

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, BGE	Pass Marks	32
Year / Part	II / I	Time	3 hrs.

Subject: - Object Oriented Programming (CT501)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. What is data abstraction? Compare it with encapsulation in C++. With suitable example, explain the concept of class in C++. [2+2+6]
2. What is the advantage of C++ over C? With suitable example explain dynamic memory allocation for object and object array. [4+6]
3. What is a default argument? What are the advantages and disadvantages of using inline function? Write a program to calculate and display the cube of integer, float and double number using function overloading (passing single argument to function). [4+3+3]
4. Write down syntax of operator overloading for various cases. Develop a program using a class to with 3x3 matrix as a data member. Overload the * operators so as multiply two matrices. [3+7]
5. What is difference between overloading and overriding? With suitable example explain hybrid inheritance. [4+6]
6. Discuss about stream class hierarchy. Write a program for transaction processing that write and read object randomly to and from a random access file so that user can add, update, delete and display the account information (accountnumber, lastname, firstname, totalbalance). [3+7]
7. Explain the reason for member function over-riding when using virtual function. Explain RTTI using dynamic cast and typeid operators with suitable example. [5+5]
8. Explain class template with suitable example. How do you handle multiple exceptions in C++? Explain with example. [5+5]

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- Write down the limitations of procedural programming. Compare procedural and object oriented programming. Write program to find prime number in procedural and object oriented ways. [2+2+6]
- What do you understand by friend functions and classes? Explain with example. Write a program to add members of objects of two different classes. [4+6]
- What do you mean by namespace? Explain how namespace can be used. Write a program that uses pass by reference to change meter to centimeter using pass by reference along with the namespace. [2+2+6]
- Explain the binary and unary operator overloading along with their syntax and example. Write a program to add two matrices by overloading the + operator. [4+6]
- Explain the constructor and destructor invocation order in single and multiple inheritance. Also show how a parameterized base class constructor is called when derived class object are created. Write a program to create classes to represent student, teaching staffs and non-teaching staffs from the base class person. Use proper members in the classes to make your program meaningful. [4+6]
- What do you mean by manipulators? Explain different manipulators available in C++. Write a program that stores information of a students in a file and display the file's content in descending order according to their marks obtained. [1+3+6]
- What are virtual functions and pure virtual functions? Explain abstract class and its use. Write a program having student as an abstract class and create derived class such as Engineering, Science and Medical. Show the use of virtual functions in this program. [2+2+6]
- What do you understand by function template? Write down the syntax and use of function template. Write a program that will find the sum and average of elements in an array using function templates. [2+2+6]

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1. What are the benefits of object oriented programming over procedure oriented programming? Describe the features of object oriented programming. What is the task of `const` keyword? [4+4+2]
2. List the feature of C++. What are constructors, write their use and explain using an example. [4+6]
3. What is dynamic memory allocation? Write a C++ program to join two strings using dynamic constructor concept. [3+7]
4. What is the disadvantage of using operator overloading in C++? Write a program to define a Class Distance with necessary data members and functions. Then overload the relational operators to compare the two objects of Distance class. [2+8]
5. What is a protected access specifier? Write a program with three classes students, test and result by using multilevel inheritance. Assume necessary data members and functions yourself and program with input information, input data and calculate marks total and display result. [3+7]
6. List the features that are used in formatting the output. Explain each with example. [10]
7. Why do we need virtual function? Explain with suitable example. What is pure virtual function? What is the task of reinterpret cast operator? [6+2+2]
8. Explain the importance of function template with suitable example. How default arguments can be used in class template? What are the tasks of try, catch and throw block? [4+3+3]

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1. What are the characteristics of OOP? How does the OOP differ from POP? Using object oriented technique, write a program to create a class vector that reads integer number. Perform vector addition by passing object as argument and returns the object as result. A vector is a class with array as member. [3+2+5]
2. What is the significance of using inline function? Describe with suitable example. What do you mean by default argument? How can you relate default argument with function overloading? Describe with suitable example. [4+2+4]
3. Define constructor and destructor. Write down different types of constructors with syntax. Create a class mdistance to store the values in meter and centimeter and class edistance to store values in feet and inches. Perform addition of object of mdistance and object of edistance by using friend function. [2+2+6]
4. Why do we need operator overloading? How can you overload operators using member function and non member function? Write a program to overload relational operators (==, !=, >, <, >=, <=) to compare complex numbers. [2+3+5]
5. How do different types of derivation affect the members of class? Write down the types of inheritance. What kind of problem is encountered in multipath inheritance? Write down its solution with suitable example. [2+2+2+4]
6. Write down the different techniques for formatting I/O stream with example. Explain the different errors encountered during file operation. [5+5]
7. Explain the need of virtual function with suitable example. What do you mean by run-time type information (RTTI)? How dynamic cast and typeid operators are used to achieve RTTI? [5+2+3]
8. Define class template and function template with respective syntax. What are the different exception handling techniques in C++? Explain with appropriate example. [5+2+3]

