UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Data Structure & Algorithm
Course Code: CS(EC)401
L-T Scheme: 3-1 **Course Credits: 3**

Introduction:

This course examines data structures and algorithms basics. The Topics to be covered (tentatively) include:

- Abstract Data Type and Data Type
- Time and space analysis of algorithms
- Linear Data structures
- Non-linear Data structures
- Sorting, Searching and Hashing

Objectives:

In this course we will study the basic components of data structure and algorithm.Students are expected to be capable of understanding the data structures, their advantages and drawbacks, how to implement them in C, how their drawbacks can be overcome and what the applications are and where they can be used. The way different modules in the operating system interact and work together to provide the basic services of an operating system.

Learning Outcomes:

Knowledge:

1. To learn about the data structures/ methods/algorithms mentioned in the course with a comparative perspective so as to make use of the most appropriate data structure/ method/algorithm in a program to enhance the efficiency (i.e. reduce the run-time) or for better memory utilization, based on the priority of the implementation.
2. To understand at least the efficiency aspects of the graph and sorting algorithms covered in this course.
3. To convert an inefficient program into an efficient one using the knowledge gathered from this course.

Application:

1. To implement different types of linked list.
2. To implement graph algorithm for any network
3. To implement sorting and searching.

Course Contents:

Unit 1: Introduction-Data and data structure, Abstract Data Type and Data Type. Algorithm efficiency and analysis, time and space analysis of algorithms – order notations.

Unit 2: Linear Data structures–Array, Linked List, Stack, Queue and Recursion with their types, different operations and applications

Unit 3: Nonlinear Data structures–Graph, Trees, Minimum spanning treewith their types, different operations and applications.

.**Unit 4:** Sorting, Searching and Hashing- Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap, application – priority queue), radix sort. Sequential search, binary search, interpolation search. Hashing functions, collision resolution techniques.

Text Books

Course Description

1. YashavantKanetkar, Abduln A.P.J. Kalam," Data Structure Through C",2nd edition, BPB Publications
2. Seymour Lipschutz, "Data Structures",Revised First edition,McGraw Hill Education.

References

1. Langsam,Augestein, Tenenbaum:Data Structures using Cand C++, 2nd Edn, 2000,
2. Horowitz and Sahani:Fundamental ofData Structuresin C,2nd Edn, 2008
3. Kruse, Tonso, Leung: Data Structures and ProgramDesign in C, 2000
4. Richard F.Gilberg&BehrouzForouzan: Data Structures, APseudocodeApproach withC, 2001.
5. Weiss: DataStructures and AlgorithmAnalysis in C/C++, 3rd Edn, 2006

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Basic Environmental Engineering
Course Code: CH401
L-T Scheme: 2-1 **Course Credits: 2**

Introduction:

This course introduces the basic principles behind the environmental phenomena and how anthropogenic activities are affecting those environmental processes. The different administrative measures taken to safeguard our environment are also discussed in this course. The Topics to be covered (tentatively) include:

- Ecology
- Air pollution and control
- Water Pollution and Control
- Land Pollution
- Noise Pollution
- Environmental Management

Objectives:

In this course we will study about the pattern of growing human population and its effect on the planet. We will be familiarizing with the consequences of anthropogenic activities and measures to mitigate their harmful effects. We will learn about the mechanism behind the global issues like global warming, acid rain, water pollution, etc.

Learning Outcomes:

Knowledge:

1. To introduce the patterns of population growth and associated problems.
2. To familiarize with the cause, effect and control measures of various human made degrading processes.
3. To enable the students to know the mechanism behind the devices to control pollution.
4. To familiarize with administrative laws to mitigate various environmental problems.

Application:

1. To understand the problems associated with pollution
2. To familiarize with the global environmental issues.
3. To understand the principles behind various control devices.
4. To understand and comply with the various government environmental laws.

