Syllabus for Computer Science

Proposed scheme for B.Sc Programme under Choice Based Credit System

SEMESTER - I				
Code	**Course Title**	**Course Type**	**HPW**	**Credits**
BS106	Optional -III (Object Oriented Programme in C++)	DSC - 3A	4T +2P=6	4+1=5
SEMESTER -I I				
BS 206	Optional -III (Data Structure & File Processing)	DSC - 3B	4T +2P=6	4+1=5
SEMESTER -III				
BS 301	A - Combinatorial Optimization B- Computer Graphics	SEC -1	2	2
BS306	Optional -III (Numerical Computing)	DSC - 3C	4T +2P=6	4+1=5
SEMESTER -IV				
BS401	C - Graph Theory D- Internet Technologies	SEC -2	2	2
BS406	Optional -III (Design & Analysis of Algorithms)	DSC - 3D	4T +2P=6	4+1=5
SEMESTER -V				
BS501	E - Boolean Algebra F- Mobile Applications	SEC -3	2	2
BS505	Optional -III -Operating Systems	DSC - 3E	3T +2P=5	3+1=4
BS506	Optional -I A- Data Mining	DSE - 1E	3T +2P=5	3+1=4
BS507	Optional -II -B-Cryptography	DSE - 2E	3T +2P=5	3+1=4
SEMESTER -VI				
BS601	G - Modeling Simulation H –Electronic Commerce	SEC -4	2	2
BS605	Optional -III -Information Securtity	DSC - 3F	3T +2P=5	3+1=4
BS606	Optional -I A- Database Applications	DSE - 1F	3T +2P=5	3+1=5
BS607	Optional -II -B-Computer Networks	DSE - 2F	3T +2P=5	3+1=5

SYLLABUS for B.Sc Computer Science 2016-17

BS106: Object Oriented Programming in C++

4 Hrs /week **Total Classes: 60**

Unit-1:

Program Development: Object oriented analysis, design, unit testing & debugging, system testing & integration, maintenance.

Programming Concepts: Algorithm and its characteristics, pseudo code / flow charts, program, compilers and interpreters. identifiers, variables, constants, data types- simple data types, floating data types, character data types, string data types, enumeration type, variables and constant declarations,

.**Unit-2:**

Operators: types of operators, operator precedence, expressions, input using the extraction operator(>>) and cin, output using the insertion operator(<<) and cout, preprocessor directives, creating a C++ program. branching statements (if and if … else statement, switch, nested if, conditional operator, goto statement), looping statements (for, while and do–while), break and continue statement,

Unit-3:

categories of functions (value returning functions, void functions, value versus reference parameters), recursion, local and global variables, static and automatic variables, one dimensional array, two dimensional array, character array, pointer data and pointer variables.

Unit-4:

basic concepts of OOP, Benefits and applications of OOP, Objects and classes- instance variables, methods, inline functions, messages, polymorphism, static and dynamic binding, inheritance, Function overloading, operator overloading

Books Recommended

1. Richard Johnson, *An Introduction to Object-Oriented Application Development*, Thomson Learning, 2006
2. B. Stroupstrup, *The C++ Programming Language*, Addison Wesley, 2004.
3. Programming in c++ D.Ravichandran McGraw-Hill
4. Introduction to Programming through c++ by Abhiram .G.Ranade.
5. Programming with ANSI C ++ by Bhushan Trivedi
6. Object Oriented Programming with c++ by Reema Thareja OXFORD

Reference books:

1. Object Oriented Programming With *C++* 4th Edition By E *balaguruswamy , Publisher*, Tata McGraw-Hill Education 2008
2. Mastering *C++*.BY . *K. R. Venugopal*. Tata McGraw-Hill Publishing Company, 1997 - *C++*
3. Mastering c++ by Ravichandran

BS 106: Object Oriented Programming in C++ Practical

2 Hrs/week **Total practical:30**

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+.....
4. WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5.....
5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
6. Write a function to find whether a given no. is prime or not. Use the same to gene rate the prime numbers less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.
9. WAP to print a triangle of stars as follows (take number of lines from user):

```
*
***
*****
*******
*********
```

10. WAP to perform following actions on an array entered by the user:
    i) Print the even -valued elements
    ii) Print the odd-valued elements
    iii) Calculate and print the sum and average of the elements of array
    iv) Print the maximum and minimum element of array
    v) Remove the duplicates from the array
    vi) Print the array in reverse order

