Khandesh Education Society
PRATAP COLLEGE (AUTONOMOUS), AMALNER

Syllabus for

S. Y. B. Sc.

(Semester Pattern)

Computer Science

(w. e. f. June 2020)

Faculty of Science and Technology

Details about the courses for S.Y.B.Sc. Computer Science Under CBSC Pattern

Semister	Core Course		Number of Credits	Hours per semester	Workload	Marks	
	Course Code	Course Title				Int	Ext
Sem III	CS-DSC 2 C (Credits: Theory-04, Practical-02	Data Structure I	2	30	2+1	40	60
		Programming in C++-I	2	30	2+1	40	60
		Practical Course	2	60	4	40	60
	CS SEC-I (Skill Enhancement Course-I)	MATLAB programming	2	30	2+1	40	60
	ENG/MAR Communication-I (Ability Enhancement course III)		2	30	2	40	60
Sem IV	CS-DSC 2 D (Credits: Theory-04, Practical-02	Data Structure-II	2	30	2+1	40	60
		Programming in C++-II	2	30	2+1	40	60
		Practical Course	2	60	4	40	60
	CS SEC-II (Skill Enhancement Course-II)	Network Security	2	30	2+1	40	60
	ENG/MAR Communication - II (Ability Enhancement course III)		2	30	2	40	60

Note :-
1. Each period is of 60 minutes duration.
2. Each course is having weightage of two periods per week.
3. Each practical course is having weightage of four periods per week.
4. Question paper will be of 90 marks; students have to attempt 60 marks.

Course Objectives:
1 To impart the basic concepts of data structures and algorithms.
2 To understand basic concepts about array, stacks, queues, linked lists, trees and graphs.
3 To impart knowledge of advance topics like AVL Trees, BTrees.
4 To understand concepts about searching and sorting techniques
5 To understand concepts of hashing.
6 To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

Sem - I Paper - I

Theory: 30 Hours

CS-DSC 2 C : COMP 211 : Data Structure – I

Unit 1. Introduction to Data Structure & Algorithm Notations (L:04, M: 18)
1.1 Introduction to Data Structure,
1.2 Types of data structure 1. Primitive 2.Non Primitive 3.Linear 4. Non linear
1.3 Need of data structure
1.4 Algorithm Notations.
a. Format Convention
b. Name of Algorithm
c. Introductory Comment
d. Steps
e. Comments
1.5 Data Structure
a. Arrays
b. Dynamic Storage allocation
c. Functions
d. Procedures

Unit 2. Introduction to Algorithm analysis for Time and Space Requirement (L:04, M:12)

2.1 Rate of Growth
2.2 Basic time analysis of an algorithm
2.3 Order Notation
2.4 More timing Analysis
2.5 Space analysis of an algorithm

Unit 3. Stacks (L: 06, M:18)

3.1 Definition and concept
3.2 Representations – static
3.3 Operations – push, pop, peep, change
3.4 Applications – infix to postfix & prefix, postfix evaluation, Recursion using stack
Unit 4. Queues (L: 06, M :18)

4.1 Definition and Concept
4.2 Representation – static
4.3 Operations- Insert, Delete
4.4 Circular queue : Concept, Operations – insert, delete
4.5 DeQue : Concept
4.6 Priority queues : Concept

4.7 Applications of queue

Unit 5. Linked List   **(L: 10, M: 24)**
5.1 Introduction to Linked list
5.2 Implementation of List – Dynamic representation.
5.3 Types of Linked List
a. Singly Linked list : Operations- Insert, delete, search
b. Circular linked list : Operations- Insert, delete, search
c. Doubly linked linear list : Operations- Insert, delete, search

References :
1. Jean-Paul Trembley, Paul. G. Soresan, An introduction to data structures with applications,
Mc-Graw Hill International Editions, ISBN-13: 978-0070651579,ISBN-10: 0070651574
2. Horowitz, Sahani, Data Structures :Galgotia publication
3. Aho, Hopcroft, Ulman, Data Structures and Algorithms, ISBN-13: 978-0201000238 ,ISBN-10: 0201000237
4. Nikaulus wirth, Algorithms- Data Structures Programs, ISBN-13: 978-0130224187,ISBN-10: 0130224189
5. Tannenbaum, Data Structures using C and C++; PHI., ISBN-13: 978-0130369970,ISBN-10: 0130369977
6. Thoms Horbron, -File systems – Structures and Algorithms; PHI. I
7. Bonald Knuth, - Art of Computer Programming Vol. I;, ISBN-13: 978-0201896831,ISBN-10: 9780201896831

Sem - I Paper - I
CS-DSC 2 C

Theory: 30 Hours

CS-DSC 2 C : COMP-212 : Programming in C++-I

1. Object oriented concepts   (4M)
   1.1 What is object oriented programming?
   1.2 Features of object oriented programming
   1.3 object oriented programming paradigm &Applications.

