
OP JINDAL UNIVERSITY

Raigarh-Chhattisgarh



Scheme and Syllabus

Of

B. Tech. (01UG020)

Department of

Computer Science and Engineering

School of Engineering

Batch 2022-2026

SCHOOL OF ENGINEERING
Department of Computer Science & Engineering



Scheme for B. Tech (CSE) Programme

SCHOOL OF ENGINEERING

Department of Computer Science & Engineering



Computer Science and Engineering

L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination

B. Tech (Computer Science and Engineering) Prog. code- 01UG020

Academic Semester III

| S. No. | Subject Code | Board of Study | SUBJECT | Periods per week | | | Scheme of Examination and Marks | | | | Credit L+(T+P)/2 (L+P+T) |
|--------------|------------------|----------------|---|------------------|----------|-----------|---------------------------------|------------|------------|-------------|--------------------------------|
| | | | | L | T | P | PRE** | | ESE* | Total Marks | |
| | | | | | | | Mid Sem | TA | | | |
| 1 | SOE-B-CSE-21-301 | CSE | Discrete Mathematics | 3 | 1 | 0 | 30 | 20 | 50 | 100 | 4 |
| 2 | SOE-B-CSE-21-302 | CSE | Data Structure | 3 | 1 | 0 | 30 | 20 | 50 | 100 | 4 |
| 3 | SOE-B-CSE-21-303 | CSE | Object Oriented Programming using JAVA | 3 | 0 | 0 | 20 | 15 | 40 | 75 | 3 |
| 4 | SOE-B-CSE-21-304 | CSE | Formal Language and Automata Theory | 3 | 0 | 0 | 20 | 15 | 40 | 75 | 3 |
| 5 | SOE-B-CSE-21-305 | CSE | Object Oriented Programming Lab | 0 | 0 | 4 | 0 | 30 | 20 | 50 | 2 |
| 6 | SOE-B-CSE-21-306 | CSE | Data Structure Lab | 0 | 0 | 4 | 0 | 30 | 20 | 50 | 2 |
| 7 | SOE-B-CSE-21-307 | CSE | Web Development Lab I | 0 | 0 | 4 | 0 | 30 | 20 | 50 | 2 |
| 8 | SOE-B-CSE-21-308 | CSE | Data Visualization Lab | 0 | 0 | 2 | 0 | 15 | 10 | 25 | 1 |
| 9 | SOE-B-CSE-21-309 | CSE | MOOCS/SWAYAM/Certification/Liberal Arts | - | - | - | - | 30 | 20 | 50 | 2 |
| 10 | SOE-B-CSE-21-310 | CSE | Professional Development III | 0 | 0 | 2 | 0 | 25 | 0 | 25 | 1 |
| Total | | | | 12 | 2 | 16 | 100 | 230 | 270 | 600 | 24 |

* End Semester Examination

** Progress Review Examination

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Detailed Syllabus

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| | | | | | |
|----------------------------|----------|-----------------------------|---------------------|----------|-------------------------|
| Programme | : | B.Tech. | Semester | : | III |
| Name of the Course: | : | Discrete Mathematics | Course Code: | : | SOE-B-CSE-21-301 |
| Credits | : | 4 | No of Hours | : | 4 Hrs./week |
| Max Marks | : | 100 | | | |

Course Description:

This course will discuss fundamental concepts in discrete mathematics with emphasis on their applications to computer science. Example topics include logic and Boolean circuits; sets, functions and relations; analysis techniques based on counting methods and recurrence equations; trees and more general graphs.

Course Outcomes:

After Completion of the course Students will be able:

| CO Number | Course Outcome |
|-----------|--|
| CO1 | To formulate logic expression for variety of applications. |
| CO2 | To use Algebraic structures for problem solving. |
| CO3 | To describe and manipulate sequences. |
| CO4 | To analyses and solve counting problems on finite and discrete structures. |
| CO5 | To apply graph theory in solving computing problems. |

Syllabus:

Unit-I: Mathematical logic

Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers. Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

Unit-II: Relations

Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram. Functions: Inverse Function Composition of functions, recursive Functions, Lattice and its Properties.

Algebraic structures: Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

Unit-III: Recurrence Relation

Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics roots solution of non-homogeneous Recurrence Relation.

Unit-IV: Combinatorics

Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion. Pigeon hole principles and its application.

