. Study of QPSK Modulation and Demodulation

4. Study of QAM Modulation and Demodulation

5. Study of ADPCM Modulation and Demodulation

6. Study of Square waveform synthesis

7. Study of Triangular waveform synthesis

8. Study of Saw-tooth waveform synthesis

9. Study of Amplitude-Modulated signal synthesis

10. Simulation of ASK Generation and Detection Scheme

11. Simulation of BPSK Generation and Detection Schemes

12. Simulation of FSK generation and detection scheme

13. Simulation of DPSK, QPSK Generation Schemes

14. Observation (simulation) of signal constellations of BPSK, QPSK and QAM

15. Simulation of linear block coding scheme

16. Simulation of error control using cyclic code

17. Simulation of Convolutional coding scheme

18. Communication link simulations

Course Name :Microwave Engineering Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1. To study and plot the radiation pattern of λ/2 Dipole antenna in azimuth plan on log/linear scale on polar plot.

2. To study and plot the radiation pattern of folded Dipole antenna in azimuth plan on log/linear scale on polar plot.

3. To study and plot the radiation pattern of Yagi (4el) antenna in azimuth plan on log/linear scale on polar plot.

4. To study and plot the radiation pattern of Square Loop antenna in azimuth plan on log/linear scale on polar plot.

5. To study and plot the radiation pattern of Helix antenna in azimuth plan on log/linear scale on polar plot.

6. To study and plot the radiation pattern of Micro strip antenna in azimuth plan on log/linear scale on polar plot.

7. To study and plot the radiation pattern of Log Periodic antenna in azimuth plan on log/linear scale on polar plot.

8. To study and plot the radiation pattern of End fire antenna in azimuth plans on Log/linear scale on polar plot.

9. To study and plot the radiation pattern of Broadside antenna in azimuth plans on Log/linear scale on polar plot.

10. To study resonant and non-resonant antenna and calculate the resonant frequency and estimate the VSWR of antenna.

11. To study the spectrum analyzer.

Course Name :Analog CMOS IC Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

To find 3dB frequency & gain for different values of load & W/L ratio in case of common source stage with resistive load using N-MOSFET.

To find 3 dB frequency & gain for different values of load & W/L ratio for common source stage with resistive load using P-MOSFET.

Simulation & analysis of diode connected load common source amplifier. Find edge of triode region & gm1, gm2, gain & 3 dB frequencies.

DC analysis of source follower using resistive & current source load.

AC analysis of common gate amplifiers and calculate input and output impedance.

AC analysis of cascade stage amplifier.

AC analysis differential amplifier & calculate CMRR.

Simulation of basic current mirrors using resistive load using N-MOSFET and P MOSFET.

Simulation of cascade current mirrors using resistive load using N-MOSFET and N-MOSFET and P-MOSFET.

10. Simulation of Wilson Current mirror circuit.

11. Mini project

Course Name : Digital Signal Processing Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1. Write a program to find convolution of two vectors.

2. Write a program to find correlation of two vectors.

3. Write a program to find out circular convolution of two vectors.

4. Write a program to design FIR low pass filter.

5. Write a program to design FIR high pass filter.

6. Write a program to design FIR band pass filter.

7. Write a program to design FIR band stop filter.

8. Write a program to design IIR low pass filter.

9. Write a program to design IIR high pass filter.

10. Write a program to design IIR band pass filter.

11. Write a program to evaluate Discrete Fourier Transform (DFT) of a Signal.

12. Write a program to evaluate Inverse Discrete Fourier Transform (IDFT) of a Signal.

13. Writing a program to apply histogram equalization on an image to improve its brightness.

14. Write a program to compress an image using Discrete Wavelet transform and reconstruct the

original image from the compressed image.

Course Name : Technical Documentation

Course Code :

Credits : 1 (L-T-P : 0-0-2)

Syllabus

Introduction: Literature survey – Understanding journal metrics (impact factor, number of citations, h

index, i10 index), Identifying high impact articles, Problem identification, Ethics of publishing.

2 hours

Document Formatting: Advantages of LaTeX, Installation, Package manager, Editors, Typesetting, Classes – Book, Thesis, Article, Slide, Poster, Parts of a document - Chapters, Sections, Items, Fonts,

Acronyms, Author kits, Debugging. 8 hours

Figures, Tables, and Equations: Figures, Subfigures, Tables, Types of tables, Spacing in tables,

Captions, Equations, Equation arrays, Equation numbering, Labels. 8 hours

Referring articles: Using labels, Citing articles, Bibliography, Bibtex, Styles, Mendeley, JabRef.

4 hours

Artwork: Drawing with LaTeX, Flowcharts in LaTeX, Creating plots with Gnuplot/ Octave/ Matlab,

Creating scalable vector graphics with Inkscape, Tikz. 4 hours

Reformatting documents, Reviewing technical documents.

