UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Values & Ethics in Profession
Course Code: HU301
L-T Scheme: 3L+1T **Course Credits: 3**

Introduction:

This course teaches students the basic principles of Values and Ethics within profession. These deals mainly with

- Values in professional life
- Ethics in professional life
- Resources depletion
- Conservation of resources for future generations
- Technology transfer
- Eco friendly Technology
- Value crisis in society
- Present society without values and Ethics.

Objectives:

This course relates to the present world and teaches students the need and importance of values and the problems faced by the present society in terms of depletion of natural resources and how to control the same for the sake of future generations.

Learning Outcomes:

Knowledge:

1. Understand the present scenario of degradation of values and Ethics system
2. Depletion of resources and how to conserve them.
3. Club Of Rome and what all stalwarts have thought to improve the situation
4. Sustainable Development.
5. Value spectrum of a good life
6. Present societal changes in terms of values and ethics
7. What steps to be taken to improve value system?
8. How to avoid conflicts to have a peaceful job life.
9.

Course Contents:

Unit 1: Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: Sustainable development Energy Crisis: Renewable Energy Resources Environmental degradation and pollution. co-friendly Technologies. Environmental Regulations, Environmental Ethics Appropriate Technology Movement of Schumacher; later developments Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis. Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.

Unit 2: Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond.

Unit 3: Values Crisis in contemporary society Nature of values: Value Spectrum Of good life Psychological values: Integrated personality; mental health Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution. Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity Moral and ethical values: Nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

Books:

AN Tripathi ,Human values in the Engineering Profession, Monograph published byIIM,Calcutta1996

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Mathematics-III
Course Code: M301
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

The goal of this mathematics course is to provide high school students and college freshmen an introduction to basic mathematics and especially show how mathematics is applied to solve fundamental engineering problems. The Topics to be covered (tentatively) include:

Fourier Series & Fourier Transform.

Introduction to Functions of a Complex Variable & Conformal Mapping.

Basic Probability Theory.

Partial Differential Equation (PDE) and Series solution of Ordinary Differential Equation (ODE).

Course Objectives:

In this course, the students will learn differentiation and integration of Complex functions and mappings in the complex plane. They are introduced to Fourier Transforms to stimulate interest in communications, control and signal processing to prepare them for follow up courses in these areas. They also learn to extend and formalize knowledge of the theory of probability and random variables and get motivated to use of statistical inference in practical data analysis. They are also introduced to Partial Differential Equations, their types and solutions.

Learning Outcomes:
Knowledge:

At the end of this course, students will be able to

1. Understand and analyze analytic functions, evaluate line integrals of complex functions.
2. Apply fundamental mathematical properties of the Fourier transform including linearity, shift, symmetry, scaling, modulation and convolution and calculate the Fourier transform or inverse transform of periodic functions.
3. Construct probability distributions of a random variable based on real world situation and use it to compute the mean and variance; approximate a given data to fit a curve and analyze and interpret the correlation between two sets of data.
4. Form PDE by eliminating arbitrary constants / functions and solve linear PDEs by direct method and separation of variables.

Application:

1. Fourier transforms (FT) take a signal and express it in terms of the frequencies of the waves that make up that signal.
2. Probability is used in Weather forecasting, calculating and in many more engineering applications.
3. At the end of this course the student should be able to apply the above mentioned concepts to engineering problems.

Course Contents:

Unit 1:**Fourier Series & Fourier Transform :** Introduction, Periodic functions: Properties, Even & Odd functions: Properties, Euler's Formulae for Fourier Series, Fourier Series for functions of period 2π, Fourier Series for functions of period $2l$, Dirichlet's conditions, Sum of Fourier series. Theorem for the convergence of Fourier Series (statement only). Fourier Series of a function with its periodic extension. Half Range Fourier series: Construction of Half Range Sine Series, Construction of Half Range Cosine

Series. Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Sine and Cosine Integral Theorem (statement only), Fourier Cosine & Sine Transforms. Fourier, Fourier Cosine & Sine Transforms of elementary functions. Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation. Fourier Transform of Derivatives. Convolution Theorem (statement only), Inverse of Fourier Transform.

Unit 2:**Introduction to Functions of a Complex Variable & Conformal Mapping:** Complex functions, Concept of Limit, Continuity and Differentiability. Analytic functions, Cauchy-Riemann Equations (statement only). Sufficient condition for a function to be analytic. Harmonic function and Conjugate Harmonic function, related problems. Construction of Analytic functions: Milne Thomson method, related problems.

