## 2HS306 Applied Engineering Mathematics [3 2 0 4]

**Learning outcomes:**

Upon completion of this course, students will be able to:

- Understand all basic fundamentals of numeric methods transforms.
- Prepare him/her self for solving the problem by applying differential equations and transforms.
- Apply knowledge of transforms and numerical methods in various application of his/her branch.

## Syllabus:

| Unit No | Topics |
|---|---|
| 1 | **Theory of complex Variable:** Analytic functions, Cauchy-Riemann equation, Line integral, Cauchy's theorem and Cauchy's integral. Simple form of conformal transformation with application of the solution of two-dimensional problems. |
| 2 | **Finite Differences And Difference Equations:** Finite differences interpolation. Newton's and LaGrange's formula. Difference equation with constants co-efficient. Solution of ordinary and partial differential equations with boundary conditions by finite difference method. |
| 3 | **Numerical Methods:** Roots of algebraic equations. Solution of linear simultaneous equations. Solution of linear simultaneous equations. Numerical differentiation and integration. Numerical methods to solve first order, first degree ordinary differential equations. |
| 4 | **Laplace Transforms:** Definition, Laplace transform of elementary functions. Properties of Laplace transform, Inverse Laplace transforms. Transform derivatives, Transform of integration. Multiplication by $t^n$, Division by t, Convolution theorem. Unit step and Heaviside's unit function, Dirac-delta function. Periodic functions Solution of ordinary linear differential equations Simultaneous equations with constant coefficient applied to electrical circuits. |
| 5 | **Fourier Series:** Definition of periodic function. Euler's formula. Functions having points of discontinuity. Change of intervals. Odd and even functions. Expansion of odd or even periodic functions. Half range cosine and sine series. Elements of harmonic analysis. |
| 6 | **Fourier Transforms:** Definition. Fourier integral Fourier sine and cosine integration. Complex form of Fourier integral. Fourier sine and cosine transform. Inverse Fourier transforms. |

**Text Book:**

1) Higher engineering mathematics by B. S. Grewal

**Reference Books:**

1) Text book of engineering mathematics by A. B. Mathur and V. P. Jaggi
2) Engineering mathematics by Srivastava
3) Applied Mathematics vol.-I and II by P.N.Wartikar and J. N. Wartikar

## 2CSE301: Computer Organization [3 0 2 4]

**Learning Outcomes:**

After successful completion of this course, students will be able to :

- Understand the organization of a Computer system
- Apply the knowledge of combinational and sequential logical circuits to design a computer architecture
- Understand the input / output and Memory related concepts.

**Syllabus:**
**Introduction to Computer Organization and Architecture**

| Unit No | Topics |
|---|---|
| 1 | **Register Transfer and Micro operations** Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro operations, Logic Micro-operations, Shift Micro operations, Arithmetic Logic Shift Unit. |
| 2 | **Basic computer organization** Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description. |
| 3 | **Micro programmed control** Control Memory, Address sequencing, Micro program Example, design of control Unit |
| 4 | **Central processing unit** Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC), comparison of RISC and CISC |
| 5 | **Pipelining** Parallel processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline. |
| 6 | **Computer arithmetic** Introduction, Addition and subtraction, Multiplication and Division Algorithms (Booth Multiplication Algorithm), Floating Point Arithmetic, Decimal Arithmetic Unit and Operations |
| 7 | **Input – Output organization** Input-output interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPUIOP communication, Serial Communication. |
| 8 | **Memory Organization** Memory Sub System, Memory hierarchy, Main memory, Auxiliary memory, Flash memory, Associative memory, Cache memory, Virtual memory. |

**Reference Books:**

1. Computer System Architecture: By M. MorrisMano.
2. Structured Computer Organization: By Tanenbaum.
3. Computer Organization: By Stallings.
4. Computer Architecture and Organization: By Hayes.
5. Computer Organization and Design by P. Pal Chaudhury.

