

SCSB1202	DATA STRUCTURES ( from 2024 Batch onwards)	L	T	P	EL	Credits	Total Marks
		3	1	0	0	3	100

### COURSE OBJECTIVES

- To understand concepts of linked list, searching and sorting techniques.
- To implement basic concepts of stacks and queues.
- To develop the ability to solve problems by choosing and applying the right data structures.

#### UNIT 1 INTRODUCTION

9 Hrs.

Introduction to Data Structures - Need - ADT-Classification-Arrays –Singly linked list - Representation of a linked list in memory - Operations on a singly linked list - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list.

#### UNIT 2 STACK AND QUEUE

9 Hrs.

Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Infix to postfix Conversion - Infix to prefix Conversion - Evaluating Arithmetic Expressions.  
Basic Queue Operations - Representation of a Queue using array - Enqueue - Dequeue - Circular Queues - Priority Queues.

#### UNIT 3 TREES

9 Hrs.

Trees- Binary Trees - Properties of Binary trees -Implementation using Array and Linked list - Recursive and Non-Recursive Binary Tree traversals - Binary Search Tree - Insertion and Deletion - AVL Trees.

#### UNIT 4 GRAPHS

9 Hrs.

Graph - Representation using Array and Linked List - Types of graphs - Graph traversals - BFS and DFS - Minimum Spanning Tree - Kruskal's, Prim's Algorithm - Shortest path using Dijkstra's - Bellman Ford and Floyd Warshall Algorithm.

#### UNIT 5 SEARCHING AND SORTING TECHNIQUES

9 Hrs.

Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort-Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

**Max.45 Hrs.**

### COURSE OUTCOMES

On completion of the course, student will be able to

- CO1** - Comprehend the concepts of data structures and choose the appropriate data structure to the problem definition.
- CO2** - Design applications of linear data structures.
- CO3** - Apply appropriate algorithms for solving problems like sorting, searching.
- CO4** - Implement the various non-linear data structures and perform the intended operations.
- CO5** - Demonstrate the representation and traversal techniques of graphs and their applications.
- CO6** - Apply the learned algorithm, data structures to solve problems.

## **TEXT / REFERENCE BOOKS**

1. Jean-Paul Tremblay, Paul G. Sorenson, "An Introduction to Data Structures with Application", TMH, 2017.
2. Richard F. Gilberg, Forouzan, "Data Structures", Cengage, 2004, 2<sup>nd</sup> Edition.
3. Larry R. Nyhoff, "ADTs, Data Structures, and Problem Solving with C++", Pearson Education, 2009.
4. Thomas H. Cormen, Charles E. Leiserson, "Introduction to Algorithms", MIT Press, 4<sup>th</sup> Edition, 2022.
5. Goodrich MT, Tamassia R, Goldwasser MH., "Data structures and Algorithms in Python", John Wiley and Sons Ltd; 2013.

SCSB2602	NETWORK SECURITY LAB	L	T	P	EL	Credits	Total Marks
		0	0	4	0	2	100

### LIST OF EXPERIMENTS

Ex.1 – VPN & Secure Communication

**1.a:** Setup and configuration of an OpenVPN server

**1.b:** Generate OpenVPN client configuration files and connect to the server

Ex. 2 – Certificates & Firewall Basics

**2.a:** Study and setup Let's Encrypt SSL certificate (with auto-renewal)

**2.b:** Study of ip tables and firewall concepts in Linux

Ex. 3 – Firewall Implementation & Network Scanning

**3.a:** Configure UFW firewall to allow only web traffic (Ports 80 & 443)

**3.b:** Identify publicly accessible webcams using Shodan.io

Ex. 4 – Encryption & Secure Access

**4.a:** Encrypt and decrypt messages using PGP keys

**4.b:** Secure SSH access using Fail2Ban and key-based authentication

Ex.5 – Network Traffic Monitoring

**5.a:** Monitor HTTP/HTTPS messages using Wireshark

**5.b:** Analyze YouTube traffic using Wireshark to determine the port with highest usage

Ex. 6 – Cryptography & Steganography

**6.a: Classical Ciphers:**

- Implement Caesar Cipher and Vigenère Cipher using a Linux shell script, perform encryption and decryption on sample text files, verify correctness by comparing plaintext and recovered text.

**6.b: Image LSB Steganography:**

- Hide a secret message inside an image using LSB steganography (steghide) and extract and verify the hidden message

**6.c: Hashing & HMAC:**

- Compute SHA-256 hash and HMAC of a file, verify file integrity using hashing techniques

**Ex. 6 - SQL Injection**

### COURSE OUTCOMES:

Upon successful completion, students will be able to:

**CO1:** Configure and deploy secure communication channels using OpenVPN, including server setup and client authentication.

**CO2:** Install and manage Let's Encrypt SSL certificates with automated renewal and apply fundamental PKI concepts to secure web servers.