Unit-V: Graph Theory

Notations & terminology, directed and undirected graphs, incidence and degrees, Sub-graphs, Walks paths, cycles, circuits, components, connectedness algorithms, shorter path algorithm. Euclidian and Hamiltonian graphs, the traveling Salesman Problem, Trees: Spanning trees, rooted trees and binary trees.

Text Books:

- A. Doerr and K. Levasser, “Applied Discrete Structures for Computer Science”.
- B Kolman & R.C. Busby, ”Discrete Mathematical Structures for Computer Science”.
- Kenneth H Rosen, “Discrete Mathematics and its Applications with Combinatorics and Graph Theory”, 7th Edition, TMH.
- C.V.Sastry, Rakesh Nayak, “A Text Book on Discrete Mathematics”, Wiley, Dreamtech press

Reference Books:

- J.P. Trembley & R. P. Manohar, “Discrete Mathematical Structures with Application to Computer Science”.
- Graph Theory by F. Harary.
- C. Liu, “Elements of Discrete Mathematics”.

CO-PO & PSO Correlation

| Course Name : Discrete Mathematics | | | | | | | | | | | | |
|------------------------------------|------------------|---|---|---|---|---|---|---|------|---|---|---|
| Course Outcomes | Program Outcomes | | | | | | | | PSOs | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 1 | 2 | 2 | | | | | | 2 | | 1 | 2 |
| CO2: | | 1 | 2 | | | | | | 1 | | 1 | 2 |
| CO3: | | 2 | 2 | | | | | | 1 | | 1 | 2 |
| CO4: | | 1 | 2 | | | | | | 2 | | 1 | 2 |
| CO5: | | 2 | 2 | | | | | | 2 | | 1 | 2 |

Note: 1.: Low 2.: Moderate 3.: High

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|----------------------------|----------|-----------------------|---------------------|----------|-------------------------|
| Programme | : | B.Tech. | Semester | : | III |
| Name of the Course: | : | Data Structure | Course Code: | : | SOE-B-CSE-21-302 |
| Credits | : | 4 | No of Hours | : | 4 Hrs./week |
| Max Marks | : | 100 | | | |

Course Description:

This course emphasizes on logical structure of data, its physical representation and techniques for program development and debugging. In this course, students will also learn how to select best suited data structure to solve a particular problem. This course is also about the computational complexities of different data structures.

Course Outcomes:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|-----------|---|
| CO1 | Identify the correctness of the algorithms. |
| CO2 | Analyze the times complexity of the algorithms using asymptotic analysis. |
| CO3 | Compare between different data structures. Pick an appropriate data structure for a design situation. |
| CO4 | Analyze/ summarize searching and sorting techniques. |
| CO5 | Employ and map suitable algorithms to solve engineering problems. |

Syllabus:

Unit-I: Introduction

Introduction: Basic Terminology, Data types and its classification, Abstract Data Types. Time and Space Analysis of Algorithms, Asymptotic Notations - Average, best and worst case analysis, Simple recurrence relations and use in algorithms, Sorting and Searching algorithms.

Unit-II: Linear Data Structure:

Arrays, Stacks, Queues, Linked Lists Arrays, Sparse Matrices, Stacks, Recursion, Queues, Types of queues, linked list, Generalized linked list, Application: Garbage collection and compaction, Conversion of Infix to Postfix Expressions, Polynomial Arithmetic etc.

Unit-III: Non-linear Data Structure:

Trees, Binary Trees, Tree Traversal, Threaded Binary trees, Binary Search Tree (BST), balanced trees - AVL Trees, B-trees, B+ tree. Application: Huffman coding Algorithm etc.

Unit-IV: Nonlinear Data Structure: Graphs

Graphs, Directed graph, Undirected graph, Traversal, Application of Graphs: Shortest path - Minimal spanning tree etc.

Unit-V: Hashing

Introduction, types, Collision Resolution Strategies, NP-completeness.

Textbooks:

- Alfred. V. Aho, John. E. Hopcroft, Jeffrey. D. Ullman, "Data Structures and Algorithms", Addison-Wesley Publications.,1985
- Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., N Delhi.
- C V Sastry, Rakesh Nayak, Ch Raja Ramesh, "Data Structures and Algorithms", Wiley, Dreamtech press.

