C. U. SHAH UNIVERSITY,WADHWAN CITY.

Faculty of: **Computer Science**
Course: **Master of Computer Applications**
Semester**: I**
Subject Code**: 5CS01CPC1**
Subject Name: **OOPs using C++**

Sr. No	Subject Code	Subject Name	Teaching hours/ Week			Credit hours	Credit Points	Evaluation Scheme/ Semester								Total
								Theory				Practical				
			Th	Tu	Pr			Internal Assessment		End Semester Exams		Internal Assessment		End Semester Exams		
								Marks	Duration	Marks	Duration	Marks	Duration	Marks	Duration	
1	5CS01CPC1	OOPs using C++	4	--	4	8	6	30	1½	70	2½	--	--	50	1½	150

Objectives:
- The C++ language most demanding language as a tool for all types of work. How this important language is to be mastered and how to use this knowledge in building efficient and flexible code is one of the prime requirements today.
- The course helps to the students to improve the object oriented programming skills.

Prerequisite:
- Knowledge of C programming
- Programming concepts including algorithm designing and logic

Course Outline:-

Sr. No.	Course Contents	Number of Hours
1	**Introduction to Object Oriented Concepts** Object Oriented Concepts, Object, Class, Keywords, Identifiers, Data types, Constants, Features of C++, Differentiate Object Oriented V/s Procedure Oriented	3
2	**Overview of C++ Language** Operators in C++, Conditional structure and looping structure, Differentiate struct v/s class, Differentiate union v/s class, Application of pointer in object oriented concepts, Pointer to objects and pointer to members of class, The local classes, Assigning objects	4
3	**Functions Utility in object oriented Approach** Function Introduction, The inline function, Default arguments to the function, Object as a parameter, Call by reference and return by reference, Function Prototyping, Function overloading, Friend Function, utility of friend function with examples, Constant and volatile function, Static function, Private and public function, Function using pointer	5

4	**Application of Constructors & Destructors in Object oriented Concepts** Constructor, Application of Constructor & Rule to define the constructor, Types of Constructor, Explicit constructor, Parameterized constructor, Multiple Constructor(With Example), Dynamic Initialization, Constructor with dynamic allocation, Copy constructor	4
5	**Operator Overloading & User define function:** Arithmetic operator overloading, Unary , Binary Operator Overloading, Assignment Operator Overloading, Subscript operator overloading, Operator overloading with Friend Function, The need for user defined conversion, Four different cases where user defined conversions are needed, Comparison of both the methods of conversion.	5
6	**Templates** Use of Templates, Define Function Templates, Function Templates with Generic & Non Generic Types, Define Class Templates, Specialization In templates, Define Class and Generic Data Types, Static Data Member in Templates, Export, typename Keyword	5
7	**Inheritance** Application of Inheritance, Defining derived class using single base class, Define Different Types of Derivation using Access modifiers, The implementation of inheritance in the C++ object model, The Access Control, Declaration, The multiple-inheritance, Abstract classes, Composite objects	3
8	**Runtime Polymorphism:** Difference Between Compile time and Run time polymorphism, Pointers to Objects, This pointer, Compatibility of Derived and base class pointers, The sub object concept, Virtual functions, Static invocation of virtual function, Default arguments to virtual functions, Virtual destructors, Pure virtual functions, RTTI.	4
9	**Exception Handling** Introduction, Exception Handling, Mechanism, Try, Catch and throw mechanism, Re throwing an exception , Terminate and Unexpected functions, Drawbacks of exception handling approach, The exception Class	3
10	**IO Streams** Stream, Difference of C and C++ IO Stream, The C++ Predefined streams, Formatting IO, IOS Members, Manipulators, Creating own manipulator	4
11	**Using Files for IO** Why IO is special, Different File Modes, File Handling, Create, Update, Delete, Files, Random Access using seek, IO Modes, Handling File Control Errors	4

12	**Namespaces**	2
	Introduction and need of name space, Defining namespaces, Extending the namespace	
13	**The Standard Template Library**	2
	Introduction, Generic Programming Technique, Generic Software Designing technique, Components, Generic Algorithms, Iterators, Containers, Algorithms	
	Total hours	48

Practical List:

1.	Write a C++ program to find the sum of individual digits of a positive integer.
2.	A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and Subsequent terms are found by adding the preceding two terms in the sequence. Write a C++ program to generate the first n terms of the sequence.
3.	Write a C++ program to generate all the prime numbers between 1 and n ,where n is a value supplied by the user.
4.	Write C++ programs that use both recursive and non-recursive functions a. To find the factorial of a given integer. b. To find the GCD of two given integers. c. To find the nth Fibonacci number.
5.	Write a C++ program that uses functions a. To swap two integers. b. To swap two characters. c. To swap two real. Note: Use overloaded functions.
6.	Write a C++ program to find both the largest and smallest number in a list of integers.
7.	Write a C++ program to sort a list of numbers in ascending order.
8.	Write a C++ program that uses function templates
9.	Write a C++ program to sort a list of names in ascending order.
10	Write a C++ program to implement the matrix using a class. a) Reading a matrix. c) Addition of matrices. b) Printing a matrix. d) Subtraction of matrices. e) Multiplication of matrices.
11	Write a C++ program that overloads the + operator and relational operators (suitable) to perform the following operations: a) Concatenation of two strings. B)Comparison of two strings.
12	Write a template based C++ program that determines if a particular value occurs in an array of values.
13	Write a C++ program that uses a function to reverse the given character string in place without any duplication of characters.
14	Write a C++ program to make the frequency count of letters in a given text.

15	Write a C++ program to count the lines, words and characters in a given text.
16	Write a C++ program to determine if the given string is a palindrome or not.
17	Write a C++ program to make frequency count of words in a given text.
18	Write a C++ program to generate Pascal's triangle.
19	Write a C++ program to construct of pyramid of numbers.
20	Write a C++ program to display the contents of a text file.
21	Write a C++ program which copies one file to another.
22	Write a C++ program to that counts the characters, lines and words in the text file.
23	Write C++ programs that illustrate how the following forms of inheritance are supported: a) Single inheritance b) Multiple inheritance c) Multi level inheritance d) Hierarchical inheritance
24	Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.

Learning Outcomes:

Students should be able to understand and appreciate the Object Oriented approach of Programming Students should be able to solve problems given to him/her using C++ with keeping balance between efficiency and flexibility language.

Books Recommended:

1. Object Oriented programming with C++, **E. Balagurusamy**, Publisher-TMH

2. Complete Reference C++ , **Herbert Schildt,** Publisher-McGraw Hill Publications

3. Computer Science- A Structured approach using C++", **Forouzan ,Gilburg**, THOMSON Books

4. Object Oriented programming in C++, **Robert Lafore**, Publisher-Pearson Education

5. C++ Primer, **Stanley Lippmann**, Publisher-Pearson Education

6. The C++ Programming Language, **Bjarne Stroustrup**, Publisher-Pearson Education

7. Effective C++, **Scott Mayer Addison Wesley**

8. OOP with C++, **S .Sahay,** Publisher-Oxford Higher Education.

9. C++ and OOP Paradigm, **D.Jana,** 2nd Edition, Publisher-PHI.

NPTEL Resources:

1. An Introduction To Programming Through C++, IIT Bombay
   Prof. Abhiram G Ranade https://nptel.ac.in/courses/106101208
2. Programming in C++, IIT Kharagpur
   Prof. Partha Pratim Das Prof. Samiran Chattopadhyay Prof. Kausik Datta
   https://nptel.ac.in/courses/106105151