KAVAYITRI BAHINABAI CHAUDHARI
NORTH MAHARASHTRA UNIVERSITY, JALGAON

.

Faculty of Science and Technology

Syllabus for S. Y. B. Sc.
(Semester CBCS Pattern)

Computer Science
(w. e. f. June 2019)

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

Semester	Core Course		Number of Credits	Hours per Semester	Work Load	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)	Software & Hardware Installation Skills	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

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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.

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

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

5.4 Applications of linked list – polynomial manipulation

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

Unit 1.IntroductiontoC++ **(6 L,18M)**

1.1Basics of C++, Structure of C++ Program
1.2 keywords in C++,Data types hierarchy in C++
1.3 Operators in C++, Scope resolution operator, Insertion and Extraction operator, New and Delete operators, reference operators.
1.4 Manipulators : endl, setw, setfill,set precision.

Unit 2. Classes and objects **(8 L, 18M)**

2.1 Classes, object, Specifying a class, Access specifiers, Class members
2.2 Defining member functions: Inside and Outside the class definition
2.3 Creating objects.
2.4Array of objects , Pointer and object ,Array of pointer to object.

Unit 3 .Functions in C++

3.1 Basics of function and its need. **(6L,18M)**
3.2 Functions Prototype.
3.3 Call by value, Call by reference with object.
3.4 Functions with default arguments.
3.5 Inline function.
3.6 friend function, friend class.

Unit 4 .Function Overloading **(4L,18M)**

4.1 Concept of Polymorphism
4.2 Function overloading, function overloading with arguments
4.3 Scoping rules & features of function overloading.

Unit 5. Operator Overloading **(6 L,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

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

Software & Hardware Installation Skills

Unit-1. Operating System Basics & Installation 6 L

Introduction to OS, Types of Operating systems, System files FAT and NTFS Dos 6.22, Windows 7 and RedHat Linux and Multi Boot Operating System.

Unit-2. Various types of Software Installation 6 L

MS-Office 2010, Photoshop 7 and CS5, Tally 7.0 and ERP, Acrobat Reader X, Java, Visual Studio, C & C++, Multimedia software's, and Internet Browsers like- IE9, Google Chrome, Mozilla Firefox .

Unit-3. Device Installation 6 L

Graphics Card, Sound Card, LAN Card, Wireless LAN Card, SCSI Card, External Drive, Flash Cards, Web Camera, CCTV Camera, Mobile Devices, Firewire Cards, Modem, Plotter, Wireless LAN, Access Point .

Unit-4. Diagnostic Tools & PC Maintenance 6 L

Introduction, Virus and its types, Effect of Virus for Computer System, Scanning and Antivirus remover tools, Antivirus Utilities for Diagnostic, Safety and Preventive Maintenance Tools, Data Recovery, Troubleshooting PC Hardware:- O/S Troubleshooting issues in computer System (Related Diagnostic Tools should be covered)

Unit-5 Basic Network Introduction & Installation 6 L

Introduction About Network, Installing Network Operating System Server and Windows 2008 Server, Cable Crimping, Network Sharing and user Permission, Internet Connection, E-Mail, Cloud Networking, Google Drive, SkyDrive, Dropbox etc.

REFRENCE BOOK:

(1) Windows XP Professional edition complete BPB Publication

(2) Office XP complete BPB publication

(3) Microsoft Windows Server 2008 Administration by STEVE SEGUIS, Mc Graw Hill Publication, **ISBN** 10: 0071493263 **ISBN** 13: **9780071493260**.

(4) Upgrading and Repairing PC by Scott Muller, **ISBN**-13: 978-0789756107,**ISBN**-10: 9780789756107

(5) https://www.makeuseof.com/tag/13-windows-diagnostics-tools-check-pcs-health/

Software & Hardware Installation Skills (SEM- I)

Practical (Demonstration to be performed in the Laboratory)

1. Installation : Windows 7 Operating Systems
2. Troubleshooting and Repair Operating System : Windows 7
3. Tacking Data Backup and System Formatting
4. Installation of Different Device and Drivers PCI, PCI-E, AGP
5. Installation of Ms-Office 2010
6. Installation of On Board and PCI Device Driver
7. Installation of Web Camera and CCTV Camera Drivers and Software
8. Installation of Application Software : Photoshop 7.0 , Tally
9. Installation Dual Operating System like: Windows XP and Windows 7
10. Installation and Troubleshooting of Laser Printer
11. Installation and Troubleshooting of Scanner (Photo & Bar Code Scanner)

12. To Run All Types of Network Troubleshooting Command

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

Sem – II Paper – I

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

Sem – II Paper – II

Theory: 30 Hours

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

Unit 1. Constructors and Destructors (6 L, 20 M)

3.1 Concept of Constructor.
3.2Types of Constructor: Default Constructor, Parameterized Constructor, Copy Constructor.
3.3Overloaded Constructors in a class.
3.4Constructor with default arguments.
3.5 Destructors.

Unit 2. Inheritance and Extending Classes (10L, 20M)

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

Unit 3. Exception Handling (4L,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++

Unit 4. Templates & Introduction to Standard Template Library (4L, 18M)

4.1Basic of templates, Function templates, Class templates
4.2 Templates with multiple parameter
4.3 Introduction to STL,
4.4Components of STL, Containers (Sequence, Associative & Derived)

Unit 5. Working with Files (6 L,18 M)

5.1 Introduction
5.2 Hierarchy of File Stream Classes.
5.3 Opening and Closing Files.
5.4 File modes
5.5 File Input/output with fstream class.

Reference Books:

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 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 5 L

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

Unit-3. Types of Attack 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 6 L

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

Unit 5. Intrusion Detection System (IDS) 4 L

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

Unit-6. System security 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.

Sem – II Paper – III

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 implement concept of file Handling.