2. Introduction to C++   (14M)

   2.1 Basics of C++, Structure of C++ Program
   2.2 keywords in C++,Data types hierarchy in C++
   2.3 Operators in C++, Scope resolution operator, Insertion and Extraction operator, New and Delete operators, reference operators.
   2.4   Manipulators: endl,setw, setfill,set precision

3   Classes & Objects   (18M)

   3.1 Classes, object, Specifying a class, Access specifiers, Class members
   3.2 Defining member functions: Inside and Outside the class definition
   3.3 Creating objects.
   3.4 Array of objects, Pointer and object ,Array of pointer to object

4 .Functions in C++   (18 M)

   4.1 Basics of function and its need.
   4.2 Functions Prototype.
   4.3 Call by value, Call by reference with object.
   4.4 Functions with default arguments.
   4.5 function overloading
   4.6 Inline function.
   4.7 friend function, friend class

5. Operator Overloading   (18M)
   5.1 Introduction to operator overloading, rules of operator overloading
   5.2 Operator overloading:
   5.2.1 Unary and binary operators,
   5.2.2 Comparison, arithmetic, assignment operator,
   5.2.3 Overloading new & delete operators

6. Working with Files   (18 M)
   6.1 Introduction
   6.2 Hierarchy of File Stream Classes.
   6.3 Opening and Closing Files.
   6.4 File modes
   6.5 File Input/output with fstream class.

Reference Books:
1. Object oriented programming with C++, E Balgurusamy, **ISBN**-10: 9383286504; **ISBN**-13: 978-9383286508
2. Programming with C++ D Ravichandran, **ISBN**, 0070681899, **97800706**

3. Programming in C++ by John H Hubbard, **ISBN**-10: 0071353461
4. Mastering C++ by K Venugopal, Rajkumar, T Ravishankar, **ISBN**-10/ASIN: 0074634542

CS SEC-I (Skill Enhancement Course-I)

Theory: 30 Hours

MATLAB Programming

Unit 1 Introduction

Start Matlab

Uderstanding Matlab Environment

Features of Matlab

Uses of Matlab

Unit 2 Data types, operators and Control statements

Variables: types of variables, naming variables, scope of variables.

Operators: Arithmatic, Relational , logical

Conditional Control: If statement, switch statement

Loop Control: for, while, continue, break.

Error control: try, catch

Unit 3 M file programming

Functions: Introduction to matlab functions, Built in matlab functions, user defined functions

Scripts: Introdutcion

Unit 4 Advanced Capabilities in MATLAB

Cell array : creating cell array accessing cell contents, deleting and resizing cell array

Cell array functions

Structure : Define structure, create structure , building structure with struct function, adding fields to structures, accessing data from structure, removing fields from structure

sparse array: definition, generating sparse matrices, example.

Unit 5 Graphics

Drawing bar charts

Drawing contours

Three dimensional plots

Unit 6 Graphical User Interface

Introduction to GUI

Basic GUI components: Button,Edit text, list box, radio button, check box, popup menu, slider, toggle button, brows button.

References:

1. Computer Programming with MATLAB : Michael Fitzpatrick

2. Understanding MATLAB : Ramesh Manza, Ganesh R. Manza, Vikas Humbe, Pravin Yannawar
3. Understanding GUI using MATLAB for students :Ramesh Manza, Yogesh Rajput, Manjiri Patwari

Sem I Paper III

CS-DSC 2 C: Lab Course on COMP 213 : PRACTICAL COURSE
PRACTICALS BASED ON DATA STRUCTURE : I

(Note :Implement all practical using 'C++' Language)

1.Write a program to implement Stack operations : push, pop, peep, change, Display
2.Write a program to convert given infix expression into postfix.
3.Write a program to implement Linear Queue operations : Insert, Delete, Display
4. Write a program to implement Circular queue with its operations: Insert, Delete, Display
5.Write a program to implement singly linked list with operations.
i)create ii)insert iii)delete iv)find
6. Write a program to implement doubly linked list with operations.
i)create ii)insert iii)delete.