2 hours

References:

World wide web

Similar courses at:

https://www.anadolu.edu.tr/en/academics/faculties/course/99276/documentation-with-latex/content (3

credit) Anadolu University, Turkey

https://www.training.cam.ac.uk/course/ucs-latex (2 half days) Cambridge, UK

UG SCHEME : Department of Electronics & Communication Engineering,

Malaviya National Institute of Technology Jaipur

http://uva-fnwi.github.io/LaTeX/ (4 weeks) University of Amsterdam, Netherlands

https://www.bath.ac.uk/guides/getting-started-with-latex-an-introductory-course-for-doctoral-students/

(6 Hours) University of Bath, UK

Outcomes – The students will be able to

1. Identify high impact literature, understand the importance of ethical publishing

2. Use LaTeX to compile technical documents containing quality figures, tables, and equations.

3. Use bibtex for automatic referencing.

4. Create quality graphics.

SYLLABUS THIRD YEAR

FIFTH SEMESTER

SUBJECTS

Course Name :Microprocessors

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Introduction to 8085 Microprocessor: Block diagram, pins & their description, demultiplexing of

buses, control signals & flags. Introduction to 8085 based microcomputer system.

Instruction & Timings: Instruction classification, instruction formats, addressing modes, Instruction

timings and status.

Programming & Programming Techniques of the 8085: 8085 instruction set, data transfer

instructions, arithmetic, logic & branch operations. Rotate & compare. Instructions related to stack

operations. Looping, counting and indexing, counters & time delays.

Stack and Subroutines: Concept of stack in 8085 and its uses. Subroutines implementation in 8085

assembly language.

Interfacing Concepts: Basic interfacing concepts. Memory Interfacing. Memory mapped and

peripheral mapped I/O. Interrupts in 8085 and their features. A/D and D/A converters. Interfacing A/D

and D/A converters.

Programming & interfacing of Support ICs: Interfacing of 8155, 8255, 8279 with 8085.

Introduction to other support chips: Introduction of 8253 and 8259A with 8085 microprocessor.

Direct memory Access: Basic concepts of DMA techniques and introduction DMA controller 8257.

Course Outcomes:

CO1- Is able to grasp the functioning of 8085 microprocessor.

CO2- Is able to appreciate the significance of demultiplexing for different application.

CO3- Is able to understand the development of codes with different data transfer methods.

CO4- Is able to understand the concept of memory mapping and I/O mapping.

CO5- Is able to understand the different interfacing ICs as 8255/8257/8259.

CO6- Design algorithm and writing the codes for different arithmetic, logical and control units.

References:

1) J.L. Antonakos, An Introduction to the Intel Family of Microprocessors, Pearson, 1999.

2) Barry B. Brey,The Intel Microprocessors, (7/e),Eastern Economy Edition , 2006.

3) M.A. Mazidi & J.C. Mazidi Microcontroller and Embedded systems using Assembly & C. (2/e), Pearson

Education,

Course Name :Antenna & Wave Propagation

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

1) Antenna Fundamentals :- Effective Aperture, Gain, Bandwidth, Beamwidths,

Radiation Resistance, Polarization, Radiation Pattern, Reciprocity Theorem,

Effective Length, Antenna Temperature

2) Antenna Arrays and Frequency Independent Antennas : Collinear, Broadside,

Endfire Arrays, Binomial, Dolph Tschebyscheff Arrays, Spiral and Log Periodic

Antennas

3) UHF and Microwave Antennas: Parabolic Reflector, Horn , Lens

Antennas, Microstrip Antennas and Arrays, Analysis and feed networks

4) Radio Wave Propagation: Ground, Space and Sky wave Propagation, Ionospheric

Layers, Analysis of EM wave Propagation in ionic medium, MUF and skip zone

5) Antennas for 5G Communication, Wave Propagation Models in Mobile

Environment

Course Outcomes :

CO1- To learn the fundamentals of antenna and its characteristics.

CO2- To understand the concepts of Antenna Arrays, UHF & Microwave Antennas, Microstrip

antennas.

CO3- To understand the radio wave propagation techniques.

CO4- To understand the free space communication, Reflection models, Diffraction model & Indoor

propagation models.

References:

1. Antennas Theory and Analysis - By Balanis (Wiley Publisher)

2. Antennas and Wave Propagation by K. D. Prasad

3. Antennas by Krauss (TMH Publisher)

Course Name : VLSI Testing &Testability

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Introduction to Digital Testing: Introduction, Test process and Test economics,- Functional vs.

