		Hours/week			Credit		Theory Marks				Practical Marks			Total
Code	**Subject Name**	**L**	**T**	**P**	**L**	**P**	**Int**	**MTE**	**ETE**	**Prac**	**Int**	**MTE**	**ETE**	
MA2303	Mathematics III	3	1	0	3.5	0	20	30	50		-	-	-	**100**
EC2331	Analog and Digital System	2	1	2	3.5	0	10	30	50	10	-	-	-	**100**
CS2302	Data Structure	3	1	0	3.5	0	20	30	50		-	-	-	**100**
CS2304	Discrete mathematics	3	1	0	3.5	0	20	30	50		-	-	-	**100**
CS2305	Computer Organization and Architecture	2	1	0	2.5	0	20	30	50		-	-	-	**100**
CS2306	Object Oriented Programming using C++	3	1	0	3.5	0	20	30	50		-	-	-	**100**
MC	Professional Ethics	2	0	0	0	0	0	0	0					**0**
CS2303	Data Structure Lab	0	0	3	0	1.5	-	-	-		20	-	30	**50**
CS2307	OOP Lab using C++	0	0	3	0	1.5	-	-	-		20	-	30	**50**
Total					**20**	**3**	-	-	-		-	-	-	**700**

Course Code : **MA2303**

Course Name : **Mathematics III**

Availability : **3rd Semester CSE**

Pre – requisites: **Knowledge of 12th Level mathematics**

Course content

Module I: Fourier series

Introduction, Periodic functions: Properties, Even & Odd functions: Properties, Special wave forms: Square wave, half wave Rectifier, Full wave Rectifier, Saw-toothed wave, Triangular wave. (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. Parseval's identity (statement only). Examples.

Module II: Transforms

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. Examples. Fourier Transform of Derivatives. Examples.

Convolution Theorem (statement only), Inverse of Fourier Transform, Examples.

Module IV: Complex Analysis

Topic: Introduction to Functions of a Complex Variable.

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.

Topic: Complex Integration.

Concept of simple curve, closed curve, smooth curve & contour. Some elementary properties of complex Integrals. Line integrals along a piecewise smooth curve. Examples.

Cauchy’s theorem (statement only). Examples.

Cauchy’s integral formula, Cauchy’s integral formula for the derivative of an analytic function, Cauchy’s integral formula for the successive derivatives of an analytic function. Examples.

Taylor’s series, Laurent’s series. Examples

Topic: Zeros and Singularities of an Analytic Function & Residue Theorem.

Zero of an Analytic function, order of zero, Singularities of an analytic function. Isolated and non-isolated singularity, essential singularities. Poles: simple pole, pole of order m. Examples on determination of singularities and their nature.

Residue, Cauchy’s Residue theorem (statement only), problems on finding the residue of a given function, evaluation of definite integrals.

Topic: Introduction to Conformal Mapping.

Concept of transformation from z-plane to w-plane. Concept of Conformal Mapping. Idea of some standard transformations. Bilinear Transformation and determination of its fixed point.

Teaching

3Hrs of Lecture, 1Hr of Tutorial in a week.
Credit: 4

Indicative reading

Textbooks:

1 J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc- Graw Hill, 2004.
2 I. N. Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1957.
3 S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

More detailed readings will be given at the beginning of the course and some notes will be provided where textbook coverage is inadequate.

Assessment

Mid term: 30 (Exam Duration: 2Hrs)

Internal: 20 (From 3 Unit test to be held during semester. Unit Test Mark:10)

End term: 50 (Exam Duration: 3Hrs)

Course Code : **EC2331**

Course Name : **Analog and Digital System**

Availability : **3rd Semester CSE**

Pre – requisites: **None**

Course content

Module 1: IC Digital Logic Families-Characteristics of digital IC‟s, Transistor-Transistor Logic family, Standard TTL characteristics, Other TTL series, Open collector TTL, Wired OR/AND connection, Tristate TTL, Emitter-Coupled Logic family, ECL NOR/OR gate and its characteristics, Metal-oxide semi-conductor (MOS) family, NMOS and CMOS gates and their characteristics, CMOS transmission gate circuits .

Module 2: Simplification of Boolean Functions-Using Karnaugh map and Quine-Mccluskey methods, SOP,POS simplification, NAND and NOR implementations, other two-level implementation (AND-OR-INVERT).

Module 3: Combinational Logic Design-Design procedure, Adder : Half adder, Full adder, Serial adder, Parallel adder & Carry look-ahead adder, Subtractors : Half subtractor & Full subtractor, BCD to Excess-3 code convertor, BCD to 7-segment decoder, Parity generator and checker.

