Course Code	**:**	**BCS-031**
Course Title	**:**	**Programming in C++**
Assignment Number	**:**	**BCA(III)031/Assignment/2026-27**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**31st October, 2026 (for July 2026 Session)**
	:	**30th April, 2027 (for January 2027 Session)**

Note: This assignment has ten questions carrying a total of 80 marks. Answer all the questions. Rest 20 marks are for viva-voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Wherever required, you may write C++ program and take its output as part of solution

Q1: **(8 Marks)**

A retail shop maintains details of products sold during a day. Write a C++ program that accepts the product price and quantity purchased from the user. Compute the total amount, applying a discount of 8% if the bill exceeds ₹5000, and display the final payable amount.

Q2: **(8 Marks)**

Develop a C++ program that accepts the marks obtained by a student in 5 distinct subjects. Calculate the percentage and assign a grade according to the following criteria:

- 90% and above – Grade A
- 75% to below 90% – Grade B
- 60% to below 75% – Grade C
- 40% to below 60% – Grade D
- Below 40% – Grade F

Display the percentage and grade for the student.

Q3: **(8 Marks)**

Write a C++ program to generate the first N terms of the Fibonacci sequence using a loop. Also compute and display the sum of all the generated terms.

Q4: **(8 Marks)**

Create a one-dimensional array to store the marks of 10 students in a class. Write a C++ program to determine:

a. Highest marks
b. Number of students scoring above the class average

Q5: **(8 Marks)**

Write a C++ program that defines separate functions to:

a. Calculate the area of a circle
b. Calculate the circumference of a circle

The radius should be entered by the user from the main() function and passed to both functions.

Q6: **(8 Marks)**

Design a class named Employee having data members for employee ID, employee name, and monthly salary. Implement member functions to:

a. Read all employee details from user
b. Calculate annual salary
c. Display all employee information in an appropriate manner

Create objects for at least 10 employees.

Q7: **(8 Marks)**

Write a C++ program that stores the names and marks of 5 students in a text file. After writing the data, reopen the file and display the complete contents on the screen.

Q8: **(8 Marks)**

A banking application allows users to withdraw money from their account. Write a C++ program that throws and catches an exception if the withdrawal amount is greater than the available balance. Display an appropriate message for both successful and unsuccessful transactions. Make use of suitable C++ constructs.

Q9: **(8 Marks)**

What is Polymorphism in C++? Explain the concepts of compile-time and run-time polymorphism. Highlight the role of function overloading, operator overloading, virtual functions, and function overriding with suitable programming examples.

Q10: **(8 Marks)**

Answer following with appropriate examples:

a. Explain the concept of inheritance in C++ and describe different types of inheritance with diagrams.

b. What are templates in C++? Explain function templates and class templates with suitable examples. Discuss their advantages in generic programming.

Q1: (8 Marks)

A retail shop maintains details of products sold during a day. Write a C++ program that accepts the product price and quantity purchased from the user. Compute the total amount, applying a discount of 8% if the bill exceeds ₹5000, and display the final payable amount.

Answer

The program reads the selling price of one product and the number of units purchased. It first multiplies price by quantity to obtain the original bill. The 8% discount applies only when this amount is strictly greater than Rs. 5000; a bill of exactly Rs. 5000 does not qualify. The net amount is total minus discount. Input validation prevents a negative price and a non-positive quantity.

```
#include <iostream>
#include <iomanip>
using namespace std;

int main() {
    double price;
    int quantity;
    cout << "Enter product price: ";
    cin >> price;
    cout << "Enter quantity: ";
    cin >> quantity;
    if (!cin || price < 0 || quantity <= 0) {
        cout << "Invalid price or quantity.\n";
        return 1;
    }
    double total = price * quantity;
    double discount = (total > 5000.0) ? total * 0.08 : 0.0;
    double payable = total - discount;
    cout << fixed << setprecision(2);
    cout << "Total amount: Rs. " << total << '\n';
    cout << "Discount: Rs. " << discount << '\n';
    cout << "Final payable amount: Rs. " << payable << '\n';
    return 0;
}
```

Sample run

```
Input: price = 1200; quantity = 5
Total amount: Rs. 6000.00
Discount: Rs. 480.00
Final payable amount: Rs. 5520.00
```

For the example, total = 1200 × 5 = 6000, discount = 0.08 × 6000 = 480, and final payable amount = 6000 − 480 = Rs. 5520. The conditional operator applies zero discount when the bill does not cross the threshold.