Structural Testing Defects, Errors, Faults and Fault Modeling (Stuck at Faults, Bridging Faults, transitor

fault, delay fault), Fault Equivalence, Fault Dominance, Fault Collapsing and Checkpoint Theorem

Fault Simulation and Testability Measures: Circuit Modelling and Algorithms for Fault Simulation,

Serial Fault Simulation, Parallel Fault Simulation, Deductive Fault Simulation, Concurrent Fault

Simulation, Combinational SCOAP Measures and Sequential SCOAP Measures, Critical Path Tracing

Combinational Circuit Test Pattern Generation: Introduction to Automatic Test Pattern Generation

(ATPG) and ATPG Algebras, Standard ATPG Algorithms, D-Calculus and D-Algorithm, Basics of

PODEM Random, Deterministic and Weighted Random Test Pattern Generation; Aliasing and its

effect on Fault Coverage.

PLA Testing, Cross Point Fault Model and Test Generation. Memory Testing- Permanent, Intermittent

and Pattern Sensitive Faults

Sequential Circuit Testing and Scan Chains: ATPG for Single-Clock Synchronous Circuits, Use of

Nine-Valued Logic and Time-Frame Expansion Methods, Complexity of Sequential ATPG, Scan Chain

based Sequential Circuit Testing, Scan Cell Design, Design variations of Scan Chains, Sequential

Testing based on Scan Chains, Overheads of Scan Design, Partial-Scan Design Controllability and

Observability Scan Design, BILBO , Boundary Scan for Board Level Testing ; BIST and Totally self

checking circuits

Self Repairing circuits and BIST: Introduction to BIST architecture BIST Test Pattern Generation,

Response Compaction and Response Analysis, Memory BIST, March Test, BIST with MISR,

Neighbourhood Pattern Sensitive Fault Test, Transparent Memory BIST, Totally self checking circuits,

Concept of Redundancy, Spatial Redundancy, Time Redundancy, Error Correction Codes. Recent

trends in VLSI Testing and Testability

Course Outcomes :

CO1- Distinguish Step Index, Graded index fibers and compute mode volume.

CO2- Explain the Transmission Characteristics of fiber and Manufacturing techniques of fiber/cable.

CO3- Classify the construction and characteristics of optical sources and detectors.

CO4- Discuss splicing techniques, passive optical components and explain noise in optical system.

CO5- Design short haul and long haul Analog/ Digital optical communication system and explain

advanced optical transmission systems.

References:

1) Abramovici, M., Breuer, M. A. and Friedman, A. D. Digital systems testing and testable

design. IEEE press (Indian edition available through Jayco Publishing house), 2001.

2) Bushnell and Agarwal, V. D. VLSI Testing. Kluwer.

3) Agarwal, V. D. and Seth, S. C. Test generation for VLSI chips. IEEE computer society

press.

4) Hurst, S. L. VLSI testing: Digital and mixed analog/digital techniques. INSPEC/IEE, 1999

5) https://nptel.ac.in/courses/106103116/handout/mod7.pdf

6) http://ece-research.unm.edu/jimp/vlsi_test/slides/html/overview1.htm,

7) http://www.cs.uoi.gr/~tsiatouhas/CCD/Section_8_1-2p.pdf, Latest

Course Name : Embedded Systems

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Syllabus:

Embedded Computing- Microprocessors, embedded design process, system description

formalisms. Instruction sets- CISC and RISC;

MBeD platform; ARM architectures and programming- Cortex M0 etc;

CPU fundamentals- programming I/Os, co-processors, supervisor mode, exceptions, memory

management units and address translation, pipelining, superscalar execution, caching, CPU power

consumption.

Embedded platform- CPU bus, memory devices, I/O devices, interfacing, debugging techniques.

Realtime OS, timer & pulse width modulation, Serial and parallel communication, digital I/O,

Analog I/O, interrupts, low power techniques

Hardware accelerators- CPUs and accelerators, accelerator system design. Networks- distributed

embedded architectures, networks for embedded systems, network-based design, Internet- enabled

systems.

Course Outcomes:

CO1- Appreciate difference between embedded and other types of computing and their specific

hardware requirements.

CO2- Identify and interface embedded platform components.

CO3- ARM family processor architectures and their specific uses.

CO4- Program analysis and optimization

CO5- Able to compile programs,, download and run them on hardware

References:

1) Wolf, W. Computers as components- Principles of embedded computing system design.

Academic Press (Indian edition available from Harcourt India Pvt. Ltd., 27M Block market,

Greater Kailash II, New Delhi-110 048.) 2)

Vahid and T. Givargis. Embedded System Design: A Unified Hardware/Software

Introduction , Wiley, 2002.

3)

4) Furber, ARM System-on-Chip Architecture, Pearson

ARM reference manuals for cortex M0+ .

Course Name : Digital CMOS IC

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Introduction to MOSFETs technology: Construction and working of MOSFET, Current-Voltage

Characteristics, and Performance metrics for digital design, Fabrication flow of CMOS n-well process.

