MACHAKOS UNIVERSITY

University Examinations for 2017/2018

SUPPLEMENTARY/SPECIAL EXAMINATIONS

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN MATHEMATICS

SMA 391: OBJECT ORIENTED PROGRAMMING

DATE: 5/9/2018 **TIME: 2:00 – 4:00 PM**

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Explain what is meant by the following OOP concepts (8 marks)

i Encapsulation

ii Inheritance

iii Polymorphism

iv Class

b) State whether the following statements are **TRUE** or **FALSE**. (4 marks)

i It is a syntax error to declare data members as public.

ii Private member functions are accessible only by member functions of that class.

iii Protected member functions are accessed just like public member functions.

iv Data members are public by default.

c) i Define data abstraction. (2 marks)

ii Using the **cout** object in C++ programming, write a C++ program that demonstrates data abstraction. (3 marks)

d) Describe **three** class access modifiers found in C++ programming. (6 marks)

e) Distinguish between virtual member function and non-virtual member function. (2 marks)

f) Define friend functions. (2 marks)

g) Write a C++ statement that declares a function a friend. (3 marks)

QUESTION TWO (20 MARKS)

a) In C++ programming, the type of inheritance is specified by the access specifier. Explain the rules of the access specifiers that should be applied while using different types of inheritance. (6 marks)

b) i Define function overloading. (2 marks)

ii Write a program to overload function **Area**() to calculate area of a circle and area of a rectangle. (10 marks)

c) Explain the use of **this** pointer in C++ program codes. (2 marks)

QUESTION THREE (20 MARKS)

a) Differentiate between the following (10 marks)

i Base class and Derived class

ii Static linkage and Dynamic linkage

iii Dot (.) operator and Operator of Scope (::)

iv Inline member functions and Normal member functions

v Constructor and Destructor

b) Write a C++ program to find sum of two integers using class and object. (10 marks)

QUESTION FOUR (20 MARKS)

a) i Define a Pointer. (2 marks)

ii Write a C++ program that defines a pointer **ip** of **integer** type and assign the pointer the address of a variable **var**, and let the pointer access the value at the address available in the pointer variable which is **20**. (6 marks)

b) Explain the following concept as used in inheritance (4 marks)

i Pure virtual function

ii Write a C++ statement of how a pure virtual function is declared.

c) With aid of an example, explain the syntax of a multiple inheritance. (2 marks)

d) Explain why inline functions are used when writing C++ codes. (1 mark)

e) Write an inline function called **Max** of **integer** type with two arguments **x** and **y**. It should return the maximum of the two values x or y. (5 marks)

QUESTION FIVE (20 MARKS)

a) Write a C++ program code that when compiled and executed will display the address of **Var1** variable and the address of **Var2** variable. (4 marks)

b) Write a C++ program to get the Area of a Rectangle called **Rect**. Implement a function **getArea**() of **integer** type to get the area of the Rectangle. The function is found in the **Class Shape** whose object is **Rect**. The class shape has **public integer** data members **width** and **height** and functions **setwidth** and **setheight** both of **void types**. (10 marks)

c) i List **three** characteristics of a Destructor. (3 marks)

ii Write a C++ code to demonstrate a Destructor using Class **XYZ**. (3 marks)