## 2CSE302: Data Structures [4 0 4 6]

**Learning Outcomes:**

On successful completion of this course, students will be able to:

- Differentiate between the types of Data Structures.
- Select an appropriate data structure for solving typical computing problems.
- Apply sorting and searching algorithms to the small and large data sets.

**Syllabus:**

| Unit No | Topics |
|---|---|
| 1 | **Introduction to Data Structure:**<br>Data Management concepts, Data types – primitive and non-primitive, Types of Data Structures- Linear & Non Linear Data Structures. |
| 2 | **Linear Data Structure:**<br>Stack: Concepts and representation, Operations, Applications. Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi.<br><br>Queue: Concept and Representation, Operations, Types viz. simple, circular, priority, double ended. Applications of queue.<br><br>Linked List: Concept and Representation. Operations: Insertion at beginning, at the end and at any point, Deletion at the beginning, at the end and at any point.<br><br>Types of Linked lists: Singly Linked List, Doubly Linked list, Circular linked list, Linked implementation of Queue. Applications and Advantages of Linked Lists. |
| 3 | **Nonlinear Data Structure:**<br>Tree : Definitions and Concepts, Representation of binary tree, Binary tree traversal (In order, post order, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees To Binary Trees, Applications Of Trees- Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance. |
| 4 | **Graph:**<br>Basic Concept of Graph Theory and its Properties, Matrix Representation Of Graphs, Elementary Graph operations, Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree. |
| 5 | **Sorting & Searching:**<br>Performance Analysis and Management - Time and space analysis of algorithms – Average, best and worst case analysis.<br><br>Sorting – Bubble Sort, Selection Sort, Quick Sort, Merge Sort, Insertion sort, Heap sort.<br><br>Searching – Sequential Search and Binary Search |
| 6 | **Hashing:**<br>Symbol Table, Hashing fun, Collision Resolution – Techniques. |

**Reference Books:**


1. Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International.
2. Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed.
3. Fundamentals of Data Structures in C++-By Sartaj Sahani.
4. Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan Publisher- Thomson Learning.
5. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill

## 2CSE303: Object Oriented Programming [3 0 4 5]

**Learning Outcomes:**

After successful completion of this course, students will be able to:

- Understand Java Programming Language
- Design, implement, test, debug, and document GUI, event-driven programs.
- Design, implement, test, debug, and document in object-oriented programming language.
- Understand JSP and Servlet Technology
- Web development and deployment

**Syllabus**

| Unit No | Topics |
|---|---|
| 1 | **Introduction**<br>Object Oriented Programming Concepts (Encapsulation, Inheritance & Polymorphism), Features of JAVA Language, Types of JAVA Programs, JAVA Architecture |
| 2 | **Literals, Data Types And Variables**<br>Literals (Integer Literals, Floating Point Literals, Character Literals, String Literals, Boolean Literals), Data Types (Integer Types, Floating Point Types, Character Type, Boolean Type), Variables |
| 3 | **The Structure of a Java Program**<br>Structure of a Java Program, Comments, Expressions and Statements, Type Conversion, Block Statements and Scope |
| 4 | **Operators**<br>Arithmetic Operators, Bitwise Operators, Relational Operators, Boolean Logical Operators, Ternary<br>Operator, Operator Precedence |
| 5 | **Control Statements**<br>The if...else Statement, The switch Statement, The while Statement, The do...while Statement, The for...Statement, The break Statement, The continue Statement, The comma Statement |
| 6 | **Arrays**<br>One-Dimensional Array, Multi-Dimensional Array |
| 7 | **Classes**<br>Defining a Class, The new Operator and Objects, The dot operator, Method Declaration and Calling, Constructors, Instance Variable Hiding, this in Constructor, Method Overloading, Passing Objects as Parameters to Methods |
| 8 | **Inheritance**<br>Creating Subclasses, Method Overriding, Final Class, Final Variables, Object Destruction and Garbage Collection, Recursion, Static Methods, Block and Variables (Static Class, Static Variables, Static Block), Abstract Classes. |
| 9 | **Packages and Interfaces**<br>Package, The import Statement, Access Modifier, Interfaces (Defining Interfaces, Implementing an Interface) |

