Roll Number:

Thapar Institute of Engineering and Technology, Patiala

Department of Computer Science and Engineering

BE* COE/CSE/EC/EI/EE/EM/NC *(II Semester) MST **UTA018: Object Oriented Programming**

4th April 2022 Time: 02 Hours; MM: 35

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Note: Attempt any five questions. Only first five questions will be evaluated. **Solve problems in order, otherwise they will not be checked.** If you are not sure about the current question then leave appropriate pages and move on. New page for new problem. Plan on the last page before attempting to avoid cutting. Assume any missing data suitably.

Q.1	Create two classes Rectangle and Triangle. Rectangle class is having the private data members: length (int), breadth (int), color (string or char array) and a public member function: setdata() to take input from the user. Triangle class is having color (string or char array) and three sides: s1 (int), s2 (int) and s3 (int) as the private data members, a public member function: void setdata(int s1, int s2, int s3) to initialize the values of the sides from main() and a default constructor to initialize color = "Green". Use a friend function to add the area of a rectangle and triangle objects and display the sum. Implement the above classes using main(). You have to use the same class names and variable names as given in the question. Take meter as a unit for length, breadth and sides. Note: $Area\ of\ triangle = \sqrt{s(s-a)(s-b)(s-c)}$ $where\ s = \left(a+b+c/_2\right)\ and\ a, b, c\ are\ sides\ of\ triangle$ **(7 marks)**
Q.2	**(a)** There cannot be two variables/two functions with the same name in the same scope. Using namespaces, we can create two variable or member functions having the same name. Justify this statement with the help of example considering variables and member functions both. **(4 marks)** **(b)** Explain the use of **this pointer** with the help of suitable programming example where local variable of constructor and class data member have the same name. **(3 marks)**
Q.3	Explain the following with the help of suitable example: i. const member function **(2 marks)** ii. Inline function **(2 marks)** iii Encapsulation **(1.5 marks)** iv Data Abstraction **(1.5 marks)**
Q.4	**(a)** Define a class Complex with variables real and imaginary along with following: i. void setComplex (float, float) to initialize object values. ii. void displayComplex() to show the complex number. iii. Pass and return objects to calculate sum of two complex numbers. Display the sum. **(4 marks)** **(b)** Write a program to implement array of objects in C++. **(3 marks)**

Q.5 **(a)** Create a class test_start which contain following data members in private:

- static int t_id;
- int hour, minutes, seconds;

and the following constructors and member functions in public:

- test_start(): as the default constructor
- test_start(int h, int m, int s): as the parameterized constructor.
- test_start(test & t): as the copy constructor
- static display_id(): static function to display the final value of t_id

In main(), create three objects t1, t2 and t3 such that default constructor is called for t1, parameterized constructor for t2 and copy constructor for t3. You also need to call display_id() function to display the final value of t_id. Call this function without the use of any object.
[Note: Increment the t_id value every time the object is created. The final value of t_id for the above scenario should be 3] **(5 marks)**

(b) List any 2 differences between the structure and class in C++. **(2 marks)**

Q.6 Create a class Property with three data members in private section:

- p_id as (int)
- p_name as (string or char array)
- p_price as (float)

It also includes two member functions in public section:

- void setdata() to initialize data members
- void getdata() to display data members.

In main(), create an array of objects using dynamic memory allocation (new operator) and assign the values to objects using setdata() and display using getdata(). At last, deallocate the dynamically allocated memory (delete operator). **(7 marks)**

Q.7 **(a)** Explain diagrammatically any four forms of inheritance in Object Oriented Programming and give syntax for each form. **(4 marks)**

(b) Create two classes named as:

student	protected: int id int marks public: void setdata(int x, int y): to initialize the id and marks.
result	public: void display_result(): to display the data of parent class

Use single inheritance in public mode to derive the parent class. In main(), create the object of result class and access the member function setdata() and display_result(). **(3 marks)**