Reference books:

- Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, Asia.1994.
- Jean-Paul Tremblay, Paul. G. Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hill second edition, 1991.
- Thomas. H. Cormen, Charles. E. Leiserson, Ronald. L. Rivest, "Introduction to Algorithms", PHI 1998.
- Lipschutz; "Data structure", (Schaum); TMH
- R. Kruse et al, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002.

CO-PO & PSO Correlation

| Course Name: Data Structure | | | | | | | | | | | | |
|-----------------------------|------------------|---|---|---|---|---|---|---|------|---|---|---|
| Course Outcomes | Program Outcomes | | | | | | | | PSOs | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 2 | 1 | | | | | | | 2 | | | |
| CO2: | 2 | 2 | 1 | | | | | | 2 | 2 | | |
| CO3: | 2 | 2 | 1 | | | | | | 2 | 2 | | |
| CO4: | 1 | | 2 | | | | | | 1 | | | 1 |
| CO5: | 1 | | 2 | | | | | | 2 | 2 | | |

Note: 1: Low 2.: Moderate 3: High

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|----------------------------|----------|---|---------------------|----------|-------------------------|
| Programme | : | B.Tech. | Semester | : | III |
| Name of the Course: | | Object Oriented Programming using JAVA | Course Code: | | SOE-B-CSE-21-303 |
| Credits | : | 3 | No of Hours | : | 3 Hrs./week |
| Max Marks | : | 75 | | | |

Course Description:

The course will provide foundational knowledge of classes and objects, interface and inheritance, handling exception and multithreading, I/O stream and JDBC, Designing GUI using AWT and SWING.

Course Outcomes:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|------------------|--|
| CO1 | Understand the concept of classes and objects. |
| CO2 | Demonstrate concept of interface and inheritance. |
| CO3 | Demonstrate concept of Exception handling and multithreading |
| CO4 | Demonstrate concept of I/O stream and JDBC |
| CO5 | Demonstrate concept of GUI design using AWT and SWING. |

Syllabus:

Unit-I: Object Oriented Programming

Class Fundamentals, Object & Object reference, Object Life time & Garbage Collection, Creating and Operating Objects, Constructor & initialization code block, Access Control, Modifiers, methods Nested, Inner Class & Anonymous Classes, Abstract Class & Interfaces Defining Methods, Argument Passing Mechanism, Method Overloading, Recursion, Dealing with Static Members, Finalize () Method, Native Method. Use of “this” reference, Use of Modifiers with Classes & Methods, Design of Accessors and Mutator Methods Cloning Objects, shallow and deep cloning, Generic Class Types.

Unit-II: Extending Classes and Inheritance

Extending Classes and Inheritance Use and Benefits of Inheritance in OOP, Types of Inheritance in Java, Inheriting Data members and Methods, Role of Constructors in inheritance, Overriding Super Class Methods, Use of “super”, Polymorphism in inheritance, Type Compatibility and Conversion Implementing interfaces. Package Organizing Classes and Interfaces in Packages, Package as Access Protection, Defining

Package, CLASSPATH Setting for Packages, Making JAR files for Library Packages
Import and Static Import Naming Convention for Packages.

Unit-III: Exception Handling and Multithreading

Exception Handling: The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, JVM reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling, In-built and User Defined Exceptions, Checked and Un-Checked Exceptions.

Thread: Understanding Threads, Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities, Synchronizing Threads, Inter Communication of Threads, Critical Factor in Thread –DeadLock.

Unit-IV: Input/Output Streams and JDBC

Concept of streams, Input Streams and Output Streams classes, byte oriented data processing, character oriented data processing, creation of files, inserting data into files, Reading/ Writing characters, Reading/ Writing bytes, concatenating files. copying data from one file to another using byte/character-oriented streams, Introduction to JDBC, JDBC Drivers & Architecture, Connecting to non-conventional Databases.

Unit-V: GUI design using AWT and SWING

Designing Graphical User Interfaces in Java, Components and Containers, Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components, Java Utilities (java.util Package)

Text Books:

- Herbert Schildt, “The Complete reference Java”, McGraw-Hill, Seventh Edition, 2007.
- E. Balagurusamy, “Programming with Java”, McGraw-Hill, Third Edition, 2007.

Reference Books:

- Eckel, Bruce, “Thinking in Java: Exploratory Data Analysis in Python”, fourth edition, 2008.