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| 10 | **Wrapper Classes**<br>The Number Class (Byte Class, Short Class, Integer Class, Long Class, Float Class, Double Class), The Character Class, The Boolean Class |
| 11 | **Exceptions**<br>Type of Exceptions, Catching Exceptions (Nested try Blocks, Hierarchy of Multiple Catch Blocks), Rethrowing Exceptions, Creating Your Own Exceptions, Broadcasting that a Method Throws Exception, The finally Block, Checked and Unchecked Exceptions |
| 12 | **Input And Output Classes**<br>I/O Streams, The File Class, Byte Stream (Input Stream, Output Stream), Disk File Handling (FileInputStream, FileOutputStream), Memory Handling (ByteArrayInputStream, ByteArrayOutputStream), Filtered Byte Streams (BufferedInputStream, BufferedOutputStream, DataInputStream, DataOutputStream), SequenceInputStream, ObjectOutputStream, ObjectInputStream, Random Access File, Character Stream(CharArrayReader, CharArrayWriter, InputStreamReader, Output Stream Writer, File Writer, File Reader, Buffered Reader, Buffered Writer) |
| 13 | **Strings**<br>The String Class( Equality Operator and equals Method, String Concatenation with +), The String Buffer Class |
| 14 | **Applets**<br>Applet Basics, Methods of Building an Applet, Some General Methods of Applet, Displaying Text in Status Bar, Embedding Applet Information, The HTML Applet Tag, Reading Parameters into Applets, Colors in Applet, Getting Documentbase and Codebase, Interfaces in Applet, Multimedia in Applet (Playing Audio Clips, Images in Applet, Applet Showing Other HTML Pages) |
| 15 | **Event Handling**<br>Delegation Event Model, Events (The Action Event Class, The Adjustment Event Class, The Component Event Class, The Item Event Class, The Key Event Class, The Mouse Event Class, The Text Event Class, The Window Event Class), Event Listeners, Registering Listners with Source, Adapter Classes |
| 16 | **Introduction to Advanced JAVA Technologies**<br>Introduction to Servlets, Servlets API, JSP, JSP Specification and Syntax, JSP Expression Language, JSP Tag files- Custom Tags, Beans, Http: Session Management, Cookie API, RMI, Web Component, Debugging Web Applications, Web Archive Development Descriptor, Web Application Security, JDBC, Java EE Packaging and deployment |

**Reference Books:**

1. Programming in Java2 By Dr. K. Somasundaram, Jaico Books
2. Java Complete Reference Java By Herbet Shield.
3. Balaguruswamy, Programming with Java – A primer, Tata McGraw Hill

## 2CSE304: Application Development - I [0 0 2 1]

The inception of Application Development – I starts from summer break. This is an integral part of their curricula every summer. The student can work on innovative ideas under the mentor ship of in-house faculties, PG / Ph.D. scholars, NGOs, R & D or industry in diverse fields of their interest.

The summer work could last anywhere between 6-8 weeks and it is continuing during semester III for effective execution.

**Learning Outcomes:**

1. Identify, formulate and solve real life problems by applying engineering principles through prototyping followed by software based solution.
2. Develop inter -personal skills and team building.

| Unit No | Topics |
|---|---|
| **1** | **Objectives:**<br>The summer work is designed to help you to experience what it is really like working in real world environment, to help you apply the theory and skills you have learnt till semesters, and for your personal development. |
| **2** | **Work Plan:**<br>1. Study the existing work environment<br>2. To improve the existing work environments propose the innovative idea.<br>3. Submit the abstract<br>4. Build the prototype and Test<br>5. Propose the software based solution<br>6. Document and present the work |
| **3** | **Assessment:**<br>Content/discipline knowledge and skills are assessed at the practical level through continuous evaluation. |