Course Contents:

Unit 1: Introduction, Ecology, Air pollution and control
Unit 2: Water Pollution and Control
Unit 3: Land Pollution, Noise Pollution
Unit 4: Environmental Management

Text Books

1. Gourkrishna Damohapatra, Basic Environmental Engineering and Elementary Biology, Vikas publishing.

References

1. A.K. De, Environmental Chemistry, New Age International.

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UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Electromagnetic Theory & Transmission Lines
Course Code: EC401
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course introduces students to handling electromagnetic theory using vector calculus. This enables students to handle problems that are more complicated than they are used to from their school days. Due to general nature of the mathematics they learn in this course, what they learn here will help them in their future courses like fluid dynamics that use similar mathematics:

- Coulomb's law Divergence of electric field Gauss' law Curl of electric field Stokes' theorem Electrostatic potential
- Laplace's equation for electrostatic potential Laplace's equation in other fields Uniqueness of solution of Laplace's equation Poisson equation and uniqueness of its solution Method of images for planar surfaces Work and energy in electrostatics
- Conductors and capacitors Reciprocity theorem Polarization and bound charges Linear dielectrics Electric displacement Fields in dielectrics
- Magnetic field due to a magnet Magnetic field due to a steady current Divergence and curl of magnetic field Ampere's law The vector potential Magnetization and bound currents
- Magnetic fields in matter Magnetic field in matter Faraday's law Induced electric field Energy in magnetic field Displacement current
- Maxwell's equations Work done by electromagnetic field Poynting's theorem Momentum in electromagnetic field Angular momentum in electromagnetic field Electromagnetic waves: the wave equation
- Wave equation Plane electromagnetic waves Energy carried by electromagnetic waves Pressure due to electromagnetic waves Reflection and transmission of electromagnetic waves Reflection and transmission of electromagnetic waves
- Review and Problem Solving

Learning Outcomes:

Knowledge:

1. Have an understanding of Maxwell's equations and be able to manipulate and apply them to EM problems.
2. Formulate and analyze problems involving lossy media with planar boundaries using uniform plane waves.
3. Able to derive and apply the steady state transmission line equations to the design of simple distributed circuit components.
4. Analyze and design basic microwave circuits using microwave network parameters.
5. For simple antennas derive fundamental antenna parameters starting from Maxwell's equations and be able to use these in the design of rudimentary wireless communications systems.

Application:

1. Every part of the electromagnetic spectrum has multiple applications in our everyday lives, and many of those applications involve technology.

2. Radio waves are used for communications - that's why the thing in your car is called a radio. But they're not just for FM and AM radio. They're also used to broadcast television signals, and they're how mobile phones work - your voice is sent through radio signals. Radio waves are also used for radar, which is why both words start with the same three letters. Radar is extremely important in military operations and can also be used in speed cameras and speed guns.

3. Microwaves have probably the most obvious application: in a microwave. Microwaves can be used to heat and cook your food. Since microwaves aren't that different from radio waves, they've also been used for communications, especially for extending TV signals to larger distances.

4. Infrared waves are what come out of remote controls. Infrared is also a type of wave that transmits a lot of heat. When you put your hand near to, but not touching, something and it feels warm, it's because of infrared waves coming out of it. All hot objects produce infrared. In fact, you're producing infrared waves right now. Infrared waves can also be used to create heat-sensitive and night vision cameras.

5. Ultraviolet waves have their uses too, but they're also a bit of a pain. That's because the sun produces a lot of ultraviolet and is a common cause of skin cancer. When powerful enough, UV can damage your skin. Getting a sun tan might be a fun-sounding use of UV, but because of the risks, it's a bad idea. More positive uses include the fact that UV can sterilize and disinfect medical instruments (or anything else, for that matter), killing bacteria and viruses. And ,UV also lights up fluorescent materials; highlighter pens are brighter and more useful because of this effect. This property can be used to check if money is real or counterfeit by hiding things in it that light up under UV.

6.X-rays are electromagnetic waves that can be used in aptly named x-ray machines to see inside your body and diagnose various diseases. They can also be used to kill cancer cells.

Course Contents:

Unit 1: Vector calculus orthogonal Coordinate System, Transformations of coordinate systems; Del operator; Gradient, Divergence, Curl- their physical interpretations; Laplacian operator

Unit 2: Coulomb's law, electric field intensity, charge distribution; Gauss's law, flux density and electric field intensity. Divergence theorem, Current Densities, Conductors, Poisson's & Laplace's equations. Uniqueness theorem, Biot-Savart law, Ampere's law, Relation between J & H, Vector magnetic Potential, Stokes' theorem.