CO-PO & PSO Correlation

| Course Name: Object Oriented Programming using JAVA | | | | | | | | | | | | |
|--|-------------------------|----------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|----------|
| | Program Outcomes | | | | | | | | PSOs | | | |
| Course Outcomes | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 2 | 3 | | | | | | | 2 | | | |
| CO2: | | 1 | | | | | | | 2 | 1 | 1 | |
| CO3: | | 3 | 3 | | | | | | 2 | 2 | 2 | |
| CO4: | 2 | 3 | 3 | | | | | | 2 | 2 | 2 | 3 |
| CO5: | 3 | 3 | 3 | | | | | | 1 | | 2 | 3 |

Note: 1.: Low 2.: Moderate 3.: High

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|----------------------------|----------|--|---------------------|----------|-------------------------|
| Programme | : | B. Tech. | Semester | : | III |
| Name of the Course: | | Formal Language and Automata Theory | Course Code: | | SOE-B-CSE-21-304 |
| Credits | : | 3 | No of Hours | : | 3 Hrs./ week |
| Max Marks | : | 75 | | | |

Course Description:

This course will discuss fundamental concepts of finite automata. It will help in understanding into formal language, grammar and automata. Classification of different machines and their usage will help in understanding and finite system effectively.

Course Outcomes:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|-----------|---|
| CO1 | Construct deterministic and non-deterministic machines. |
| CO2 | Convert Language to Finite automata and vice versa. |
| CO3 | Distinguish Push down Automata and Turing Machine. |
| CO4 | Understand Decidable and Undecidable problem. |

Syllabus:

Unit-I: Introduction to Automata

Introduction to Automata, Finite Automata, Transition Systems, Acceptance of a String by a Finite Automata, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

Unit-II: Formal Languages

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, e-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

Unit-III: Context Free Grammars

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, e-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

Pushdown Automata:

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

Unit-IV: Turing Machine

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Universal Turing Machine.

Unit-V: Computability

Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Classes of P and NP, NP Hard and NP Complete Problems.

Text Books:

- J.E.Hopcroft, R.Motwani and J.D.Ullman, "Introduction to Automata Theory, Languages and Computation", 3rd Edition, Pearson 2008
- K.L.P.Mishra and N.Chandrasekharan, "Theory of Computer Science-Automata, Languages and Computation", 3rd Edition, PHI, 2007.
- K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science (Automata, Languages and Computation ", 3rd ed., Thirty-fourth printing (Third Edition) April, 2016.

Reference Books:

- K.V.N.Sunitha and N.Kalyani, "Formal Language and Automata Theory", Pearson, 2015.
- Shyamalendu Kandar," Introduction to Automata Theory, Formal Languages and Computation" , Pearson,2013.
- V.Kulkarni, "Theory of Computation", Oxford University Press,2013.

- Rajendra Kumar, “Theory of Automata, Languages and Computation”, McGraw Hill, 2014.

CO-PO & PSO Correlation

| Course Name: Formal Language and Automata Theory | | | | | | | | | | | | |
|---|-------------------------|----------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|----------|
| | Program Outcomes | | | | | | | | PSOs | | | |
| Course Outcomes | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 2 | | 2 | | | | | | 2 | | 1 | 2 |
| CO2: | | | 3 | | | | | | 1 | | 1 | 2 |
| CO3: | | | 3 | | | | | | 1 | | 1 | 2 |
| CO4: | | | 3 | | | | | | 2 | | 1 | 2 |

Note: 1.: Low 2.: Moderate 3.: High

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Programme : **B.Tech.** **Semester** : **III**
Name of the Course: **Object Oriented Programming using Java Lab** **Course Code:** **SOE-B-CSE-21-305**
Credits : **2** **No of Hours** : **4 Hrs. / week**

Course Descriptions:

The course will provide foundational knowledge of classes and objects, interface and inheritance, handling exception and multithreading, I/O stream and JDBC, Designing GUI using AWT and SWING.

Course Outcomes:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|-----------|---|
| CO1 | Implement classes and objects, |
| CO2 | Implement interface and inheritance. |
| CO3 | Implement exception handling and multithreading |
| CO4 | Implement input and output stream and JDBC |
| CO5 | Implement GUI design using AWT and SWING. |

The following concepts will be covered in the lab:

- Concepts related to classes and objects.
- Concepts related access specifiers and scope.
- Concepts related to interface and inheritance, polymorphism.
- Concepts related exception handling and multithreading
- Concepts related to file handling
- Concepts related to GUI design using AWT and SWING.