**CO3:** Implement and manage Linux firewalls (iptables, UFW) to control network access and apply web-specific security rules.

**CO4:** Perform secure encryption and decryption using PGP keys and apply SSH hardening techniques using key-based authentication and Fail2Ban.

**CO5:** Monitor and analyze network traffic using Wireshark to identify protocol usage, encrypted communication patterns, and high-usage ports such as in YouTube streaming.

**CO6:** Apply cryptographic and steganographic techniques such as classical ciphers, LSB image steganography, hashing, and HMAC to protect data and verify integrity.

SCSB3040	SERVICE NOW FUNDAMENTALS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

### COURSE OBJECTIVES

- Understand the roles and responsibilities of an Application Developer within the ServiceNow environment.
- Explore the ServiceNow platform, its seven core areas, and navigation features to build digital workflows and Generative AI
- Learn to use App Engine Studio for creating low-code applications on the ServiceNow platform.
- Develop knowledge of ServiceNow Studio and Scripting for application file management, form design, and UI configuration.
- Gain proficiency in using Flow Designer and Application Development and Ui Builder Fundamentals to automate processes such as tasks, approvals, and notifications without programming.

### UNIT 1

9 Hrs.

#### Module 1: A Day in the life of an Application Developer

What does an Application Developer do?

#### Module 2: Welcome to ServiceNow

##### Welcome to ServiceNow Micro Certification Assessment

Explore the seven core areas of ServiceNow and how to navigate the Platform.

#### Module 3: Introduction to App Engine Studio for Developers

Learn how Application Developers can build ServiceNow applications without writing code by utilizing App Engine Studio.

#### Module 4: ServiceNow Studio Overview

This course covers how to use ServiceNow Studio to add application files to apps and how to design form layouts.

#### Module 5: Flow Designer Fundamentals

Flow Designer Micro Certification Assessment

Flow Designer is a platform feature that enables rich process automation capabilities in a single design environment. Natural language is used to configure the automation of approvals, tasks, notifications, and record operations without coding.

### UNIT 2

9 Hrs.

#### Module 1: ServiceNow Administration Fundamentals

SNAF is designed to be the introduction-to-intermediate point for those performing ServiceNow System Administration responsibilities within an organization.

#### Module 2: Introduction to Generative AI

This course introduces ServiceNow's revolutionary Generative AI Experience—Now Assist—and covers its innovative suite of generative AI features integrated into our platform across all workflow offerings.

#### Module 3: Introduction to PlayBooks and process Automation Designers

Familiarize yourself with the Playbooks interface and Process Automation Designer canvas to organize and build cross-enterprise workflows.

### UNIT 3

9 Hrs.

#### Module 1: Get Started with Reports

ServiceNow Reporting overview

Study for your CSA Exam  
Review Certified System Administrator Blueprint  
Academic Partnerships Certified System Administrator[CSA] Exam for Preparation  
Review ServiceNow Credentialing Program Guide  
Search for Test Centers  
System Administrator Career Journey  
"optional: only if student has taken servicenow administration fundamentals above Certified System Administrator (CSA) Exam Prep"

#### **UNIT 4**

**9 Hrs.**

##### **Module 1: Learning JavaScript on the Now Platform**

Basic Introduction to JavaScript

##### **Module 2: Scripting in ServiceNow Fundamentals**

See how to use your existing JavaScript skills in the Now Platform to add new functionality or modify the baseline behavior of your instance.

##### **Module 3: Application Development Fundamentals**

Learn how to design, build, develop, and deploy an application in ServiceNow.

#### **UNIT 5**

**9 Hrs.**

##### **Module 1: Ui Builder Fundamentals**

###### **Ui Builder Micro-Certification**

Learn about Ui Builder and how it can be used as a we user interface builder within ServiceNow

###### **Study for your CAD Exam**

###### **Review Certified Application Developer Blueprint**

###### **Academic Partnerships Certified Application Developer(CAD) Exam Preparation**

###### **Review ServiceNow Credentialing Program Guide**

###### **Search for Test Centers**

###### **Application Developer Career Journey**

Certified Application Developer (CAD) Exam Prep

**Max.45 Hrs.**

#### **COURSE OUTCOMES**

On completion of the course, the student will be able to

**CO 1** Describe the roles, activities, and lifecycle of a ServiceNow Application Developer.

**CO 2** Navigate the ServiceNow interface and identify the seven core platform areas and Generative AI effectively.

**CO 3** Build and deploy low-code applications using App Engine Studio with minimal scripting.

**CO 4** Utilize ServiceNow Studio and Scripting to add, configure, and manage application files and design effective form layouts.

**CO 5** Create automated workflows using Flow Designer for process optimization and task management.

**CO 6** Demonstrate proficiency through micro-certification assessments in ServiceNow and Flow Designer and Ui Builder Fundamental modules.