Module 4: Combinational Logic Design using MSI Circuits-Application of typical IC‟s like 4-bit parallel adder (ex : 7483), Encoders (ex :74148), Multiplexers (ex: 74151, 74153, 74157) and their use in realising boolean functions, Multiplexer trees, Demultiplexer / Decoders (e.g.: 74138, 74154) and their use in realising a boolean function and demultiplexer trees, 4-bit magnitude comparator (ex:7485).

Module 5: Synchronous Sequential Logic-Analysis of clocked sequential logic, State education and assignment, Flip-flop excitation tables, Design procedure, Design of sequential circuits ex : 3-bit up/down counter (mod < 8), 3-bit up/down gray code counter, Serial adder.

Module 6: Counters-Dependancy notation, Symbols for Decoder, Multiplexer, Flipflops, Registers, Counters, RAM. Flipflops, Asynchronous counters (mod 8 and less than 8), IC asynchronous counters (7493, 7490) and cascading, synchronous counters, binary and binary up-down counters, IC synchronous counters (74192, 74190) and cascading.

Module 7: Registers-Registers and their different modes of operation SISO, SIPO, PISO, PIPO, Shift registers (7495 / 74195), bidirectional

universal shift register (74194), Applications of shift registers, Time delay, Ring counter, Johnson counter, Sequence generator; Programmable Logic Devices-PLD, PLA,PAL, FPGA structures & applications.

Teaching

2Hrs of Lecture, 1Hr of tutorial and 2Hrs of practical in a week.
Credit: 4

Indicative reading

Text Books:

1. M Morris Mano, Digital Design, 3rd Edition, 2006, PHI

2. R.P Jain, Modern Digital Electronics, Second Edition, TMH

3. Bignell & Donovan Digital Electronics, 4th Edition, 2007, Thomson Learning.

Reference Books:

1. Tocci: Digital Systems PHI , 6e, 2001 88

2. Uyemura : Digital Systems Design, 2003, Thomson Learning

3. Anand Kumar : Digital Integrated Electronics ,2nd 2009

More detailed readings will be given at the beginning of the course and some notes will be provided where textbook coverage is inadequate.

Assessment

Mid term: 30 (Exam Duration: 2Hrs)

Internal: 10 (From 3 Unit test to be held during semester. Unit Test Mark:10)

End term: 50 (Exam Duration: 3Hrs)

Practicals: 10 (From Practical Session/Practical Exam)

Course Code : **CS2302**

Course Name : **Data Structure**

Availability : **3rd Semester CSE**

Pre – requisites: **C programming fundamentals**

Course content

Linear Data Structures: Arrays, Records, Strings and string processing, References and aliasing, Linked lists, Strategies for choosing the appropriate data structure, Abstract data types and their implementation: Stacks, Queues, Priority queues, Sets, Maps.

Basic Analysis: Differences among best, expected, and worst case behaviours of an algorithm, Asymptotic analysis of upper and expected complexity bounds, Big O notation: formal definition and use, Little o, big omega and big theta notation , Complexity classes, such as constant, logarithmic, linear, quadratic, and exponential, Time and space trade-offs in algorithms, Recurrence relations , Analysis of iterative and recursive algorithms.

Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Quick Sort, Heap Sort, Merge Sort, Counting Sort, Radix Sort.

Non-Linear Data Structures And Sorting Algorithms: Hash tables, including strategies for avoiding and resolving collisions, Binary search trees, Common operations on binary search trees such as select min, max, insert, delete, iterate over tree, Graphs and graph algorithms , Representations of graphs, Depth- and breadth-first traversals , Heaps ,Graphs and graph algorithms , Shortest-path algorithms (Dijkstra and Floyd) , Minimum spanning tree (Prim and Kruskal). (Basic Ideas only)

Teaching

3Hrs of lecture and 1 Hr of tutorial in a week.
Theory Credit: 4

Indicative reading

Text Books:

1. Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft, Addison-Wesley Series (1983)

2. Data Structures and Algorithm Analysis in Java (3rd Edition) by Mark Allen Weiss, Addison Wesley,(2011).

Reference Books:

1. T.H. Cormen, C.E. Leiserson, and R.L. Rivest. Introduction to Algorithms. The MIT Press and McGraw-Hill Book Company, Cambridge, Massachusetts, 1990 (Available in Indian Edition).

2. Steven S. Skiena. The Algorithm Design Manual, Springer, Second Edition, 2008.

More detailed readings will be given at the beginning of the course and some notes will be provided where textbook coverage is inadequate.

