Thapar Institute of Engineering and Technology, Patiala

BE (II Semester) EST
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UTA018: Object Oriented Programming
Time: 3 Hours; MM: 50 (Weightage 40)

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NOTE: Solve all the questions in order . Questions attempted with pencil will not be checked. New problem, new page. Write the page number of the question attempted on the front. Partially cut questions will not be given partial credit. Plan on the last page before attempting to avoid cutting. Assume any missing data.

Q.1	Write a program in C++ to	(7 marks)
(a)		

    i.   Define a class that has an integer variable and character array in private scope.
    ii.   Write a member function to input the values.
    iii.   Write a member function to write the input values to a binary file. This write function will call the input function.
    iv.   Write a member function to read the all data stored in a binary file.
    v.   Write a member function to display the data that is read from the binary file.
    vi.   Write a member function to update/modify a particular record on the basis of integer data variable.
    vii.   Write the main function appropriately to call these functions to input 3 records (values) and write to a binary file, read the records of binary file, modify a record of binary file and display the records on the console.

(b) Explain in brief the purpose of each of the following modes .   **(3 marks)**
    i.   ios::out
    ii.   ios::in
    iii.   ios::app

Q.2	Write a program in C++ to	(5 marks)
(a)		

    (i)   Create a base class shape. Use this class to store two double type values (val1 and val2) that could be used to compute the area of figures.

    (ii)   Derive two specific classes called **triangle** and **rectangle** from the base class **shape**. Define a member function get_data() of the base class to interactively initialise base class data members and an another member function display_area() to compute and display the area of figures. Make display_area() as a pure virtual function and redefine this function in the derived classes to suit their requirements.

    (iii)   Using these three classes, design a program that will accept dimensions of a triangle and a rectangle interactively from the user, and display the area by using array of base class pointers (or use multiple pointers to the base class objects) to the derived classes.

    (iv)   Define each member function outside the class.

The two values given as input will be treated as lengths of two sides in case of rectangles, and as base and height in the case of triangles, and used as follows:

Area of rectangle = val1*val2
Area of triangle = 0.5 *val1*val2

(b)	Differentiate between **(2.5+2.5=5 marks)**
	   i. Late Binding and Early binding
	   ii. Function overloading and Function overriding	

Q.3
(a)
	Write a program to overload + operator for performing addition of two template based class objects.
	                                                                                                   (6 marks)
	   i. Create a class *num* with a *private template type data* member *number*.
	   ii. Use a function *input()* to get the value of data member *number* at run time from user. A public member function **show()** has to be used to display the sum as output.
	   iii. overload + operator for performing addition of two template based class objects (i.e. addition of two objects having data type of *number* as int and addition of two objects having data type of *number* as double
	   iv. Write the appropriate main function.

(b)	List and explain (in one sentence each) the three components of standard template library (STL). **(3 marks)**
(c)	How to handle "divide by zero" exception with try catch and throw statements. Explain with the help of a program. **(3 marks)**

Q.4 (a)	Implement a C++ program that showcases operator overloading for comparison operations. Define a class called "Time" that represents a time of day in hours and minutes. Use constructor to read the data. Overload the comparison operator (==) for checking the equality and overload not equal to operator (!=) for checking the inquality using non-member function (friend function) with return type "bool", to compare Time objects based on their hours and minutes. Test the overloaded operators by comparing different Time objects. **(5 marks)**

(b)	Write short notes on following: **(2+2+1=5marks)**
	   (i) Inline functions
	   (ii) Reference Variables
	   (iii) Abstraction

Q.5 (a)	What are constructors and destructors? **(2 marks)**
(b)	Explain different types of constructors with examples. **(6 marks)**