MCA I Semester 1

Subject Name: Object Oriented Programming with C++ – Practical **Subject Code:** MTCA23106

Type of course: Professional Course

Prerequisite (if any):

- Problem solving using C

List of Courses where this course will be prerequisite:

- Object oriented programming using Java

Rationale: OOP has become a fundamental part of software development. OOP facilitates reuse of code, flexibility and effective problem solving. This course introduces standard tools and techniques for software development, using an object oriented approach.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks		Practical Marks		Total
L	T	P	C	TEE	CAT	TEP	CAP	
0	0	4	2	-	-	30	20	50

CAT: Continuous Assessment Theory comprised of CA1 and CA2 **CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CAP:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in courses.

List of Practical:

Sr. No.	Problem Statement
1	Write a C++ program to swap the values of pairs of integers using function and call by reference.
2	Create two classes X and Y containing private variables x and y respectively. Using a common friend function, perform a multiplication operation between x and y.
3	Define a class matrix with an integer array of 3X3 as a data member. Define a friend function which adds two matrix objects and returns resultant matrix objects.
4	Write a simple program that multiplies two numbers and then also divides the two numbers.(Use Inline Functions)
5	Write a program to demonstrate the use of Manipulators (setw () and endl).
6	Write a C++ program to find the volume of cube, cylinder and rectangular box using concepts of function overloading.(volume of cube = s3, volume of cylinder is p*r2*h, volume of rectangular box is l*b*h)
7	Create a class SPACE having three member data x(int),y(int),z(int).overload the unary '-' operator for the class SPACE
8	Create a class coordinate containing x, y and z private variables. Perform operations for incrementing, adding and comparing object(s) by overloading + +, + = and = = operators respectively. Define necessary functions to set and display the variables.
9	Write a program to create a class distance containing feet and inches. Using operator keyword, convert an object of class distance into total meters which is a float data type.
10	Declare a class called book having members like book_title, publisher and author_name. Overload extractor and insertion operators (>> and <<) for class book.
11	Implement a string class containing the following functions. • Overloaded + operator function to carry out the concatenation of strings. • Overloaded = (assignment) operator function to carry out string copy. • Function to display the length of a string. • Function to overload comparison operator (= =) for two strings
12	Create a class Box whose default constructor initializes the dimensions length, width and height of the box. The main method is to be created for the above class that creates a Box object of dimension 3.89 cm, 2.1 cm and 1.5 cm. compute the volume of this box
13	Write a program to create a copy constructor. A constructor should be created, then a second constructor should be created which should have values of the previous constructor

14	Define a Class named point which represents 2-D Point, i.e P(x, y). Define Default constructor to initialize both data member value 5, Parameterized constructor to initialize members according to the value supplied by the user and Copy Constructor. Define Necessary Function and Write a program to test class Point.
15	Create a class called ITEM that has separate member data for item number(int) and item cost(float).Include the following member functions: • setdata( ) to set these values to predefined values in the program • getdata( ) to get these values from the user • putdata( ) to display these values
16	Write a program to demonstrate the use of static member data and static member function.
17	Define a class to represent a bank account. include the following members: Data members : 1) name of the depositor 2) account number 3) type of account 4) balance amount in the account Member functions: 1) to assign initial value 2) to deposit an amount 3) to withdraw an amount after checking the balance 4) to display name and balance Write a main function to test the program
18	Implement Student class having proper member variables and functions for the following : To input marks of 5 subjects. • Check whether or not a student has passed. (above 40 marks is required to pass) • Check grade of student • If percentage is o >=70 then A grade o >=60 and <70 then B grade o >=50 and <60 then C grade o >=40 then D grade • Display whole result of a given student Write a main program to create such n objects for n students and enter information for all students. Write a function to display information of all students who are PASS. Write a function to display information of those students who are FAIL.

	Also write a function to Display information of first 3 ranked students.
19	Assume that a bank maintains two kinds of accounts for customers, one called a savings account and the other as a current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides a check book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class account that stores customer name, account number and type of account. From this derive the classescur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks: • Accept deposits from a customer and update the balance. • Display the balance. • Compute and deposit interest. • Permit withdrawal and update the balance. • Check for the minimum balance, impose penalty, necessary, and update the balance
20	Create a class called TIME that has separate member data for hour(int) and minutes(int). Include the following member functions: • setdata( )to set these values to predefined values in the program • getdata( )to get these values from the user • putdata( ) to display these values. • add_time( ) to add two time objects to a third time object (e.g. T3.add_time(T1,T2). • Make a new function to return a time object after addition of an object passed as argument with the calling object, so that the function works as follows: T3=T1.add_time(T2).
21	Write a program with the following: • A function to read two double type numbers from the keyboard. • A function to calculate division of these two numbers. • A try block to throw an exception when a wrong type of data is keyed in . • A try block to detect and throw an exception if the condition "divide by zero " occurs. • Appropriate catch block to handle the exception thrown.
22	WAP in c++ to convert lowercase to uppercase from a file.
23	Write a function template for finding the minimum values contained in the array.
24	Create a generic class stack using template and implement common PUSH and POP operations for different data types.

Suggested Specification table with Marks (Practical):

%Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	30	10	15	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Object Oriented Programming with C++	EBalagurusamy	McGraw Hill Education, ISBN: 978-1-25-902993-6	2013	6th Edition
2	C: How to Program with an introduction to C++	Paul Deitel Harvey Deitel	Pearson, ISBN: 978-93-530-6282-8	2018	8th Edition
3	Teach Yourself C++	Herbert Schildt	Tata McGraw Hill ISBN: 0-07-463333-3	2007	3rd edition
4	Object Oriented Programming in C++	Robert Lafore	Galgotia publication pvt ltd. Pearson Education, ISBN: 978-81-317-2282-4	2022	4th edition

Course Outcomes:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % Weightage
CO-1	Understand the concepts of object oriented programming	07
CO-2	Write basic programs using C++ programming language	18
CO-3	Implement object oriented programming methodology using C++	33
CO-4	Implement the concept of inheritance	13
CO-5	Understand types of polymorphism, use of pointers in polymorphism	18
CO-6	Apply the usage of templates, STL and exception handling mechanisms	11

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13
CO-1	2	2	1	1	0	1	0	2	0	0	0	0	0
CO-2	1	0	0	0	1	1	0	1	0	0	0	0	0
CO-3	2	2	1	1	0	1	0	2	0	0	0	0	0
CO-4	2	2	1	1	0	1	0	2	0	0	0	0	0
CO-5	2	2	1	1	0	1	0	2	0	0	0	0	0
CO-6	0	0	0	1	0	0	0	0	0	0	0	0	0
Rationale*													

Rationale*: Explaining why it is matching this particular program outcome.