Unit 3: Faraday's law & Lenz's law. Displacement Current, Jc–J_D Relation, Maxwell's equations, Time-harmonic fields, Wave Equation, Boundary Conditions between media interface; Uniform Plane wave; Plane Wave Propagation in Lossy Dielectric, Loss-less Dielectric, Good Conductor, Free space; Poynting Theorem, Power flow, Poynting vector, Skin Depth, Surface Resistance; Reflection and Transmission for normal incidence.

Unit 4: Transmission Lines; Concept of Lumped parameters and Distributed parameters. Line Parameters, Transmission line equations and solutions, Physical significance of the solutions, Propagation constant, Characteristic Impedance; Wavelength; Velocity of Propagation; Distortion-less Line, Reflection and Transmission coefficients; Standing Waves, VSWR, Input Impedance, Smith Chart-Applications; Load Matching Techniques / Quarter wave Matching, Bandwidth problem; Low loss RF transmission lines, line as circuit elements.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Unit 5: Types of transmission line (open2-wire, co-axial line, micro strip coplanar waveguide), applications and limitations Design principle, Power handling capacity. Power Dissipation, Breakdown with coaxial line and micro strip line as examples.

Text Books

1.Principles of Electromagnetics,4th Edition, Matthew O H Sadiku, Oxford UniversityPress.
2.Electromagnetic Field Theory&TransmissionLines,G.S.N.Raju,PearsonEducation
3.Electromagnetic WavesShevgaonkar,Tata-McGaw-Hillr –RK

Reference Books

1. Engineering Electromagnetics, 2ed Edition - Nathan Ida, SpringerIndia
2. Fields &Waves in Communication Electronics, S.Ramo, J.R.Whinnery & T.VanDuzer, John Wiley
3. Electromagnetic Theory & Applications, A.K. Saxena, Narosa Publishing House Pvt. Ltd.
4. Electromagnetics, 2ed Edition –JA Edminister, Tata-McGraw-Hill.
Engineering Electromagnetics, 7th Edition-W.H.Hayt & J.A.Buck, Tata-McGraw-Hill
5. Electromagnetic Waves and TransmissionLines- by G.Prasad, J.Prasad and J.Reddy- Scitech

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Digital Electronic & Integrated Circuits
Course Code: EC402
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course examines about Digital Electronics circuit. The Topics to be covered (tentatively) include:

- Data and Number System
- Boolean algebra
- Combinational Circuit
- Sequential Circuit
- A/D converter and D/A converter
- Memory system

Objectives:

1. To acquire knowledge on basics of digital circuits and its applications.
2. This course deals with the basics of Boolean algebra, Digital principles and circuits.
3. The course starts with the basics of Boolean algebra and Boolean expression minimization techniques. Then it explains simple combinational networks like Multiplexers, decoders etc.
4. Sequential and combinational digital circuits are the building blocks of
5. any processor, irrespective of its application.
6. After this the difference between the combinational technologies and sequential circuits is dealt with. Finally, it gives the method to realize the basic gates using different technologies.

Learning Outcomes:

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

1. Able to explain the basic concepts of digital electronics circuits
2. Able to describe different types of logics, complexity, circuit specifications.
3. On successful completion of this Course, the students would be able to minimize functions using any type of minimizing algorithms (Boolean algebra, Karnaugh map).
4. Define the problem (Inputs and Outputs), write its functions. Implement functions using digital circuit (Combinational or Sequential) and knowledge in analyzing and designing procedures of Combinational and Sequential circuits.
5. To be able to differentiate electronic from electrical systems and identify the basic blocks in any electronic system

Course Contents:

1. Data and number systems; Binary, Octal and Hexadecimal representation and their conversions; BCD, ASCII, EBDIC, Gray codes and their conversions; Signed binary number representation with 1's and 2's complement methods, Binary arithmetic.

2. Venn diagram, Boolean algebra; Various Logic gates- their truth tables and circuits; Representation in SOP and POS forms; Minimization of logic expressions by algebraic method, K-map method.

3. Combinational circuits- Adder and Subtractor circuits; Applications and circuits of Encoder, Decoder, Comparator, Multiplexer, De-Multiplexer and Parity Generator.

4. Memory Systems: RAM, ROM, EPROM, EEROM; Design of combinational circuit using ROM, Programming logic devices and gate arrays. (PLAs and PLDs).

5. Sequential Circuits- Basic memory element-S-R, J-K, D and T Flip Flops, various types of Registers and counters and their design, Irregular counter, State table and state transition diagram, sequential circuits design methodology.