Text Books:

- Herbert Schildt, "The Complete reference Java", McGraw-Hill, Seventh Edition, 2007.
- E. Balagurusamy, "Programming with Java", McGraw-Hill, Third Edition, 2007.

Reference Books:

- Eckel, Bruce, "Thinking in Java: Exploratory Data Analysis in Python", fourth edition, 2008.

CO-PO & PSO Correlation

| Course Name: Object Oriented Programming using Java Lab | | | | | | | | | | | | |
|--|-------------------------|----------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|----------|
| Course Outcomes | Program Outcomes | | | | | | | | PSOs | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 1 | 1 | 2 | 2 | | | | | 1 | 2 | 2 | |
| CO2: | 3 | 3 | 2 | 2 | | | | | 2 | 2 | 2 | |
| CO3: | | | 3 | | | | | | | | 3 | |
| CO4: | 1 | | | | 2 | | | | | | 2 | |
| CO5: | 2 | 2 | | 1 | | | | | 2 | | 1 | |

Note: 1.: Low 2.: Moderate 3.: High

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|----------------------------|----------|---------------------------|---------------------|----------|-------------------------|
| Programme | : | B.Tech. | Semester | : | III |
| Name of the Course: | | Data Structure Lab | Course Code: | | SOE-B-CSE-21-306 |
| Credits | : | 2 | No of Hours | : | 4 Hrs./week |
| Max. Marks | : | 50 | | | |

Course Descriptions:

The objective of this lab is to teach students various data structures and to explain them algorithms for performing various operations on these data structures. This lab complements the data structures course. Students will gain practical knowledge by writing and executing programs using various data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Course Outcomes:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|-----------|---|
| CO1 | Arrays, records, linked structures, stacks, queues, trees, and graphs, etc. |
| CO2 | Apply different data structures in real applications. |

The following concepts will be covered in the lab:

- Implementation of the Queue: Linear Queue, Circular Queue, D-queue and Priority Queues.
- Implementation of Stack & perform infix to postfix conversion.
- Implementation of Linked list : Singly, Doubly and Circular Linked list.
- Representation of a polynomial using Linked list and write functions for polynomial addition.
- Implement and analyze the various Searching algorithms i.e. Linear, Binary and Hashing.
- Implement and analyze the various Sorting algorithms i.e. Selection, Insertion, Bubble, Quick, Merge, Heap, Radix sort etc.
- Implementation of Tree and its applications i.e. Spanning tree, Binary Search Tree, AVL tree and Tree traversal etc.
- Representation of Graph and Implement some of its application i.e. Shortest path.

Text Books:

- Deepali Srivastava and S. K. Srivastava, "Data Structures Through C in Depth", BPB Publication.

- “Fundamentals of Computing with C++” by John R. Hubbard, Schaum’s Outline Series.

Reference Books:

- Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, Pearson Publication.
- Byron Gottfried, “Programming with C”, Schaum’s Outline Series.
- Seymour Lipschutz, “Data Structures”, Schaum’s Outline Series.

CO-PO & PSO Correlation

| Course Name: Data Structure Lab | | | | | | | | | | | | |
|---------------------------------|------------------|---|---|---|---|---|---|---|------|---|---|---|
| | Program Outcomes | | | | | | | | PSOs | | | |
| Course Outcomes | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 1 | 1 | 2 | 2 | | 2 | 2 | | 1 | 2 | 2 | |
| CO2: | 3 | 3 | 2 | 2 | | 1 | | | 2 | 2 | 2 | |

Note: 1.: Low 2.: Moderate 3.: High

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|----------------------------|----------|------------------------------|---------------------|----------|-------------------------|
| Programme | : | B.Tech. | Semester | : | III |
| Name of the Course: | | Web Development Lab I | Course Code: | | SOE-B-CSE-21-307 |
| Credits | : | 2 | No of Hours | : | 4 Hrs. / week |
| Max. Marks | : | 50 | | | |

Course Descriptions:

This course is designed as a programming intensive introduction to web technologies. We will study and build software programs using several different programming languages, markup languages and meta- markup languages. We will consider and work with two styles of client side programming - programming within the browser and programming standalone clients. On the server, we will program using Node JS.