Assessment

Mid term: 30 (Exam Duration: 2Hrs)

Internal: 20 (From 3 Unit test to be held during semester. Unit Test Mark:10)

End term: 50 (Exam Duration: 3Hrs)

Course Code : **CS2304**

Course Name : **Discrete mathematics**

Availability : **3rd Semester CSE**

Pre – requisites: **None**

Course content

Module 1: Sets, countable/uncountable sets, integers, induction.

Module 2: Functions, relations, equivalence classes, partitions, elementary graph theory.

Module 3: Propositional logic, Boolean algebra.

Module 4: Abstract Algebra: Basics of groups, rings, finite fields, vector spaces.

Module 5: Combinatorics – Counting principles, recurrence equations, generating functions.

Module 6: Probability Theory – Sample space, events, expectations, variance, distribution, random variables, binomial, Poisson and geometric random variables

Teaching

3Hrs of Lecture, 1Hr of tutorial in a week.
Credit: 4

Indicative reading
Textbooks:

1. “Discrete Mathematics and Its Applications”, by Kenneth H. Rosen, Tata McGraw Hill, 6th edition, ISBN: 0072880082© 2007

2. “Elements of Discrete Mathematics”, by C. L. Liu, Tata McGraw Hill Education Private Limited, 3rd edition,2008.

More detailed readings will be given at the beginning of the course and some notes will be provided where textbook coverage is inadequate.

Assessment

Mid term: 30 (Exam Duration: 2Hrs)

Internal: 20 (From 3 Unit test to be held during semester. Unit Test Mark:10)

End term: 50 (Exam Duration: 3Hrs)

Course Code : **CS2305**

Course Name : **Computer Organization and Architecture**

Availability : **3rd Semester CSE**

Pre – requisites: **None**

Course content

Module 1: Basic organization of computers, Block level description of the functional units as related to the execution of a program; Fetch, decode and execute cycle.

Module 2: Machine instructions, Instruction set architectures, Assembly language programming, addressing modes, instruction cycles, registers and storage, addressing modes; discussions about RISC versus CISC architectures; Inside a CPU:

Module 3: Information representation, Floating point representation (IEEE 754), computer arithmetic and their implementation; Fixed-Point Arithmetic: Addition, Subtraction, Multiplication and Division, Arithmetic Logic Units control and data path, data path components, design of ALU and data path, controller design; Hardwired and Microprogrammed Control

Module 4: Memory Technology, static and dynamic memory, Random Access and Serial Access Memories, Cache memory and Memory Hierarchy, Address Mapping, Cache updation schemes, Virtual memory and memory management unit.

Module 5: I/O subsystems: Input-Output devices such as Disk, CD-ROM, Printer etc.; Interfacing with IO devices, keyboard and display interfaces; Basic concepts Bus Control, Read Write operations, Programmed IO, Concept of handshaking, Polled and Interrupt-driven I/O, DMA data transfer;

Module 6: Pipeline Processing, Instruction and Arithmetic Pipeline, Pipeline hazards and their resolution, Parallel Processing

Teaching

3Hrs of Lecture and 1Hr of tutorial in a week.
Credit: 4

Indicative reading
Text Book:

1. Computer Organization by V. Carl Hamacher, Safwat G. Zaky and Zvonko G. Vranesic , McGraw-Hill series (2002)

Reference Books:

1. Computer Organization and Design, by David Patterson and John Hennessey, ” Elsevier. 2008.

2. Computer System Architecture by Mano, M.M.,, Prentice Hall of India, New Delhi, 1992

3. Computer Systems Design and Architecture (2nd Edition) by Vincent P. Heuring and Harry F. Jordan (Dec 6, 2003)

4. Computer Architecture and Organization, by Hayes, J.P.1998, McGraw-Hill

More detailed readings will be given at the beginning of the course and some notes will be provided where textbook coverage is inadequate.

Assessment

Mid term: 30 (Exam Duration: 2Hrs)

Internal: 20 (From 3 Unit test to be held during semester. Unit Test Mark:10)

End term: 50 (Exam Duration: 3Hrs)

Course Code : **CS2306**

Course Name : Object Oriented Programming using C++

Availability : 3rd Semester CSE

Pre – requisites: C programming fundamentals

Course content

Module 1: **Introduction**

What is object oriented programming? Why do we need object-oriented. Programming characteristics of object-oriented languages. C and C++.

Module 2:C++ Programming basics

Output using cout. Directives. Input with cin. Type bool. The setw manipulator. Type conversions.

Module 3:Functions

Returning values from functions. Reference arguments. Overloaded function. Inline function. Default arguments. Returning by reference.

Module 4:**Object and Classes**

Making sense of core object concepts (Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces).