6. Different types of A/D and D/A conversion techniques; Logic families- TTL, ECL, MOS and CMOS, their operation and specifications.

Text Books

1. A.Anand Kumar, Fundamentals of Digital Circuits- PHI
2. A.K.Maini- Digital Electronics- Wiley-India
3. Kharate- Digital Electronics- Oxford

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Signals & Systems
Course Code: EC403
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This tutorial covers the basics of signals and system necessary for understanding the concepts of digital image processing. Before going into the detail concepts, lets first define the simple terms.
Signals
In electrical engineering, the fundamental quantity of representing some information is called a signal. It does not matter what the information is i-e: Analog or digital information. In mathematics, a signal is a function that conveys some information. In fact any quantity measurable through time over space or any higher dimension can be taken as a signal. A signal could be of any dimension and could be of any form.

Learning Outcomes:

Knowledge:

1. Demonstrate an understanding of the fundamental properties of linear systems, by explaining the properties to others.
2. Use linear systems tools, especially transform analysis and convolution, to analyze and predict the behavior of linear systems
3. Gain an appreciation for the importance of linear systems analysis in aerospace systems.

Measurable outcomes (assessment method):

1. Explain the importance of superposition in the analysis of linear systems.(concept test, homework, quiz)
2. Explain the role of convolution in the analysis of linear time invariant systems, and use convolution to determine the response of linear systems to arbitrary inputs. (concept test, homework, quiz)
3. List and apply properties of the unilateral and bilateral Laplace transforms.(concept test, homework, quiz)
4. Use Laplace transforms to solve differential equations, and to determine the response of linear systems to known inputs. (homework, quiz)
5. Demonstrate an understanding of the relationship between the stability and causality of systems and the region of convergence of their Laplace transforms, by correctly explaining the relationship, and using the relationship to determine the stability and causality of systems. (concept test, homework, quiz)
6. Demonstrate an understanding of the relation among the transfer function, convolution, and the impulse response, by explaining the relationship, and using the relationship to solve forced response problems. (concept test, homework, quiz)
7. Explain the relationship between a signal's bandwidth and its duration, and use that relationship to predict and explain the bandwidth requirements for aerospace applications such as Loran navigation, amplitude modulation, etc.(homework, quiz)
8. Explain the fundamentals of modulation, including amplitude modulation, frequency modulation, and sampling (impulse modulation), including the implications of the sampling theorem. (homework, quiz)

Course Content:

Unit 1: Introduction to signal and systems: Continuous and discrete time signals: Classification of Signals – Periodic aperiodic even – odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – periodicity –unit impulse – unit step – Transformation of

independent variable of signals: time scaling, time shifting. System properties: Linearity, Causality, time invariance and stability.

Unit 2: Details of systems, various types of systems

Unit 3: Dirichlet's conditions, Determination of Fourier series coefficients of signal, Signal Transformation: Fourier transformation of continuous and discrete time signals and their properties.

Unit 4: Laplace transformation- analysis with examples and properties. Parseval's theorem; Convolution in time (both discrete and continuous) and frequency domains with magnitude and phase response of LTI systems, Analysis and characterization of LTI systems using Laplace transform: Computation of impulse response and transfer function using Laplace transform.

Unit 5: Sampling Theorem: Representation of continuous time signals by its sample –Types of sampling, sampling theorem. Reconstruction of a Signal from its samples, aliasing –sampling of band pass signals.

Unit 6: Z-Transforms: Basic principles of z-transform - z-transform definition –, Relationship between z-transform and Fourier transform, region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion.

Unit 7: Random Signals & Systems: Definitions, distribution & density functions, mean values & moments, function of two random variables, concepts of correlation, random processes, spectral densities, response of LTI systems to random inputs.

