

B.E in INFORMATION TECHNOLOGY

2ND YEAR, 1ST SEMESTER EXAMINATION, 2025

OBJECT ORIENTED PROGRAMMING

Time: 3 hours

Full Marks: 100

CO1 [20 MARKS]	1. a) Fill in the blanks with appropriate phrases. Hence justify the validity of each of them. Provide suitable arguments and proper syntax/code snippets where necessary. i) The _____ and _____ functions require type casting. However, it is not required in the case of _____ because _____. ii) The _____ operator is used to access the _____ variables from the local blocks. iii) Function _____ is also called early binding because _____. It is also known as _____ polymorphism. iv) We cannot supply a default value to the _____ parameter/s of a function skipping the _____ parameters. v) The reference variables are _____. However, the pointers are _____. Hence call by reference takes _____ space than call by _____. vi) We can use _____ operator to deallocate a memory only if it is allocated by _____. Otherwise, _____ is reported as an error. b) Write a complete program that allocates an array of N number of integers dynamically. Then pass the array pointer to a function that finds out the difference between each element of the array from the highest element of the array. Or, Write a complete program that allocates an array of N number of integers dynamically. Then pass the array pointer to a function that finds out the duplicate elements from the array. [(2x6)+8=20]
CO2 [20 MARKS]	2. a) Justify the truth/falsity of each of the following statements. Provide suitable arguments in support of your answers along with suitable code snippets. i) A friend function of a class cannot access <i>this</i> pointer. ii) A static member variable of a class cannot be initialized within the constructor of the class. iii) A friend function of a class can invoke the static member methods of that class. iv) The copy constructor of a class accepts the address of an object of that class as parameter. v) An array of objects cannot be initialized with different values at the time of creation. b) Fill up the blanks with suitable phrases. Hence justify the validity of each of the completed statements with supporting reasons. Provide necessary code snippets. i) The _____ member variables of a class, if not accessed outside the class using _____, reports a _____ error. ii) Friend functions are invoked _____ objects of the class because _____. iii) The static member methods of a class can be invoked by _____ or _____. iv) The _____ of a class cannot be overloaded because _____. v) A non-static member method of a class can be called from a static member method by _____. [(2x5)+(2x5)=20]

[Turn over

CO3 [20 MARKS]	3. a) Fill up the blanks with suitable phrases. Hence justify the validity of each of the completed statements with supporting reasons. Provide suitable code snippets where needed. i) The purpose of using virtual destructor is to eliminate _____ problem. ii) The Base class is constructed twice in case of _____. It can be restricted by _____. iii) The accessibility order of the 3 access specifiers can be arranged as _____ < _____ < public. iv) If the signatures of a method in a Base class and a Child class are identical, then it is called _____. However, it does not ensure _____ polymorphism. v) There is no _____ keyword in C++. However, we can make it by having a _____ or a _____ in a class. vi) A _____, if not defined outside a class using _____ produces a _____ error. vii) In case of _____ inheritance, the _____ constructor of the Base class never gets called unless it is called explicitly from the _____. b) Distinguish between each of the following pairs. i) Static binding vs. Dynamic binding ii) Pure virtual function vs. Virtual function [(2x7)+(3+3)=20]
CO4 [20 MARKS]	4. a) Consider the following class Sample. Update its definition to perform the tasks as specified in main(). Clearly indicate which portion of the class is dedicated for which task. Finally discuss the output with proper logic. <pre> class Sample { int s; }; int main() { Sample ob1(3), ob2(4), ob3; ob1+=2; ob3=ob1*(ob2++/2); cout<<ob2<<" "<<ob3<<endl; ob2=25 - ++ob3*ob1; cout<<ob2<<" "<<ob3; } </pre> b) Consider the following two classes A and B. Complete their definitions to execute the statements specified in main(). Clearly indicate which portion of the class is dedicated for which task. Finally discuss the output. The order of the classes should not be changed. <pre> class A { int a; }; class B { int b; }; int main() { A oba1; B obb1(5), obb2(15); oba1=obb1; oba1->show(); int x=oba1+obb2; cout<<"x="<<x<<endl; obb2*=oba1; cout<<oba1<<" "<<obb2<<endl; B obb3(obb2); cout<<obb3<<endl; obb3(100); cout<<obb3; } </pre>

	c) Justify the truth/falsity of each of the following statements. Provide suitable arguments in support of your answers along with suitable code snippets. i) A function call statement cannot appear on the left hand side of an assignment operator. ii) We can overload any operator by using member functions and friend functions. iii) Operator overloading is run time polymorphism. Or, Consider the following namespaces. State the output of each and every invocation of the <i>fun()</i> method with brief explanation. <pre> namespace ns1 { int a,b; void fun() { cout<<"a="<<a; cout<<"b="<<b<<endl; } namespace ns2 { int a,b; void fun() { cout<<"a="<<a; cout<<"b="<<b<<endl; }/*end of fun*/ }/*end of ns2*/ }/*end of ns1*/ </pre> <pre> int main() { using namespace ns1; a=10, b=20; using ns2::a; using ns2::b; a=30, b=40; fun(); using ns2::fun; b=50; fun(); a=60; ns1::b=70; ns1::fun(); ns1::a=80; b=90; fun(); } </pre>
CO5 [20 MARKS]	5. a) Consider a function template having the following signature: <pre> template <int N=3, class T=char> void print(T a) { for(int i=0;i<N;i++) cout<<a<<" "; cout<<endl; } </pre> Now identify which of the following function call statements are valid and which are invalid. Provide supporting reasons for each of them. Discuss the output for the valid ones. <pre> print<4>(3); print<4,int>('A'); print<int>(3); print<>(3.56F); print<5>(4.5); print<4,char>(65); print<>(); </pre>

[7+7+6=20]

	b) Fill up the blanks with suitable phrases. Hence justify the validity of each of the completed statements with supporting reasons. Provide code snippets where needed. i) After the execution of the statements in the catch block, the program control _____. ii) A catch block cannot take _____ parameter/s and it also does not support _____. iii) To _____ an exception within a catch block, the try-catch block should be enclosed within a _____. c) Write a complete C++ program to open a file <i>a.txt</i> in input mode. Now select all the words having atleast 1 numeral value in this file and write them into another file <i>b.txt</i>. Hence count how many such words are present over there. Example: <i>We are the students of IT UG2.</i> Words having atleast 1 numeral: <i>UG2</i> <i>Or,</i> Write a complete C++ program to open a file <i>a.txt</i> in input mode. Now select all the lines having more than 8 words in this file and write them into another file <i>b.txt</i>. Hence count how many such lines are present over there. [7+(2x3)+7=20]
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Course outcomes:

CO1: Recognise and **illustrate** the procedural enhancements of object-oriented programming languages over procedural languages.

CO2: Explain, illustrate and **recognise** the basic features of classes and objects.

CO3: Illustrate the extended features of OOP (Inheritance, Polymorphism) and **apply** them in practical problem solving.

CO4: Explain and **illustrate** RTTI, Namespace and Operator overloading.

CO5: Demonstrate I/O, exception handling and generic programming.