PRACTICALS BASED ON C++ PROGRAMMING-I

1. Write a program to demonstrate all manipulators in C++.
2. Demonstrate the memory management operators: new, delete
3. Write a program to demonstrate the simple class for following objects
i) Student Information (Define function inside the class)
ii) Employee Information (Define function outside the class)
4. Write a C++ program to demonstrate the array of objects.
5. Write a C++ program to demonstrate inline function
6. Write a C++ program to demonstrate friend function
7. Write a C++ program to demonstrate
     i) Function overloading. ii) Operator overloading
8. Write a C++ program to read and write data from a file.

MATLAB Programming (SEM- I)

Practical Assignments using MATLAB:

1. Demonstrate use of arithmetic operators.
2. Demonstrate use of if and switch statements.
3. Demonstrate use of for loop, while loop.
4. Demonstrate functions in Matlab.
5. Demonstrate use of cell, array and structure.
6. Draw bar charts in Matlab.
7. Create form using various GUI controls .

Theory: 30 Hours

CS-DSC 2 D : Comp-221: Data Structure – II

Unit 1. Tree   **(L: 10, M :23)**

1.1 Definition and Concept

1.2 Binary tree

1.3 Storage representation and Manipulation of Binary trees

a. Sequential Storage representation of Binary Tree

b. Linked Storage representation of Binary Tree

c. Threaded storage representation of Binary Tree

1.4 Operations on Binary tree - Traversing

1.5 Operations & Algorithms on BST – Create, Insert, Delete

1.6 Concept: AVL tree. B- Tree

Unit 2. Graph   **(L: 05, M:21)**

2.1 Definition and Concept

2.2 Matrix representation of graph

2.3 List Structures

2.4 Multi list representation of Graph

2.5 Traversal of graph : Breadth First Search and Depth First search

2.6 Applications of graph

Unit 3. Sorting   **(L:10, M :28)**

3.1 Introduction

3.2 Sorting Techniques :

3.2.1 Selection Sort

3.2.2 Insertion sort

3.2.3 Bubble Sort

3.2.4 Merge Sort

3.2.5 Heap Sort

3.2.6 Quick Sort

3.2.7 Sorting Method Comparison on Time and space Complexity attribute

Unit 4. Searching Techniques   **(L:05, M:18)**

4.1 Sequential Searching

4.2 Binary searching

4.3 Hash Table Method

4.3.1 Introduction

4.3.2 Hashing Function

4.3.3 Collision Resolution Technique

References :

1. Jean-Paul Trembley, Paul. G. Soresan, An introduction to data structures with applications,
Mc-Graw Hill International Editions, ISBN-13: 978-0070651579,ISBN-10: 0070651574

2. Horowitz, Sahani, Data Structures :Galgotia publication

3. Aho, Hopcroft, Ulman, Data Structures and Algorithms, ISBN-13: 978-0201000238 ,ISBN- 10: 0201000237

4. Nikaulus wirth, Algorithms- Data Structures Programs, ISBN-13: 978-0130224187,ISBN- 10: 0130224189

5. Tannenbaum, Data Structures using C and C++; PHI., ISBN-13: 978-0130369970,ISBN-10: 0130369977

6. Thoms Horbron, -File systems – Structures and Algorithms; PHI. I

7. Bonald Knuth, - Art of Computer Programming Vol. I;, ISBN-13: 978-0201896831,ISBN- 10: 9780201896831

Theory: 30 Hours
CS-DSC 2 D : COMP-222 : Programming in C++-II

1.Constructors and Destructors (20 M)

1.1Concept of Constructor.
1.2Types of Constructor: Default Constructor, Parameterized Constructor, Copy Constructor.
1.3Overloaded Constructors in a class.
1.4Constructor with default arguments.
1.5 Destructors

2. Inheritance (20M)
2.1 Introduction to Inheritance
2.2 Types of Inheritance
2.3 Derived Class Constructors
2.4 Benefits of inheritance in C++
2.5 this pointer.
2.6 virtual function , Abstract class, pure virtual function.