CMOS Inverter: Design and analysis of NMOS inverter (resistive, enhancement and depletion load) ,

CMOS inverters; Noise margins, rationing of transistor size, logic voltage levels, rise and fall of delays,

Propagation Delay, Power Consumption.

Combinational Circuits: Design of basic gates in NMOS technology; CMOS logic design styles: static

CMOS logic (NAND, NOR gates), complex gates, Pass Transistor logic, Transmission gate, Dynamic

MOS design: pseudo NMOS logic, clocked CMOS (C2 MOS) logic, domino logic, NORA, Half and

Full adder), Multiplexer, XOR, XNOR.

Logical Effort: Logical effort of different digital circuit design, parasitic delay, Single stage and

Multistage with and without branch network.

Layout and stick diagram: Layout design rules: Lambda and micron based design rules- stick diagram,

Layout design of different CMOS circuit, area estimation.

Sequential Circuits and Memory Design: Sequential MOS Logic and Memory Design: Static latches;

Flip flops & Register.

Course Outcomes :

At the end of the course the student will be able to:

CO1- Understand the advancement of CMOS devices and circuits

CO2- Design CMOS circuits with specified noise margin and propagation delay.

CO3- Implement efficient techniques at circuit level for improving power and speed of

combinational and sequential circuits.

CO4- Design and optimization of layout for Digital ICs.

CO5- Design and analysis of efficient memory architectures.

References:

1. Sung-Mo Kang & Yusuf Leblebici, CMOS Digital Integrated Circuits Analysis and Design, Second

Edition, McGraw-Hill, 1999.

2. Rabaey, Chandrakasan and Milokic. Digital system design- A design perspective. Pearson

education, India.

3. Neil H.E.Weste and Kamran Eshraghian, Principles of CMOS VLSI Design, A System Perspective,

Pearson Education, India. 4. Ken Martin, Digital Integrated Circuits, Oxford Press.

4. CMOS Circuit Design, Layout and simulation: J. Baker, D.E. Boyce., IEEE press.

FIFTH SEMESTER

LABORATORIES

Course Name : Project Lab I

Course Code :

Credits : 3 (L-T-P: 0-0-6)

List of Experiments/ activities

Design, verification, prototyping and implementation of hardware/ software

Devices, circuits and systems based on software, hardware, algorithms, protocol, concepts in emerging

areas such as AI, ML, IoT, Sensors, Smart Antennas, NOMA, Computer Vision, Computer Networking,

Nano Devices, Smart Materials, Data Mining, Nano Photonics, Optical Wireless Communications,

Embedded Systems, Chip Design, Drone Technology and related areas

Course Name : Microprocessors Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1. 0x0101.

2.A byte is stored in location 0x0100. Complement this byte and store the result in location

Two bytes are available in locations 0x0100 and 0x0101. Add them and store the result in

0x0102. Neglecting the carry generated.

3. Subtract using 2's complement 0x0100 (Subtrahend), 0x0101 (Minuend), Store result in

location 0x0102, Neglect borrow.

4. Two 16 bit numbers are in locations 0x0100 and 0x0101 & 0x0102 and 0x0103. Add these 16

bit numbers and store the result in 0x0104-0x0105.

5.

6.Evaluation of problem (4) using 16 bit instructions.

Two 8-bit packed BCD numbers are available in 0x0100 and 0x0101. Add them and store the

result in 0x0102, Neglect carry.

7. Adding 3 consecutive bytes available in memory locations available in 0x0101, 0x0102,

0x0103. Neglect carry generated at each level and store the result in 0x0104.

8.A byte is available at location 0x0100. Separate out its nibbles and store them at locations

0x0101 and 0x0102.

9. Two nibbles are available at locations 0x0100 and 0x0101. Combine them to form a byte and

store at location 0x0102.

10.Two bytes are available at location 0x0100 & 0x0101. Compare them for equality i.e. if they
are

equal than store the same value at 0x0102 else store 00 at 0x0102.

11.A byte is available at 0x0100. Check this byte for odd/even parity. If odd store 'OD' in 0x0101
else

store 'EE' in 0x0101.

12.Multiplication by 2 using bit rotation. A byte is available at 0x0100. Multiply it by 2 and store
the

result generated in 0x0101. Neglect carry.

13.A group of N bytes are available from 0x0101 onwards. The no. of bytes in the group available
in

0x0100. Add these bytes and store the result in 0x0200. Neglect carry generated.

14.Addition of N bytes starting from 0x0101 onwards. No. of bytes is available in 0x0100. Take carry

into account. The result will be stored in 0x0200-0x0201.

15.Multiplication by repeated addition of two bytes is available in location 0x0100 and 0x0101.

Multiply them and store the result in 0x0102-0x0103 (with minimum no. of addition).