Unit 3Basic Probability Theory: Classical definition and its limitations. Axiomatic definition. Some elementary deduction: i) $P(O)=0$, ii) $0 \leq P(A) \leq 1$, iii) $P(A')=1-P(A)$ etc. where the symbols have their usual meanings. Frequency interpretation of probability. Addition rule for 2 events (proof) & its extension to more than 2 events (statement only). Related problems. Conditional probability & Independent events. Extension to more than 2 events (pairwise & mutual independence). Multiplication Rule. Examples. Baye's theorem (statement only) and related problems.

Definition of random variable. Continuous and discrete random variables. Probability density function & probability mass function for single variable only. Distribution function and its properties (without proof). Definitions of Expectation & Variance, properties & examples. Some important discrete distributions: Bernoulli, Binomial & Poisson distributions and related problems. Some important continuous distributions: Normal distributions and related problems.

Unit 4Partial Differential Equation (PDE) and Series solution of Ordinary Differential Equation (ODE): Basic concepts of PDE. Origin of PDE, its order and degree, concept of solution in PDE. Introduction to different methods of solution: Separation of variables, Laplace & Fourier transforms methods.

Solution of Initial Value & Boundary Value PDE's by Separation of variables, Laplace &Fourier transform methods.

PDE I: One dimensional Wave equation.
PDE II: One dimensional Heat equation.
PDE III: Two dimensional Laplace equation.

Text Books

1. Engineering Mathematics-III(B.K Pal and K.Das) [All course]

Reference Books:

1. Brown J.W and Churchill R.V: Complex Variables and Applications, McGraw-Hill.
2. Das N.G.: Statistical Methods, TMH.
3. Grewal B S: Higher Engineering Mathematics, Khanna Publishers.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Advanced OOPs using C++
Course Code: CS301
L-T-P Scheme: 3-0-0 **Course Credit: 3**

Introduction:
The course presents advanced C++ programming including: C++ environment, exception handling, conception of different file handling, template, STL etc.

Objectives:
After completion of the course the students will:

- Be able to program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
- Be able to build class template, function template and also they will able to know how STL are works.
- Be able to understand different string operations and different file operations, like text file, binary file.

Learning Outcomes:

- Be able to develop simple computer programs.
- Understand exception handling mechanism.
- Be able to do different file(text, binary) operations.
- Understand template-class template & function template.
- Understand the usage of STL.
- Be able to do different operations on string in C++ programming.

Course Contents:

Module-I: Introduction
Basics of OOP, Features; Structure of C++ program; Class and object; Concept of Constructor& destructor; Abstraction and Encapsulation; Inheritance; Static and dynamic binding; Polymorphism.

Module II: Exception Handling
Exception handling mechanism; throwing, catching, rethrowing mechanism; Multiple catch statement; Nested try-catch block; exception in constructor & destructor; exceptions in operator overloaded functions.

Module III: Template
Class template; Member function inclusion; Class template with different parameter; Function template; Function template with multiple parameters; Overloading of template function; member function template.

Module IV: Console I/O operations
C++ streams; C++ stream classes; Unformatted I/O operations; Formatted I/O operations; Managing output with Manipulators.

Module V: Working with Files

Data File Handling: Need for a data file, Types of data files – Text file and Binary file; Text File: Basic file operations on text file: Creating/Writing text into file, reading and manipulation of text from an already existing text File (accessing sequentially).Binary File: Creation of file, Writing data into file, Searching for required data from file, Appending data to a file, Insertion of data in sorted file, Deletion of data from file, Modification of data in a file; opening and closing files; classes for file stream operations; Error handling during file operations; command line arguments.

Module VI: Standard Template Library

Components of STL; Containers, Iterator; Applications of container classes.

Standard Functions Library

C-based I/O functions (fflush, fgetc, ferror, fscanf, fprintf etc.); Time, Date, Localization functions (asctime, clock, ctime, difftime, localtime mktime, strftime etc.); Dynamic memory allocation functions (calloc, malloc, realloc, free).

Module VII: String Manipulation

The String class; Creating String object; Manipulating strings; Relational operations on strings; String comparison characteristics, swapping; Accessing characters in strings.

Text Books:

- Schildt, H., The Complete Reference C++, Tata McGraw Hill Education Pvt. Ltd.
- E.Balagurusamy; Object Oriented programming with C++; Tata McGraw Hill Education Pvt. Ltd.

