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1 (Sem-3/Ar) COM

2025

COMPUTER SCIENCE

Paper : COM0300104

(Object Oriented Programming using C++)

Full Marks : 45

Time : 2 hours

***The figures in the margin indicate
full marks for the questions.***

1. Answer the following questions as directed :

1×5=5

(a) _____ refers to the ability of a function, variable, or object to take multiple forms when the same object or entity behaves differently in different contexts.

(Fill in the blank)

(b) The Scope Resolution Operator (::) in C++ enables us to access variables, functions, or classes defined in different scopes.

(State True or False)

(c) A reference variable is an alias for an existing variable. (State True **or** False)

(d) A _____ is a special type of constructor used to create a new object using an existing object of the same class.

(Fill in the blank)

(e) Static member functions do not have access to the this pointer.

(State True **or** False)

2. Define the following terms : (**any five**)

2×5=10

- (a) Abstraction
- (b) inheritance
- (c) late binding
- (d) dynamic constructor
- (e) return by reference
- (f) this pointer
- (g) virtual base class
- (h) overriding
- (i) virtual function
- (j) exception

3. Answer **any four** of the following questions :

5×4=20

- (a) What are the benefits of object oriented programming ?
- (b) Explain the use of new and delete operator with suitable example.
- (c) Explain the use of reference variables in function arguments with an example.
- (d) Differentiate between a class and a structure in C++.
- (e) List the key characteristics of a C++ constructor and destructor.
- (f) What is a friend function ? How is a friend function declared and defined ? Give example.
- (g) Describe the different types of inheritance with diagrams.
- (h) Describe exception handling mechanism in C++.

4. Answer **any one** of the following questions :
10×1=10



(a) Define a class "time" to store time as hour, minute and second, all being integer values. Write member functions to display time in standard formats. Also overload the ++ operator to increase a given time by one second where the minute and hour values will have to be updated whenever necessary.

(b) Define a class to store matrices. Write suitable friend functions to add and multiply *two* matrices.

(c) Define an abstract base class printer. Derive *three* classes laser-printer, line-printer and inkjet-printer. The derived classes will have data members to store the features of that particular printer. Write pure virtual function display() in the base class and redefine it in the derived classes.

(d) Explain with suitable example how virtual base class solves the diamond problem.