Course Outcomes:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|------------------|--|
| CO1 | Develop Static web based application. |
| CO2 | Implement client side scripting. |
| CO3 | Implement server side scripting. |
| CO4 | Develop dynamic web based application. |

The following concepts will be covered in the lab:

- Introduction to different browsers and HTML
- Designing of simple web pages using basic HTML tags, attributes and elements.
- Introduction to Doctype element and importance of comments.
- Web pages containing Headings, Paragraphs, and Formatting Text, lists, and links
- Introduction to Images and Tables in HTML
- Introduction to CSS and applying CSS to HTML
- Web page design using CSS Selectors, Properties and Values
- Web page design using CSS Colors and Backgrounds
- Web page design using CSS Box Model
- Web page design using CSS Margins, Padding, Borders, Text and Font Properties
- Introduction to JavaScript, its variables and operators
- Introduction to Document and Window Object
- Programs related to JS Data Types and Num Type Conversion, Math and String Manipulation, Objects and Arrays

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- Programs related to Date and Time, Conditional Statements, Switch Case, Looping in JS, and Functions
- Overview of NodeJS: Basics, setup, console, command utilities and modules

Text Books:

- HTML5 : Cover CSS 3, JavaScript, XML ,XHTML,Ajax,Jquery :Black Book , Second Edition, Dreamtech .
- Brad Dayley, “Node.js, MongoDB, and AngularJS Web Development”, Addison-Wesley Professional

Reference Books:

- Achyt S Godbole &Atul Kahate, “Web Technologies TCP/IP Architecture and Java Programming” ,2nd Edition, TMH.
- Uttam K. Roy, “Web Technologies”, Oxford.

CO-PO & PSO Correlation

| Course Name: Web Development Lab I | | | | | | | | | | | | |
|------------------------------------|------------------|---|---|---|---|---|---|---|------|---|---|---|
| Course Outcomes | Program Outcomes | | | | | | | | PSOs | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 1 | 2 | | 2 | | | | | 1 | 2 | 1 | |
| CO2: | 1 | 3 | 1 | | | | | | 1 | 2 | 1 | |
| CO3: | 1 | 3 | 1 | 2 | | | | | 1 | 2 | 1 | |
| CO4: | 1 | 3 | 2 | | | | | | 1 | 2 | 1 | |

Note: 1.: Low 2.: Moderate 3.: High

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|----------------------------|-------------------------------|---------------------|-------------------------|
| Programme | : B.Tech. | Semester | : III |
| Name of the Course: | Data Visualization Lab | Course Code: | SOE-B-CSE-21-308 |
| Credits | : 1 | No of Hours | : 2 Hr. / week |
| Max Marks | : 25 | | |

Course Description:

This course is all about data visualization, the art and science of turning data into readable graphics. We'll explore how to design and create data visualizations based on data available and tasks to be achieved. This process includes data modeling, data processing (such as aggregation and filtering), mapping data attributes to graphical attributes, and strategic visual encoding based on known properties of visual perception as well as the task(s) at hand. Students will also learn to evaluate the effectiveness of visualization designs, and think critically about each design decision, such as choice of color and choice of visual encoding.

Course Outcomes:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|-----------|--|
| CO1 | Understand the key techniques and theory behind data visualization. |
| CO2 | Use effectively the various visualization structures (like tables, spatial data, tree and network etc.) |
| CO3 | Evaluate information visualization systems and other forms of visual presentation for their effectiveness. |
| CO4 | Design and build data visualization systems |

The following concepts will be covered in the lab:

- Introduction to Matplotlib by drawing basic plots (plot, scatter, bar, stem, step)
- Learn to draw various statistical plots like histogram, boxplot, error bar, violin plot, pie plot.
- Explore different parameters of line plot: line color, line width, line style, legend, marker with the help of an example.
 - Example: Compare the salaries of data scientists and software engineers using line graph
- Explore different parameters of bar charts: bar width, bar color, shifting the bars, xticks, legends using the above example

- Explore different parameters of pie chart: strangle, explode, fig size, explode, color options, legend, autopct, title, font etc. with the help of an example.
- Learn to draw Histogram with the help of sample dataset
- Learn to draw Box plot with the help of sample dataset
- Introduction to SEABORN
- Draw Line plot using SEABORN library and explore different parameters of it.
- Draw Bar plot using SEABORN library and explore different parameters of it.
- Draw Cat plot using SEABORN library and explore different parameters of it.
- Explore the utilities and applications of Histogram
- Learn to draw Pair plot on iris dataset
- Draw Heat Map using SEABORN library and explore different parameters of it.