References:

- Debasish Jana, C++ object oriented programming paradigm, PHI.
- D. Ravichandran, Programming with C++, Tata McGraw Hill Education Pvt. Ltd.
- Y.I. Shah and M.H. Thaker, Programming In C++, ISTE/EXCEL BOOKS.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Analog & Digital Electronics
Course Code: CS302
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

This course encompasses analog and digital electronic circuits from a circuit and monolithic (integrated circuit) implementation point of view. The objective of this course is to provide undergraduates with sufficient fundamental theoretical and practical knowledge to pursue advanced topics in analog and digital integrated circuits. The course includes the design of elements in bipolar- and CMOS-based op amps, feedback, power supplies, linear and non-linear applications circuits with the op amp as the basic building block, and transistor circuits for realizing basic digital circuits. This course provides sufficient basic knowledge for the undergraduate to understand the design of op amps and their applications as well as the design of digital circuits.

Objectives:

An understanding of basic on which analysis and design of electrical and electronic Circuits and systems are based, including lumped circuit, digital and operational amplifier Abstractions. The capability to use abstractions to analyze and design simple electronic circuits. Student will also acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
To prepare students to perform the analysis and design of various digital electronic circuit.

Learning Outcomes:

Knowledge:

1. The learner will be trained to compare the merits and demerits of the different amplifiers and must be able to bias the transistors accordingly;
2. the student must be able to design multi vibrator circuits using 555 timers
3. The student must be able to convert from one number system to another, work out problems related to Boolean algebra, minimization problems etc.
4. The student must also learn to differentiate between the combinational and sequential circuits and design simple circuits.

Application:

1. To analyzes the properties of photonic sensors and emitters and the circuits that power them
2. To details the design of instrumentation amplifiers and medical isolation amplifiers
3. Considers the modulation and demodulation of biomedical signals
4. Examines analog power amplifiers, including power op amps and class D (switched) PAs
5. Devices that use digital electronics are limitless, from laptops,TV, smart phones to even your washing machines or the anti breaking system in cars have digital components.
6. It's application are infinite, ranging for high end computing to miniature circuits that can be very versatile, signal processing, communication, etc.
7. Digital Electronics is currently rapidly developing and removing conventional analogue machines due to its high speed, more accuracy, and greater flexibility.

Course Contents:

Pre-requisites of Analog Electronics:

Basic Electronics Parts I & II learned in the First year, semesters 1 & 2. Basic concept of the working of P-N diodes, Schottky diodes, Basic BJTs, Basic FETs and OPAMP as a basic circuit component. Concept of Feedback.

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Course Description

Unit 1: Different Classes of Amplifiers - (Class-A, B, AB and C - basic concepts, power, efficiency; Recapitulation of basic concepts of Feedback and Oscillation, Phase Shift, Wein Bridge oscillators , Astable & Monostable Multivibrators ; Schimtt Trigger circuits ; 555 Timer.

Pre-requisite of Digital Electronics:
Binary numbers & Basic Boolean algebra – already covered in First year; Logic gates, Truth Tables and function realization – already covered in First year up to minimization of Logic expressions by algebraic method, K-map.

Unit 2: Binary Number System & Boolean Algebra (recapitulation)BCD, ASCII, EBDIC, Gray codes and their conversions ;Signed binary number representation with 1's and 2's complement methods, Binary arithmetic, Venn diagram, Boolean algebra (recapitulation);Representation in SOP and POS forms; Minimization of logic expressions by algebraic method. Combinational circuits: Adder and Subtractor circuits (half & full adder & subtractor); Encoder, Decoder, Comparator, Multiplexer, De-Multiplexer and Parity Generator.

Unit 3: Sequential Circuits: Basic Flip-flop & Latch ,Flip-flops -SR, JK, D, T and JK Master-slave Flip Flops, Registers (SISO,SIPO,PIPO,PISO),Ring counter, Johnson counter, Basic concept of Synchronous and Asynchronous counters (detail design of circuits excluded),Design of Mod N Counter.

Unit 4: A/D and D/A conversion techniques – Basic concepts (D/A): R-2-R only; A/D: successive approximation; Logic families- TTL, ECL, MOS and CMOS - basic concepts.