    The program should present a menu to the user and ask for one of the options. The menu should also include Options to re-enter array and to quit the program.
11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
12. Write a program that swaps two numbers using pointers.
13. Write a program in which a function is passed address of two variables and then alter its contents.
14. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
15. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.
16. Write a menu driven program to perform following operations on strings:
    a)Show address of each character in string
    b)Concatenate two strings without using strcat function.
    c)Concatenate two strings using strcat function.
    d)Compare two strings
    e)Calculate length of the string (use pointers)
    f)Convert all lowercase characters to uppercase
    g)Convert all uppercase characters to lowercase
    h)Calculate number of vowels
    i)Reverse the string
17. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
18. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
19. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
21. Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation): a) Sum b) Difference c) Product d) Transpose

22. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
24. Create a class Box containing length, breath and height. Include following methods in it:
    a)Calculate surface Area
    b)Calculate Volume
    c)Increment, Overload ++ operator (both prefix & postfix)
    d)Decrement, Overload -- operator (both prefix & postfix)
    e)Overload operator == (to check equality of two boxes), as a friend function
    f)Overload Assignment operator
    g)Check if it is a Cube or cuboid

    Write a program which takes input from the user for length, breath and height to test the above class.
25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
26. Write a program to retrieve the student information from file created in previous question and print it in following format: Roll No. Name Marks
27. Copy the contents of one text file to another file, after removing all whitespaces.
28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
29. Write a program that will read 10 integers from user and store them in an array. Implement array using Pointers. The program will print the array elements in ascending and descending order.

BS 206: Data Structures and File Processing (C++)

4 Hrs/week **Total Classes - 60**

Unit-1:
Basic Data Structures: Abstract data structures- stacks, queues, linked lists and binary trees.

Unit -2
Sets: Dictionary implementation, use of priority queues, hashing, binary trees, balanced trees, sets with merge-find operations.
Sorting: sorting techniques-selection sort, bubble sort, insertion sort.
Searching: Internal and external searching, use of hashing and balancing techniques.

Unit-3
Physical Devices: Characteristics of storage devices such as disks and tapes, I/O buffering. Basic File System Operations: Create, open, close, extend, delete, read-block, write-block, protection mechanisms
File Organizations: Sequential, indexed sequential, direct, inverted, multi-list, directory systems, Indexing using B-tree, B+ tree and their variants, hashing – hash function, collision handling methods, extendible hashing.

Unit-4
File concepts: Streams in C++, Stream classes, Formatted and Unformatted data, manipulators, User defined manipulators, file streams, file pointer manipulation, file open and close.
Templates: Template functions and Template classes

Books Recommended

1. M.T. Goodrich, R. Tamassia and D. Mount, *Data Structures and Algorithms in C++*, John Wiley and Sons, Inc., 2004.
2. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, *Introduction to Algorithms*, 2nd Ed., Prentice-Hall of India, 2006.
3. Robert L. Kruse and A.J. Ryba, *Data Structures and Program Design in C++*, Prentice Hall, Inc., NJ, 1998.
4. B. Stroupstrup, *The C++ Programming Language*, Addison Wesley, 2004
5. D.E. Knuth, *Fundamental Algorithms* (Vol. I), Addison Wesley, 1997
6. Data Structures Through C++ Varsha .H.Patil OXFORD

Reference books:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 3rd ed, Pearson Education Asia, 2007.
2. E. Balagurusamy, " Object Oriented Programming with C++", McGraw Hill Company Ltd., 2007
3. Data structure using C++ by Tannenbaum
4. Aho, Hopcroft, Ulman: Data structures and Algorithms

BS 206: Data Structures and File Processing (using c++) practical

2 Hrs/week **Total Classes:30**

List of programs

1. Program to implement Bubble Sort
2. Program to implement selection sort
3. Program to implement insertion sort
4. Program to implement internal search.
5. Program to implement External search.
6. Program to implement push and pop operations on stack using array method
7. Program to implement insert and delete operations on queue using array method
8. Program to implement insert and delete operations on priority queue
9. Program to create, insert, delete and display operations on single linked list
10. Program to illustrate reverse linked list.
11. Program to split a single linked list
12. Program to create, insert, delete and display operations on single circular linked list
13. Program to implement push and pop operations on stack using linked list method
14. Program to implement insert and delete operations on queue using linked list method
15. Program to implement operations on circular queue
16. Program to create, insert, delete and display operations on double linked list
17. Program to construct binary search tree and implement tree traversing techniques
18. Program to delete a leaf node from binary search tree
19. Program to find number of leaf nodes and non-leaf nodes in a binary search tree
20. Write a program to create and display contents of file.
21. To illustrate file stream classes.
22. To demonstrate file handling (random access to files)
23. To illustrate seekg(), seekp(), tellp() and tellg() functions in file handling.
24. To illustrate function templates.
25. To illustrate template class.