Text Books:

- Tamara Munzner, “Visualization Analysis and Design”, A K Peters Visualization Series, CRC Press, 2014.
- Scott Murray, “Interactive Data Visualization for the Web”, O’Reilly, 2013.

Reference Books:

- Alberto Cairo, “The Functional Art: An Introduction to Information Graphics and Visualization”, New Riders, 2012
- Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization and Statistics”, John Wiley & Sons, 2011.

CO-PO & PSO Correlation

| Course Name: Data visualization lab | | | | | | | | | | | | |
|--|-------------------------|----------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|----------|
| Course Outcomes | Program Outcomes | | | | | | | | PSOs | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 1 | | 1 | | | | | | 1 | 2 | 1 | |
| CO2: | 2 | 1 | 2 | 2 | | | | | 1 | | | |
| CO3: | | | 1 | | | | | | | | 2 | |
| CO4: | 1 | 2 | | | | | | | | | 2 | 1 |

Note: 1.: Low 2.: Moderate 3.: High

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|---------------------------|---|--------------------|---------------------------|
| Programme | : B.Tech. | Semester | : III |
| Name of the Course | : MOOCS/SWAYAM/Certification/ Liberal Arts(Programing in C++) | Course Code | : SOE-B-CSE-21-309 |
| Credits | : 2 | No of Hours | : 2 Hrs./week |
| Max Marks | : 50 | | |

Course Description:

Introduction to computer programming using C++. Emphasis on the fundamentals of object-oriented design with development, testing, implementation, and documentation. Includes language syntax, data and file structures, input/output devices, and files.

Course Outcomes:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|-----------|---|
| CO1 | Understand the concepts of Object-oriented feature. |
| CO2 | Understand the concepts of: a) Variables, data Types (including strings and arrays) and Expressions b) Flow of Control c) Functional and procedural abstraction and its importance in good program design d) Pointers and memory allocation (static and dynamic) e) Iteration and Recursion |
| CO3 | Analyze a simple programming problem specification. |
| CO4 | Design a high-level (programming language independent) solution to the problem using functional abstraction and general imperative programming language constructs. |

Syllabus:

Unit-I:

Object-Oriented Programming Concepts: Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

Unit-II:

Standard Input/Output: Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators. Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers, static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

Unit-III:

Pointers and Dynamic Memory Management: Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures. Constructors and Destructors: Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initializer lists.

Unit-IV:

Operator Overloading and Type Conversion: Overloading operators, rules for overloading operators, overloading of various operators, type conversion - basic type to class type, class type to basic type, class type to another class type. Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.

Unit-V:

Virtual functions & Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors. Exception Handling: Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions. Templates and Generic Programming: Template concepts, Function templates, class templates, illustrative examples. Files: File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files.

Text Books:

- Lafore R., “Object Oriented Programming in C++”, Waite Group.
- E. Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill.

Reference Books:

- R. S. Salaria, “Mastering Object-Oriented Programming with C++”, Salaria Publishing House.
- Bjarne Stroustrup, “The C++ Programming Language”, Addison Wesley.
- Herbert Schildt, “The Complete Reference to C++ Language”, McGraw Hill-Osborne.
- Lippman F. B, “C++ Primer”, Addison Wesley.
- R. S. Salaria, “Test Your Skills in Object-Oriented Programming With C++”, Salaria Publishing House.

CO-PO & PSO Correlation

| Course Name: MOOCS/SWAYAM/Certification/Liberal Arts (Programing in C++) | | | | | | | | | | | | |
|---|-------------------------|----------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|----------|
| Course Outcomes | Program Outcomes | | | | | | | | PSOs | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | 3 | 2 | 1 | | | | | | 2 | | | |
| CO2: | 2 | 2 | | | | | | | | | | 1 |
| CO3: | | | 2 | | | | | | 1 | | | |
| CO4: | 2 | 2 | | | | | | | | | | |

Note: 1: Low 2.: Moderate 3: High

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|----------------------------|----------|-------------------------------------|---------------------|----------|-------------------------|
| Programme | : | B.Tech | Semester | : | III |
| Name of the Course: | | Professional Development-Iii | Course Code: | | SOE-B-CSE-21-310 |
| Credits | : | 1 | No of Hours | : | 1 Hrs./ week |
| Max Marks | : | 25 | | | |

Course Description:

Information is crucial to an organization and when this information is communicated in writing, the quality of such communications can have a significant impact on business performance and decision making. Effective business writing is concise, accurate, unambiguous, logical and easily understood. This Professional Development (Business Writing Skills) course teaches the best practices students must know to be able to write clear, effective, professional business documents. This course will help students to develop the skills necessary for successful business writing – be it reports, business proposals and official communication.