Text Books
1. S. Salivahanan-Digital Circuits and Design chapter 1-12
2. Anand Kumar - Digital Circuits chapter 1-13

References
1. Floyed & Jain- Digital Fundamentals-Pearson
2. Morries Mano- Digital Logic Design- PHI
3. Electronic Devices & Circuit Theory – Boyelstad & Nashelsky - PHI
4. P.Raja- Digital Electronics- Scitech Publications
5. Kang Sung-Mo and Leblebici Yusuf, CMOS Digital

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Data Structure & Algorithm
Course Code: CS303
L-T Scheme: 3-1 **Course Credits: 4**

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.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Text Books

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,2ndEdn, 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++, 3rdEdn, 2006

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Computer Organization
Course Code: CS304
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course examines the basic organization of digital computer and discuss about all the components of it like memory, ALU, Input-Output devices etc. The Topics to be covered (tentatively) include:

- Necessity of digital computer
- Basic working principal of digital computer
- Processing of high level computer language at the hardware level
- Basic concept of microprocessor
- Basic design of ALU and control unit
- Various addressing modes and bus structure
- I/O subsystem
- Concept of pipeline
- Memory unit

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 course, a student will be able to:

1. An ability to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.
2. An ability to understand the functions of various hardware components and their building blocks
3. An ability to understand and appreciate Boolean algebraic expressions to digital design
4. An in depth understanding of sequential & Combinational circuits
5. An in depth understanding of realization of different combinational/sequential circuits
6. An in depth understanding of different stages of an instruction execution
7. An in depth understanding of how different hardware components are related and work in coordination
8. An ability to understand computer buses and input/output peripherals
9. An ability to understand memory hierarchy and design of primary memory

Course Contents:

Unit 1: Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler. Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes. Commonly used number systems. Fixed and floating point representation of numbers.

Unit 2: Overflow and underflow. Design of adders - ripple carry and carry look ahead principles. Design of ALU. Fixed point multiplication -Booth's algorithm. Fixed point division-Restoring and non-restoring algorithms. Floating point - IEEE 754 standard.

Unit 3: Memory unit design with special emphasis on implementation of CPU-memory interfacing. Memory organization, static and dynamic memory, memory hierarchy, associative memory.Cache memory, Virtual memory. Data path design for read/write access.

Unit 4: Design of control unit - hardwired and microprogrammed control. Introduction to instruction pipelining. Introduction to RISC architectures. RISC vs CISC architectures.
I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA.

Text Books

1. M. Morris Mano & Michael D. Ciletti (2013), Digital Design, 5th Edition, PHI.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky (2011), Computer Organization, 5th Edition, McGraw-Hill.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Advanced OOPs using C++ Lab
Course Code: CS391
L-T-P Scheme: 0-0-3 **Course Credit: 2**

Objectives:
The course presents C++ programming including: advanced C++ environment, exception handling, conception of different file handling, template, STL that aims to:

- Be able to code using more advanced C++ features such as class, objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, exception handling, etc.
- Be able to build class template, function template and also they will able to know how practically STL are works.
- Be able to understand practically different string operations and different file operations, like text file, binary file.

Learning Outcomes:

- Be able to develop different types of computer programs using C++.
- Understand exception handling mechanism anddifferent file(text, binary) operations.
- Understand the usage of template: class template & function template and STL.
- Be able to do different operations on string in C++ programming.

Course Contents:
Exercises that must be done in this course are listed below:
Exercise No.1: Introduction, Basics of C++, Inline function, friend function, function and overloading, inheritance
Exercise No. 2: Exception Handing: throwing, catching, rethrowing mechanism; Multiple catch statement
Exercise No. 3: Template: Class template, Function template
Exercise No. 4: Console I/O operations: C++ streams; C++ stream classes; Unformatted I/O operations; Formatted I/O operations; Managing output with Manipulators.
Exercise No. 5: Working with Files: Text File: Basic file operations on text file: Creating/Writing text into file; Binary File: Creation of file, writing data into file, searching.
Exercise No. 6: Standard Template Library: Components of STL; Containers, Iterator; Applications of container classes.
Exercise No. 7: String Manipulation: The String class; Creating String object; Manipulating strings; Relational operations on strings; String comparison characteristics.

Text Books:

- Schildt, H., The Complete Reference C++, Tata McGraw Hill Education Pvt. Ltd.
- E.Balagurusamy; Object Oriented programming with C++; Tata McGraw Hill Education Pvt. Ltd.