16.Multiplication of 16 bit number by a 8 bit number. Let 16 bit number located at 0x0100 and 0x0101.

8-bit no. is stored at 0x0102. Store result in 0x0103, 0x0104 and carry at 0x0105.

17.Divide two 8-bit numbers by repeated subtraction. Dividend at 0x0100 and divisor at 0x0101 and

store the quotient at 0x0102 (rounding off).

18.A group of N bytes are available from 0x0101 onwards. The value of N is available in 0x0100.

Move these bytes from 0x0201 onwards.

19.Numbers from 0x00 to 0x0F are present in 0x0100. Squares of numbers are available from 0x0200

onwards. Store the result in 0x0101.

20.Multiplication by partial products (0x0100–Multiplicand,0x0101- Multiplier, 0x0102-0x0103 –

Product).

21.To print "Hello World" in screen.

22.Read a character from keyboard and display it on monitor.

23.Adding two one digit numbers. The result should also be of one digit.

24.Find the factorial of numbers (factorial max value can be 65535).

25. Conversion of a byte from Hexadecimal to BCD.

Course Name : Antenna and Wave Propagation Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1. To study and plot the radiation pattern of λ/2 Dipole antenna in azimuth plan on log/linear scale on

polar plot.

2. To study and plot the radiation pattern of folded Dipole antennas in azimuth plan on log/linear scale

on polar plot.

3. To study and plot the radiation pattern of Yagi (4el) antenna in azimuth plan on log/linear scale on

polar plot.

4. To study and plot the radiation pattern of the Square Loop antenna in azimuth plan on log/linear

scale on polar plot.

5. To study and plot the radiation pattern of Helix antenna in azimuth plan on log/linear scale on polar

plot.

6. To study and plot the radiation pattern of Micro Strip antenna in azimuth plan on log/linear scale on

polar plot.

7. To study and plot the radiation pattern of Log Periodic antenna in azimuth plan on log/linear scale

on polar plot.

8. To study and plot the radiation pattern of the End Fire antenna in azimuth plans on Log/linear scale

on polar plot.

9. To study and plot the radiation pattern of Broadside antenna in azimuth plans on Log/linear scale on

polar plot.

10. To study resonant and non-resonant antenna and calculate the resonant frequency and estimate the

VSWR of the antenna.

11. Familiarization with basic operation of Vector Network Analyzer (VNA) and Use the VNA to

measure the complete S parameters of the components under test

Course Name : Digital CMOS IC Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

V characterization of Long channel N-MOSFET & P-MOSFET for using SPICE simulation.

V characterization of Short Channel N-MOSFET & P-MOSFET using a SPICE simulation.

VTC analysis of CMOS Inverter for different W/L Ratio of NMOS and PMOS.

Transient analysis of CMOS Inverter for input signal of equal rise and fall time.

Noise Margin Analysis of different NMOS based Inverter circuits such as Diode Connected Load,

Depletion Load, PMOS Load, etc.

Connect a 2 I/P NAND Gate to an identical NAND Gate such that the fan out is 1,2,5,10,50,100.

Plot the propagation Delay.

Connect a set of 7 inverters in a closed loop in the form of a clock. Estimate the clock frequency.

Determined experimentally change in clock frequency without load (i.e Cout/Cin), varying from

1, 20, 100.

Connect 3 I/P NAND gate a, b, c and connect to a capacitor such that fan out is 1. Find the rise

time of NAND gate for the I/P=000; 001; 011.

To design layout of CMOS inverter and followed by simulation.

10. To design a layout of 2 input NOR gate and followed by simulation.

11. To design a layout of 3 input NAND gate and followed by simulation.

12. Mini projects

Course Name : Embedded Systems Lab (Embedded Systems Design Lab)

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

1. Write a C or Assembly program to interface 7 segments with 8051/ARM to display 0-9 and 0-99 on

Universal embedded system Board.

2. Write a C or Assembly program to interface 16*2 Char LCD module with 8051/ARM on Universal

embedded system Board.

3. Write a C or Assembly program to interface ADC 0809 IC with 8051/ARM and Read Value on

LCD on Universal embedded system Board.

4. Write a C or Assembly program to interface DAC 0808 IC with 8051/ARM and Sine and triangular

Wave on Universal embedded system Board.

5. Write a C or Assembly program to interface a DC motor with 8051/ARM and Control the RPM

using PWM on Universal embedded system Board.

6. Write a C or Assembly program to interface Stepper Motor with 8051/ARM and study the angle of

rotation on Universal embedded system Board.

7. Write a C or Assembly program to interface Serial Communication with 8051/ARM and Read the

Value of ADC on PC.

8. Write a C or Assembly program to interface RTC with 8051/ARM and Read the Time on LCD and

serial monitor on PC.