The another purpose of this course is to equip the students with the nuances of the English language which includes proficiency in vocabulary and its effective usage in speaking and writing. It further helps them to prepare for various competitive exams and to keep up with the increasing demand for English in Indian society and at the global level. It also develops their overall confidence and personality.

Course Objectives:

After Completion of the course Students will be able to:

| CO Number | Course Outcome |
|-----------|---|
| CO1 | To make student understand the benefits and usage of effective communication and business communication context by removing barriers of communication |
| CO2 | To make students conversant with the basic forms, formats and techniques of business writings |
| CO3 | To make students proficient in vocabulary and its effective usage of English in speaking and writing. |
| CO4 | To make students proficient in reading comprehension to stand out in any competitive exam |
| CO5 | Students will be able to prepare various business and project reports, Proposals |

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Syllabus

UNIT- I: Communication In Business

Business Communication-functions and principles of communication (7C's of communication), Types of Communication, Context of communication, Medium of communication, Barriers to communication.

UNIT – II: Elements Of Business Writing

Business letter -principles of business writing; Elements of letter writing and styles of writing, Resume, covering letter.

UNIT-III: Competitive English I

Enhance word Power, Synonyms and Antonyms, one-word substitution, error detection, rearrangement of sentence, paragraph, jumbled parts, idioms and phrase

UNIT-IV: Competitive English II

Reading comprehension, Theme detection, deriving conclusion from passages, Comprehension of Unseen Passages, Précis writing.

UNIT – V: Business Proposals And Reports

Project proposals- characteristics and structure, Project reports – types- characteristics – structure, Process and mechanics of report writing- visual aids- abstract - executive summary- recommendation Writing- definition of terms.

Text Books:

- Raman, Meenakhshi, and Prakash Singh, “Business Communication” O U P, New Delhi, 2008.
- Lesikar, Raymond V., John D Pettit, and Mary E FlatlyLesikar’s, “Basic Business Communication”, 10th ed. Tata McGraw-Hill, New Delhi, 2007.
- Gerson, Sharan J., and Steven M Gerson, “Technical Writing: Process and Product. Pearson Education”, New Delhi, 2008.
- Murphy, Herta, Herbert W Hildebrandt, and Jane P Thomas, “Effective Business Communication” 7th ed. Tata McGraw-Hill, New Delhi.
- Bovee, Courtland and John V Thill, “Business Communication Today”, 8th ed. Pearson Education, New Delhi, 2008.

Reference Books:

- Stuart Bonne E., Marilyn S Sarow and Laurence Stuart, “Integrated Business Communication in a Global Market Place”,3rd ed. John Wiley India, New Delhi, 2007.
- Guffey, Mary Ellen., “Business Communication: Process and Product”, 3rd ed. Thomson and South-western, 2004.
- Fiske, john, "Introduction to Communication Studies", Rotledge London, 1990.
- Geoffrey Leech & Jan Svartvik – "A Communicative Grammar of English", ELBS Longman, England.
- Bill Scott, "The Skills of Communicating", Jaico Publishing House, Mumbai, 2004.
- Gartside L, "Model Business Letters", Pitman, London, 1992.
- T.L.H. Smith, Pearse, I.E.S., “The English Errors of Indian Students”, Oxford University Press, Madras- Latest Edition.
- P.R. Sarkar, “Grammar and Composition”, Anand Marg Publications, Kolkata

CO-PO & PSO Correlation

| Course Name: PROFESSIONAL DEVELOPMENT-III | | | | | | | | | | | | |
|--|-------------------------|----------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|----------|
| | Program Outcomes | | | | | | | | PSOs | | | |
| Course Outcomes | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 |
| CO1: | | 2 | | 3 | | 1 | 2 | | | | | 1 |
| CO2: | | 1 | | 2 | | 1 | 1 | | | | | |
| CO3: | | | | 3 | | 2 | 2 | | | | | 1 |
| CO4: | | | | 1 | | 1 | 1 | | | | | |
| CO5: | | | | | | 2 | 1 | | | | 1 | |

Note: 1: Low 2.: Moderate 3: High