References:

- Debasish Jana, C++ object oriented programming paradigm, PHI.
- D. Ravichandran, Programming with C++, Tata McGraw Hill Education Pvt. Ltd.
- Y.I. Shah and M.H. Thaker, Programming In C++, ISTE/EXCEL BOOKS.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Analog & Digital Electronics Lab
Course Code: CS392
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:
Exercise No.1: Realization of basic gates using Universal logic gates
Exercise No. 2: Code conversion circuits- BCD to Excess-3
Exercise No. 3: One bit and two bit comparator circuits
Exercise No. 4: Construction of simple Decoder and Multiplexer circuits using NAND gate.
Exercise No. 5: Construction of simple arithmetic circuits-Adder, Subtractor.
Exercise No. 6: Realization of RS-JK and D flip-flops using Universal logic gates.
Exercise No. 7: Realization of Ring counter and Johnson's counter.
Exercise No. 8: Study of Diode as clipper & clamper.
Exercise No. 9: Study of Zener diode as a voltage regulator.
Exercise No. 10: Study of ripple and regulation characteristics of full wave rectifier without and with capacitor filter.
Exercise No. 11: Study of characteristics curves of B.J.T.

Text Book:
1.

Recommended Systems/Software Requirements:

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Course Description

Title of Course: Data Structure & Algorithm Lab
Course Code: CS393
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: Computer Organization Lab
Course Code: CS394
L-T-P Scheme: 0-0-3 **Course Credits: 2**

Objective:
1. Understand the architecture of a modern computer with its various processing units.
2. To learn and understand IC of basic gates.
3. To provide an efficient understanding of the Hardware, design complete circuit.

Learning Outcomes: The students will have a detailed knowledge of the concept of IC
1**.** Students can understand the architecture of modern computer.
2. They can analyze the Performance of a computer using performance equation
3. Students can calculate the effective address of an operand by addressing modes
4. They can understand how computer stores positive and negative numbers.
5. Understanding of how a computer performs arithmetic operation of positive and negative numbers.
6. Understanding of how computer stores floating point numbers in IEEE 754 standard.
7. Students can understand how cache mapping occurs in computer and can solve various problems related to this.
8. Secondary storage organization and problem solving

Course Contents:

Unit –I: Basic gates
Study about logic gates and verify their truth tables. XOR (IC 7486), OR (IC 7432),NOT (IC 7404), AND (IC 7408),NAND (IC 7400), etc. Also implementation basic gates using universal gate (NAND).

Unit –II: Half adder, Full Adder
Implement Half and Full Adder using basic gates and check with the following truth table. Half Adder and Full Adder circuits are explained with their truth tables in this article. Design of Full Adder using Half Adder circuit is also shown. Single-bit Full Adder circuit and Multi-bit addition using Full Adder

Unit –III: Half Substractor, Full Substractor.
Implement Half and Full Adder using basic gates and check with the following truth table. Half Subtractor is used for subtracting one single bit binary digit from another single bit binary digit. Full Subtractor, A logic Circuit which is used for Subtracting Three Single bit Binary digit is known as Full Subtractor

Unit –IV: 4-bit parallel Binary adder and substractor.
The arithmetic addition of two binary digits, together with an input carries from a previous stage. The serial addition method uses only one full-adder circuit and a storage device to hold the generated output carry and sum.

Unit –V: BCD adder
The arithmetic addition of two decimal digits in BCD, together with an input carries from a previous stage. Since each input digit does not exceed 9, the output sum cannot be greater than 19, the 1 in the sum being an input carry.

Unit –VI: 8 to 1 Multiplexer unit (MUX)

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Course Description

It transfer a large number of information units over a smaller number of channels, (usually one channel) under the control of selection signals. Multiplexer means many to one. A multiplexer is a circuit with many inputs but only one output.

Unit –VII: DEMULTIPLEXER
It perform the opposite function of multiplexers.

Unit –VIII: BCD to 7 segment decoder
Using digital kit implement Digital number (0,1,2,3,4,5,6,7,8,9)

Unit –IX: BCD TO EXCESS 3CODE CONVERTOR
The excess-3 code digit is obtained by adding three to the corresponding BCD digit.

Unit –X: FLIP FLOP
S-R Flip Flop, J-K Flip Flop, T Flip Flop, T Flip Flop

Unit –X: Design a composite ALU.
Implement Airthmatic Logic Unit Arithmetic operations are like addition ,substraction, multiplication, and division. Logical operations are like and, or nand, nor ,not operations on bits

Text Book:
1. David A. Patterson, John L. Hennessy, "Computer Organization and Design", Elsevier.

References:
1. S.Salivahanan & S.Arivazhagan, **"**Digital Circuits and Design", VIKAS publishing house PVT LTD

Recommended Systems/ Software Requrements:
1. Trainer kit
2. IC (Integrated Circuit)
3. Wire/ Probes