Implementation of class in C++, C++ Objects as physical object, C++ object as data types constructor. Object as function arguments. The default copy constructor, returning object from function. Structures and classes. Classes objects and memory static class data. Const and classes.

Module 5:**Arrays and string arrays fundamentals. Arrays as class Member Data**

Arrays of object, string, The standard C++ String class

Module 6:**Operator overloading**

Overloading unary operations. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable.

Module 7:**Inheritance**

Concept of inheritance. Derived class and based class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private

inheritance, aggregation : Classes within classes, inheritance and program development.

Module 8:**Pointer**

Addresses and pointers. The address of operator and pointer and arrays. Pointer and Faction pointer and C-types string. Memory management : New and Delete, pointers to objects, debugging pointers.

Module 9:**Virtual Function**

Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, dynamic type information.

Module 10:Streams and Files

Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, and printer output.

Module 11:**Templates and Exceptions**

Function templates, Class templates Exceptions

Module 12:The Standard Template Library

Introduction algorithms, sequence containers, iterator, specialized iterator, associative containers, strong user-defined object, function object

Teaching

3Hrs lecture, 1Hr tutorial and 3Hrs practical in week.
Theory Credit: 4
Practical Credit: 1

Indicative reading
Textbooks:
1. Object Oriented Programming in C++ by Robert Lafore Techmedia Publication.

2. Object Oriented Programming in C++ Saurav Sahay Oxford University Press.

3. Object Oriented Programming in C++ R Rajaram, New Age International Publishers 2nd.

5. OOPS C++ Big C++ Cay Horstmann Wiley Publication

More detailed readings will be given at the beginning of the course and some notes will be provided where textbook coverage is inadequate.

Assessment

Mid term: 30 (Exam Duration: 2Hrs)

Internal: 20 (From 3 Unit test to be held during semester. Unit Test Mark:10)

End term: 50 (Exam Duration: 3Hrs)

Practicals

Internal: 20 (To be assessed from practical sessions)

End term: 30 (Exam duration: 3Hrs)

Course Code : **CS2303**

Course Name : Data Structure and Algorithms Lab

Availability : 3rd Semester CSE

Pre – requisites: C programming fundamentals

Course content

1. Linear Search
2. Finding the maximum element in an array
3. Create 5 nodes in singly linked list
4. Insert an element in the beginning of singly linked list.
5. Insert an element in the end of singly linked list.
6. Insert an element at any position in singly linked list.
7. Counting the number of nodes in singly linked list.
8. Implement stack using array.
9. Implement stack using linked list.
10. Implement circular queue
11. Insert an element at any position in doubly linked list.
12. Delete a node at given position in doubly linked list.
13. Tower of Hanoi.
14. Reverse a string using stack

Teaching

3Hrs of Practical in a week.

Practical Credit: 1

Indicative reading

1. Data Structure through C in Depth by S.K. Srivastava & Deepali Srivastava (BPB PUBLICATION)
2. Let us C by Yashavant Kanetkar (BPB PUBLICATION)

Assessment

Internal: 20 (To be assessed from practical sessions)

End term: 30 (Exam duration: 3Hrs)

Course Code : **CS 2307**

Course Name : Object Oriented Programming using C++ Lab

Availability : 3rd Semester CSE

Pre – requisites: C programming fundamentals

Course content

1. Simple C++ Programs to Implement Various Control Structures.
    A. If statement
    B. Switch case statement and do while loop
    C. For loop
    D. While loop
2. Programs to Understand Structure & Unions.
    A. Structure
    B. union
3. Programs to Understand Pointer Arithmetic.
4. Functions & Recursion.
    A. Recursion

B. function

5. Inline Functions.

6. Programs to Understand Different Function Call Mechanism.

A. Call by reference & Call by Value

7. Programs to Understand Storage Specifiers.

8. Constructors & Destructors.

9. Use of “this” Pointer. Using class

10. Programs to Implement Inheritance and Function Overriding.

A. Multiple inheritance –Access Specifiers

B. Hierarchical inheritance – Function Overriding / Virtual Function

11. Programs to Overload Unary & Binary Operators as Member Function & Non Member

Function.

A. Unary operator as member function

B. Binary operator as non member function

12. Programs to Understand Friend Function & Friend Class.

A. Friend Function

B. Friend class

13. Programs on Class Templates

Teaching

3Hrs of Practical in a week.
Practical Credit: 1

Indicative reading

As listed in the Object Oriented Programming using C++ readings

Assessment

Internal: 20 (To be assessed from practical sessions)

End term: 30 (Exam duration: 3Hrs)