9. Write a C or Assembly program to interface Relay Buzzer with 8051/ARM and control and per

instruction.

10. Write a C or Assembly program to interface HEX KEYPAD with 8051/ARM and Read the Values

on LCD and serial monitor on PC.

11. Write a C or Assembly program to interface external EEPROM with 8051/ARM and store the

values of ADC.

Universal Human Values & Ethics (Audit course)

L-T-P: 2-0-0 (2 Credits)

Syllabus

A. Universal Human Values-

Need, Basic Guidelines, Content and Process for Value Education

The problem Twin goals: happiness and just order; the role of value education

Paradoxes of happiness Concepts of good life – quality of life and subjective well-being;

happiness, life satisfaction, and positive affect; studying the quality of life through surveys;

and findings of quality The problem of social transformation Moral and institutional

approaches; and the inherent conflict between the two

.

Human values and humanism: dilemmas and directions- Jeevan Vidya; human values, “I”

and “Body” need for harmony in the self; harmony with the body; harmony in family,

society, nature and existence; evaluation of Jeevan Vidya. Implications of the above Holistic

Understanding of Harmony on Professional Ethics

.

Conceptualizing the relationship between man and society- Man and society; theories of man and society such as methodological individualism, structuralism, Gidden's theory of structuration, and structural symbolic interactionism

.

Religious and spiritual approaches to human happiness- Vedic, Jain and Buddhist philosophies; Christianity; Islam; Zoroastrianism, and Sikhism

B. Ethics & Professionalism-

.

.

Possibilities of transformation- Hope and hopelessness; transforming society;

Ethical Theories, Meta ethical theories- Consequentialist and Non-consequentialist Theories; Hedonism; Utilitarianism; Ethical Relativism: Is Anything Wrong at all? Ethical Naturalism; Non-naturalism; Non-cognitive or Non-descriptivist Theories; Intuitionism; Approach to an Adequate Theory; the Moral point of view; Why be Moral?

.

Professional ethics- The liberal society's values; Professions' nature and traits; Professional Ethics' roots and conventions; Professionals require their own code of behaviour.

.

The connection between professional and broader ethical standards; The topic of professional Ethics' autonomy and moral dilemma; Care practice, legal Ethics; Environmentalism; Computer Ethics; Business Ethics

Text:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

2. Weston, Anthony. A 21st Century Ethical Toolbox. New York: Oxford University Press, 2008.

3. Hospers, John. An introduction to philosophical analysis. New Delhi: Allied Publishers Private Limited, 1967.

References (not limited to):

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2. Rediscovering India - by Dharampal

3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

4. The Story of Stuff (Book).

5. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

6. Small is Beautiful - E. F Schumacher.

7. Slow is Beautiful - Cecile Andrews

8. Economy of Permanence - J C Kumarappa

9. Bharat Mein Angreji Raj – Pandit Sunderlal

10. Vivekananda - Romain Rolland (English)

11. Joshi, Harsiddh Maganlal. Traditional and Contemporary Ethics: Western and Indian. Bharatiya Vidya Prakashan, 2000.

12. Ranganathan, Shyam. Ethics and the history of Indian philosophy. Motilal Banarsidass Publishe, 2007.

13. MacIntyre, Alasdair. A short history of ethics: a history of moral philosophy from the Homeric age to the 20th century. Routledge, 2003.

14. Nussbaum, Martha C. The therapy of desire: Theory and practice in Hellenistic ethics. Vol. 33. Princeton University Press, 2013.

SYLLABUS THIRD YEAR

SIXTH SEMESTER

SUBJECT

Course Name : Management Principles for Engineers

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Course Name : Optical Communication Systems

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Fundamentals of fiber optics: Ray propagation, waveguiding in optical fibers, step index and graded index fibers, Modes in optical fiber, mono mode & multimode fibers, fiber fabrication, dispersion relations. Signal degradation: Dispersion, attenuation & scattering in fibers, link analysis.

Fiber Measurement: Measurement of fiber attenuation, bandwidth, power, & cut-off wavelength, OTDR.

Opto electronic devices:- Light source materials, LEDs, Lasers, Photo-diodes, PIN diodes etc. Modulation capability. Photodetectors, PIN photodiode and Avalanche photodiodes,

Power launching and coupling: Fiber joints, cables and connectors, fiber splices, optical coupler and optical measurements.

Analog and Digital optical transmission systems: Link Analysis, system design considerations for point-topoint links, noise sources in optical communication, system architecture. WDM, Coherent optical systems. Methods of modulation, Heterodyne and Homodyne systems, Noise in coherent systems, Multichannel coherent systems, Optical amplifiers, Introduction to lightwave networks

Dr. Satyasai Jagannath Nanda

DUGC Convener, DEPT OF ECE

Prof. Lava Bhargava,

HOD , DEPT of ECE

Course Outcomes :

CO1: Distinguish Step Index, Graded index fibers and compute mode volume.