Text Books

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab -Signals & Systems, Pearson
2. S.Haykin & B.V.Veen, Signals and Systems- John Wiley
3. A. Nagoor Kani- Signals and Systems- McGraw Hill

ReferenceBooks

1. J.G. Proakis & D.G.Manolakis- Digital Signal Processing Principles, Algorithms and Applications, PHI.
2. C-T Chen- Signals and Systems- Oxford
3. E W Kamen&BS Heck- Fundamentals of Signals and Systems Using the Web and Matlab-Pearson
4. B.P. Lathi- Signal Processing & Linear Systems- Oxford
5. P. Ramesh Babu & R.Anandanatarajan- Signals and Systems 4/e- Scitech
6. M.J. Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH
7. S Ghosh- Signals and Systems- Pearson
8. M.H. Hays- Digital Signal Processing ", Schaum's outlines, TMH
9. Ashok Ambardar, -Analog and Digital Signal Processing- Thomson.
10. Phillip, Parr &Riskin- Signal, Systems and Transforms- Pearson

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Technical Report Writing & Language Lab
Course Code: HU481
L-T-P scheme: 0-0-2 **Course Credit: 2**

Objectives:
1. To inculcate a sense of confidence in the students.
2. To help them become good communicators both socially and professionally.
3. To assist them to enhance their power of Technical Communication.

Learning Outcomes:

Course Contents:
Exercises that must be done in this course are listed below:
Exercise No.1: Report Types (Organizational/Commercial/Business/Project)

Exercise No. 2: Report Format & Organization of Writing Materials

Exercise No. 3: Report Writing (Practice Sessions &Workshops)

Exercise No. 4: Introductory Lecture to help the students get a clear idea of Technical Communication& the need of Language Laboratory Practice Sessions

Exercise No. 5: Conversation Practice Sessions: (To be done as real life interactions)
a) Training the students by using Language Lab Device/ Recommended Texts/cassettes / cd to get their Listening Skill & Speaking Skill honed
b) Introducing Role Play & honing overall Communicative Competence

Exercise No. 6: Group Discussion Sessions:
a) Teaching Strategies of Group Discussion
b) Introducing Different Models & Topics of Group Discussion
c) Exploring Live/Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure Interview Sessions;
d) Training students to face Job Interviews confidently and successfully
e) Arranging Mock interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in formal situation for effective communication

Exercise No. 7: Presentation:
a) Teaching Presentation as a skill
b) Strategies and Standard Practices of Individual/Group Presentation
c) Media & Means of Presentation: OHP/POWERPOINT/Other Audio-Visual Aids

Exercise No. 8: Competitive Examination:
a) Making thestudentsawareofProvincial/National/InternationalCompetitiveExaminations
b) Strategies/Tactics for success in Competitive Examinations
c) SWOT Analysis and its Application in fixing Target

Text Book:
1. NiraKonar: English Language Laboratory: A Comprehensive Manual
2. D. Sudharani: Advanced Manual for Communication Laboratories& Technical Report Writing Pearson Education (W.B. Edition), 2011 PHI Learning, 2011

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Data structure & algorithm Lab
Course Code: CS(EC)491
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. Develop problem solving ability using Programming.
2. Develop ability to design and analyze algorithms.
3. Introduce students to data abstraction and fundamental data structures.
4. Develop ability to design and evaluate Abstract Data Types and data structures.
5. Apply data structure concepts to various examples and real life applications

Learning Outcomes:

The course will use hands on practice and applying the knowledge gained in theory course to different day to day real world applications..Upon the completion of data structure and algorithm practical course, the student will be able to:

- **Understand** and implement different type of data structure techniques
- **Analyze** the hashing method..
- **Implement** different type os sorting searching techniques.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Implementation of array operations
Exercise No. 2: Stacks and Queues: adding, deleting elements
Exercise No. 3: Circular Queue: Adding & deleting elements
Exercise No. 4: Merging Problem :Evaluation of expressions operations on Multiple stacks & queues
Exercise No. 5: Implementation of linked lists: inserting, deleting, inverting a linked list.
Exercise No. 6: Implementation of stacks & queues using linked lists, Polynomial addition, Polynomial multiplication
Exercise No. 7: Sparse Matrices : Multiplication, addition.
Exercise No. 8: Recursive and Non-recursive traversal of Trees
Exercise No. 9: Threaded binary tree traversal. AVL tree implementation
Exercise No. 10: Application of Trees. Application of sorting and searching algorithms

Text Book:

1. Yashavant Kanetkar, Abduln A.P.J. Kalam," Data Structure Through C",2nd edition, BPB Publications
2. Seymour Lipschutz,"Data Structures",Revised First edition,McGraw Hill Education.

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
2. Turbo C or TC3 complier in Windows XP or Linux Operating System.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: EM Theory & Transmission Lines Lab
Course Code: EC491
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To provide the students with a hands-on experience on the theoretical concepts through simple experiments.
2. To develop the ability to design and validate their knowledge through open ended experiments.