3. Exception Handling (14M)
3.1Concept of Exception Handling mechanism
3.2 Concept of try, throw and catch
3.3 Multiple catch statements
3.4 Standard Exception in C++

4. Overview of Template (8M)
4.1 Basic of templates
4..2Function templates, Class templates
4.3 Templates with multiple parameter

5. Overview of the Standard Template Library: (10M)
5.1 History and evolution
5.2.New features in C++
5.3 The Standard Template Library, Design goals, Header files
5.6 Introduction to STL components, Containers, Algorithms, Iterators

6. STL Components (18 M)
6.1.STLContainers: Vector, Deque, List, The beauty of STL, Associative Containers, Set, Multiset, Map, Multimap
6.1 STL Iterators: Input iterators, Output iterators, Forward iterators, backward iterators.

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1Object oriented programming with C++, E Balgurusamy, **ISBN**-10: 9383286504; **ISBN**-13: 978-9383286508
2. Programming with C++ D Ravichandran, **ISBN**, 0070681899, **97800706**
3. Programming in C++ by John H Hubbard, **ISBN**-10: 0071353461
4. Mastering C++ by K Venugopal, Rajkumar, T Ravishankar, **ISBN**-10/ASIN: 0074634542

CS SEC-II (Skill Enhancement Course-II)

Theory: 30 Hours

Network Security

Unit-1.Introduction **(15 M 5 L)**

Need of Security, Security approaches, Principles of Security , Anti-virus Software, Access Control, Firewall, Smart cards, Biometric, Encryption, Physical Security Mechanisms .

Unit-2. Malicious Software **(15M 5 L)**

Types of Malicious Software , Viruses , Virus Countermeasures , Worms , Distributed Denial of Service Attacks,

Unit-3. Types of Attack **(15 M 5 L)**

Snooping, Eavesdropping, Interception, Denial of Service attack, Hacking Techniques – Open Sharing, Bad Passwords, Programming Flaw, Sniffing Switch Network, IP Spoofing.

Unit-4. Firewalls **(15M 6 L)**

The Need for Firewalls , Firewall Characteristics , Types of Firewalls , Firewall Basing , Firewall Location and Configurations

Unit 5. Intrusion Detection System (IDS) (15 M 4 L)

Introduction; IDS limitations – teardrop attacks, counter measures; Host based IDS set up

Unit-6. System security (15 M 5 L)

Operating system hardening, general steps for securing windows operating system, Hardening Unix/Linux based operating system, updates: hot fix, patch, service pack

(* Delivery of Basic & practical knowledge of above topics is expected)

References :

1. Fundamental of Network Security – Eric Maiwald **ISBN**-10: 0072230932
2. Cryptography and Network security – Atul Kahate, **ISBN**-10: 0070151458
3. Cryptography and Network security- 5th Edition, William stalling, **ISBN**: 9788131761663

Practical Based on Network Security(Demonstration to be performed in the Laboratory)

1. Demonstration of Malware for using any Antivirus software
   • Viruses
   • Worms
   • Intrusion Tools
   • Spyware using
2. Secure Client of Network by using various permissions as well as password protection.
3. Apply Firewall rules for Inbound and Outbound services.
4. Create user groups and perform various roles for securing Network
5. Demonstration of securing Wireless Network.

CS-DSC 2 D : Lab Course on COMP 223: PRACTICAL COURSE

PRACTICALS BASED ON DATA STRUCTURE: II
(Note: Implement all practical using 'C++' Language)

1**.** To Create a binary tree and Implement following Tree Traversal Techniques:
i)Inorder ii) Preorder iii)Postorder.
2. Implement following Graph Search Techniques:
i) BFS ii) DFS.
3. Implement Selection sort technique.
4. Implement Bubble sort technique
5. Implement Selection sort technique
6. Implement Insertion sort technique.
7.Implement Merge sort technique.
8. Implement Quick sort technique.
9. Implement: i) Linear Search ii) Binary Search

PRACTICALS BASED ON C++ PROGRAMMING-II

1. Write a C++ program to demonstrate following constructors and Destructor
i) Default constructor ii) Parameterized constructor iii) Copy Constructor
2 . Write a C++ program to demonstrate all types of Inheritances.
3. Write a C++ program to demonstrate the concept of virtual function.
4. Write a C++ program to demonstrate exception handling mechanism.
5. Write a C++ program to demonstrate:
i) Function template ii) Class template.
6. Write C++ program to demonstrate i) vector ii) dqueue ii)list.
7. Write a C++ program to demonstrate
   i) Set ii) Multiset iii)Map iv)MultiMap