CO2: Explain the Transmission Characteristics of fiber and Manufacturing techniques of fiber/cable.

CO3: Classify the construction and characteristics of optical sources and detectors.

CO4: Discuss splicing techniques, passive optical components and explain noise in optical system.

CO5: Design short haul and long haul Analog/ Digital optical communication system and explain advanced optical transmission systems.

References:

1. Fiber Optics and Optoelectronics – R.P. Khare

2. Optical Communication-VK Jain, Franz

3. Optical Communication - Keiser

4. Optical fiber communication - J.M. Senior

Course Name : Wireless and 5G Communication

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Introduction to 5G: Fundamentals of Wireless Communication, Evolution from 1G to 5G, 5G

spectrum, Wireless Standards: Overview of 2G 3G, 4G and 5G, Key capabilities of 5G, System

Architecture, Performance measures- Outage, average snr, average symbol/bit error rate. System

examples- GSM, EDGE, GPRS, IS-95, CDMA 2000 and WCDMA, 3G, 4G and 5G mobile

communications.

Cellular System Design Fundamentals: Components of Mobile Cellular Systems: Cell structure,

frequency reuse, cell splitting, Call origination & Termination. Cellular concepts- Signal propagation-

Propagation mechanism, reflection, refraction, diffraction and scattering, large scale signal propagation

and lognormal shadowing. Interference & System Capacity: Improving Capacity in Cellular Systems,

Co-Channel Interference, Channel Assignment Strategies, Handoff Strategies.

Channel Fading and Diversity: Multipath Measurements, Parameters of Mobile Multipath Channels,

Types of Fading: Multipath and small-scale fading- Doppler shift, power delay profile, average and rms

delay spread, coherence bandwidth and coherence time, flat and frequency selective fading, slow and

fast fading, average fade duration and level crossing rate. Impulse Response Model of a Multipath

Channel, Channel State Information. Receiver structure- Diversity receivers- selection and MRC

receivers, RAKE receiver, equalization: linear-ZFE and adaptive, DFE. Transmit diversity Altamonte

scheme

5G Radio Standard: Orthogonal frequency division multiplexing (OFDM), Modulation schemes-

BPSK, QPSK and variants, QAM, MSK and GMSK, multicarrier modulation, OFDM, MIMO and space time signal processing, spatial multiplexing, diversity/multiplexing tradeoff.

5G Enabling Technologies: Concept of 5G Communication, Multi-carrier with filtering, Filter-bank

based multi-carrier, Non-orthogonal multiple access (NOMA). Principle and Spectrum Allocation,

Power Control Mechanism in NOMA Techniques, 5G Applications.

Course Outcomes :

CO1- Appreciate and familiarize the world of mobile communications.

CO2- Develop requisite mathematical background for mobile systems using teletraffic theory,

probability theory and stochastic processes as well as linear algebra.

CO3- Design parts of mobile communication system using mathematical models.

CO4- Develop proficiency in the subject by working on individual term papers and presenting their

study to the entire class (Presentation Sessions).

References:

1) Wireless Communications: Principles & Practices by Theodore S. Rapport.

2) Mobile Cellular Telecomm. B y William C. Y. Lee.

3) Mobile Communication by Schiller, (Pearson Education India.

4) Osseiran, Afif, Jose F. Monserrat, and Patrick Marsch, eds. 5G mobile and wireless

communications technology. Cambridge University Press, 2016.

5) Rodriguez, Jonathan. Fundamentals of 5G mobile networks. John Wiley & Sons, 2015.

Course Name : Neural Networks and Fuzzy Logic

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus: Biological basis for Neural Networks, Activation functions, Single neuron/

Perceptron networks, training methodology, typical application to linearly separable problems.

Various Neural Networks :

1. Multilayer Perceptron (MLP) :- Back propagation algorithm, virtues and limitation of

BP algorithm, LMS algorithms.

2. ADALINE networks

3. Functional Link Artificial Neural Network (FLANN) : introduction to single layer

structure, Trigonometric expansion, Polynomial expansion, Chebyshev expansion, Legendre expansion, FLANN learning algorithms.

4. Radial-basis function Networks : interpolation problem, Covers theorem, learning algorithm.

5. Recurrent Neural Networks : Fully Recurrent Network, Hopfield Network.

6. Clustering, Unsupervised learning methods, Support Vector Machines, Self Organizing Maps

7. Deep Learning Networks : Convolutional Neural Networks, LSTM, Auto Encoders and variants

Fuzzy Logics :

Fuzzification, Membership Functions, Fuzzy Rules, Fuzzy operations, De-fuzzification, Mamdani, Sugeno and Tsukamoto fuzzy models, Adaptive Neuro-Fuzzy Inference Systems (ANFIS).