Learning Outcomes:
On successful completion of this lab course, the students would be able to

1. Demonstrate and analyze the response of vector for various inputs
2. Perform and analyze integration in terms of surface and volume.
3. Demonstrate E Field for surface and Linear Charges.
4. Analyze the Flux Density through surface.
5. Conduct an open ended experiment in a group of 2 to 3.

Course Contents:
List of Experiments:

1. Vector Analysis
2. Surface and Volume Integrals
3. E Field of Linear Charges
4. E Field of Surface Charges
S. Electric Flux Density
6. Electric Flux through a Surface
7. Electric Potential
8. Electric Energy
9. Electric Current
10. Image Theory

Text Book:

1) William H Hayt Jr (200l), Engineering Electromagnetics, T"Edition! Tata Mc Graw Hill.
2) Clayton R. Paul, Kath W. Whites, Syed A Nasar (2007), Introduction to Electromagneticfields, 2ndrevised edition, TMH

Recommended Systems/Software Requirements:

SCILAB

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Digital Electronics & Integrated Circuit Lab
Course Code: EC492
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
The objective of this course is to introduce the organization of a computer and its principal components, viz, ALU, Control, Memory and Input/output. The course will also enable the student to understand the design components of a digital subsystem that required realizing various components such as ALU, Control, etc.

Learning Outcomes:
Upon successful completion of the Lab course, a student will be able to:
1. An ability to implement basic gates and their operations.
2. An ability to understand and implement Flip Flops
3. An ability to understand and implement Multiplexers
4. An ability to understand and implement shift registers and counters
5. An ability to understand and implement Encoders and Decoders
6. An ability to understand and implement Half adder and Full adder Must be able to build a small 8 bit processor that supports reading from memory (16 bytes), Execute 3 instructions, and add/subtract/stop. All operations are to be performed on set of 4 registers. Must implement program counter and decoder to fetch the next instruction.

Course Contents:
Exercises that must be done in this course are listed below:
Experiment No.: 1 : To study about logic gates and verify their truth tables.
Experiment No.: 2 : Realization of basic gates using Universal logic gates
Experiment No.: 3 : To design and implement 4-bit Gray to binary code converter
Experiment No.: 4 : Code conversion circuits- BCD to Excess-3& Excess-3 to BCD
Experiment No.: 5 : One bit and two bit comparator circuit.
Experiment No.: 6 : Construction of simple decoder and multiplexer circuit using NAND gate.
Experiment No.: 7 : Construction of simple arithmetic circuits – ADDER.
Experiment No.: 8 : Construction of simple arithmetic circuits – SUBTRACTOR.
Experiment No.: 9 : Realization of RS-JK, T and D flip-flop using universal logic gates.
Experiment No.: 10 : Realization of ring counter and Johnson's counter.

Text Book:

Recommended Systems/Software Requirements:

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Signals & Systems Lab
Course Code: EC493
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To provide the students with a hands-on experience on the theoretical concepts through simple experiments.
2. To develop the ability to design and validate their knowledge through open ended experiments.

Learning Outcomes:

On successful completion of this lab course, the students would be able to

1. Generate the basic signals like unit impulse, unit step, ramp, sawtooth etc..
2. Analyze the response of various signal like Impulse Ramp etc.
3. Find out the basic signals operations like time shift, time scale, convolution, correlation etc.
4. Conduct an open ended experiment in a group of2 to 3.

Course Contents:

List of Experiments:

1. Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.
2. Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.
3. Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.
4. Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.
5. Write a program to find the trigonometric and exponential fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
6. Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
7. The signal x (t) is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for this signal.

$$x(t) = \cos(2p' 47t) + \cos(2p' 219t), \qquad 0 \pounds t \pounds 10$$

$$0, \qquad \textit{otherwise}$$

8. Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
9. Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
10. Write a program to find the autocorrelation and cross correlation of sequences.
11. Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the histogram and the probability function for the sequence. Compute the mean and variance of the random signal.
12. Generate a Gaussian distributed length 1000 random sequence. Compute the mean and variance of the random signal by a suitable method.
13. Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.
14. Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.

15. Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response.

Text Book:

1) Oppeinheim, "Signals & Systems".

Recommended Systems/Software Requirements:

SCILAB, MATLAB