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1. Compare C and C++. Write down different features of C++ with example for each. [5+5]
2. What do you understand by the static data member and member functions? Explain their use in the program. Write a program that uses static member functions and static data member. [2+2+6]
3. What do you understand by default arguments? Replace the function with default argument with function overloading. Write a program to find the area of triangle (when three sides are given) and area of rectangle using function overloading and default argument. [2+2+6]
4. What are the overloadable operators in C++? Write down the syntax for operator overloading in different cases. Write a program to compare the magnitude of complex numbers by overloading < and == operators. [2+2+6]
5. Explain different types of access specifiers used in inheritance. Explain the case of ambiguity in inheritance. Write a program that shows ambiguity in multiple inheritance. [2+2+6]
6. What do you mean by stream? Explain different stream class for file input/output. Write a program to display the output in pyramid form as follows: [2+2+6]

A
AB
ABC
ABCD

7. What do you mean by polymorphic class? What are different RTTI mechanisms in C++? Write a program that shows both RTTI mechanisms. [2+2+6]
8. What do you mean by templates? Write down the syntax for function template and class templates. Write a program with a class template to represent array and add member functions to find maximum, minimum and sort the generic array. [2+2+6]

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1. What is encapsulation? What are its advantages? How can encapsulation be enforced in C++? Write a program to create a class LandMeasure that reads Ropani, Ana, Paisa and Dam as data members. Write a function to pass two objects of type Land Measure and return their sum. (16 Ana = 1 Ropani, 4 Paisa = 1 Ana, 4 Dam = 1 Paisa) [1+1+2+6]
2. What is function overloading? Use new and delete operators to store n numbers dynamically and find their average using casting operator. What are the things we should remember while using default argument. Explain with an example. [2+5+3]
3. What do you mean by friend function and friend class? Do friends violate encapsulation? Write a program that can store Department ID and Department name with constructor. Also write destructor in the same class and show that objects are destroyed in reverse order of creation with suitable message. [2+3+5]
4. List the operators which cannot be overloaded. Why does the overloading of binary operator with member function requires only one argument? Create a class having an array as member. Overload index operator ([]) to input and display the elements in the array. [2+2+6]
5. How do you access overridden members of the base class from a member function in the derived class? What is the problem faced when using multipath inheritance and how is it solved? Explain with an example the order of constructor and destructor invocation during multiple inheritance. [2+3+5]
6. What are the primary trade offs between static and dynamic binding? What is pure virtual function? Write a function template for the function power() which has two parameters base and exp and returns base^{exp} . The type of base is the parameter to the template and exp is int. If the exp is negative, then it must be converted to its positive equivalent. For example 2^3 and 2^{-3} must both return 8. [2+2+6]
7. What is a file stream? Write a class student with roll, name, address, marks as member variables. Use a member function to write records of students in a binary file and another member function to read records from file. Write a program to search a specific record of student using roll number as key from user input. [2+8]
8. What are the advantages of Exception Handling over Conventional Error Handling mechanism? Explain the constructs for Exception Handling in C++ with an example. Write a meaningful program illustrating the use of both Exception with argument and Exception Specification for function. [3+3+4]

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Subject: - Computer Programming II

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1. What advantage does object oriented programming offer over traditional programming? Discuss various features of object oriented programming with necessary example. Write a program that will represent time measurement in 12 hour system with object oriented approach. The program should have conversion functions to convert to 12 hour and 24 hour system. [2+3+5]
2. How is pass by reference with alias variables different than the pass by reference with pointer variables. Give example to illustrate each. Write a program with function that takes two arguments as reference and assign the average of the two arguments to the smaller one and return that by reference. Call this function by assigning value to the function and display the value of both arguments and call this function without assigning the value and display the value of both the arguments. What will be the output? [4+6]
3. What do you mean by const member function of a class? How are const cast operator and mutable members used with const member functions? Write a meaningful program to illustrate the use of const member functions and const data member. [2+3+5]
4. What is the significance of operator overloading? What are the points to remember when overloading operators? Write a program to convert object of a class that represents weight of gold in *tola* to object of class that represent weight in grams. (1 *tola* = 11.664 gm) [2+2+6]
5. What do you mean by access specifiers? Explain how different access specifiers can be used in inheriting features of base class members. Write a program with a class cricketer that has data members to represent name, age and no of matched played. From this class cricketer derive two classes, bowler and batsman. The bowler class should have no of wickets as data members and the batsman class should have no of runs and no of centuries as data members. Use appropriate member functions in all classes to make the program meaningful. [1+3+6]
6. What are standard manipulators? Explain the parameterized and non parameterized manipulator. Write an interactive program to maintain student database. The information to be stored in the database is registration number, name, program, contact number and address. The user must be able to access all detail about a student by entering the registration number. [1+3+6]
7. What do you understand by class template? Write down the syntax and use of class template. Write a program for a stack class that can handle any data type. The stack class can be made with array member and the access to the elements of array can be done from only one point. The data element that is stored at last must be accessed first. You should not access other elements of array member except the top element. [1+3+6]
8. Discuss the advantage of exception handling over traditional error handling? Explain the exception handling mechanism in C++? Write a meaningful program that can handle multiple exceptions. [2+2+6]