Course Outcomes :

CO1- To learn biological bases and to understand basic mathematical modelling of single layer neuron.

CO2- To understand the development of neural structures (including Multilayer Perceptron, ADALINE, RBF, FLANN) and training algorithms (including Back Propagation, LMS etc).

CO3- To understand the Fuzzy Logic and De-fuzzyfication processes.

CO4- To explore the applications of neural networks and Fuzzy logic to Pattern Classification, Clustering, System Identification, Channel Equalization etc.

CO5- To develop MATLAB and Python programming skills for Neural Network and FuzzyModeling.

References:

1) Neural Network Design : Authors-Hagan, Demuth, Beale, Publisher-CENGAGE Learning

2) Neuro-Fuzzy and Soft Computing : J S R Jang, C T Sun and E Mizutani- Publisher-PHI

3) Neural Networks A Classroom Approach, Second Edition : Satish Kumar, McGraw Hill Education

4) Principle of Neurocomputing for Science and Engineering – Fredric M. ham, Ivica Kostanic- Tata McGraw Hill Edition

Course Name : Satellite & Radar Engineering

Course Code :

Credits : 3 (L-T-P : 3-0-0)

Syllabus:

Introduction: Introduction to satellite communication, LEO, GEO, MEO and higher orbits, Orbital

Mechanics and Parameters.

Satellite subsystems: Transponders, Amplifiers and Receiver, Link Budget Analysis.

Navigation systems and Techniques: Multiplexing and Access Techniques for Satellite

Communication, Introduction to Spread Spectrum; GPS, Global navigation satellite systems (GNSS).

Networking: Internet and Satellite Links; Very Small Aperture Antenna; Special Purpose Satellites

RADAR: Fundamentals of Radar Systems, Types of RADAR And Modalities, Radar System

Components, Basic Operating Principles (Detection, Ranging, Doppler, Importance Of Phase) and Its

Application.

Course Outcomes :

CO1-Understand the basic principles of satellite communication.

CO2-Design the satellite link to fulfil various power requirements Techniques

CO3-Discuss the multiplexing and multiple access techniques used in satellite and navigation systems.

CO4-Discuss special satellites and their subsystems.

CO5-Explain the basics of RADAR

References:

1) Introduction to Radar Systems: Merrill I. Skolnik, McGraw-Hill

2) Satellite communication systems, B. G. Evans, Published by IET

3) Satellite Communication, P. Banerjee, PHI

Dr. Satyasai Jagannath Nanda

SIXTH SEMESTER

LABORATORIES

Course Name : Project Lab II

Course Code :

Credits : 2 (L-T-P: 0-0-4)

List of Experiments/ activities

Design, verification, prototyping and implementation of hardware/ software

Devices, circuits and systems based on software, hardware, algorithms, protocol, concepts in emerging

areas such as AI, ML, IoT, Sensors, Smart Antennas, NOMA, Computer Vision, Computer Networking,

Nano Devices, Smart Materials, Data Mining, Nano Photonics, Optical Wireless Communications,

Embedded Systems, Chip Design, Drone Technology and related areas

Course Name : Optical Communication Systems Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments

To Study of Optisystem and Optisystem component library.

To Design and study basic optical communication systems.

To study the length dependence of attenuation in the given optical fiber at different wavelengths.

To study indirect modulation technique with Mach-Zehnder modulator(MZM) using OptiSystem.

To observe variation in BER with respect to different sets of parameters in the OFC system.

To Optimize the length and power of an optical fiber for given system parameters.

To Calculation of minimum sensitivity of the optical receiver.

To study and Draw EDFA characteristic curves.

To Design optical NOT gate using MATLAB components.

10. To Design optical AND and NAND using MATLAB components.

11. To Design optical OR and NOR gate using MATLAB components.

12. To Design optical XOR and XNOR using MATLAB components.

Course Name : Wireless and 5G Communication Lab

Course Code :

Credits : 1 (L-T-P: 0-0-2)

Lab experiments associated with the theory course

Course Name :Neural Networks and Fuzzy Logic Laboratory

Course Code :

Credits : 1 (L-T-P: 0-0-2)

List of Experiments :

1) To study the Multi-layer perceptrn network and use it for design of OR, AND, NOR NAND gates.

2) To design a ADALINE network for identification of FIR system.

3) To design a Functional Link Artificial Neural Network (FLANN) for a tie series prediction.

4) To design a RBF network for function approximation.

5) To design a K-means algorithm for clustering.

6) To use Self Organizing Map for Clustering.

7) To do a Fuzzification and Defuzzification process using MAMDANI inference system.

8) To use CNN for Image classification.

9) Implementation of LSTM.