THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering & Technology

DEPARTMENT COMPUTER SCIENCE & INFORMATION TECHNOLOGY

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING (BSC ME)

EMG 2210: COMPUTER PROGRAMMING FOR ENGINEERS (Matlab, Visual Basic, Labview, Object Oriented C++)

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY/MARCH 2012
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

QUESTION ONE [COMPULSORY, 30 MARKS]

a) Describe any five features of the LAB view application program [10 marks]

b) Write a C++ program that reads 100 numbers from the user and output their sum [5 marks]

c) Distinguish between a constructor and a destructor and show with code how each can be declared for a class the class above [4 marks]

d) Describe Four steps in object oriented design [8 marks]

e) List **THREE** outputs of the object-oriented design phase: [3 marks]

SECTION B (Answer any two questions)

QUESTION TWO[MATLAB] [20 marks]

a) Describe the applications of MATLAB program in engineering [5 marks]

b) A vector has four elements (a, b, c, d). Demonstrate how to create the following based on this vector
  i.   Row vector
  ii. Column vector
  iii. Transpose [3 marks]

c) Represent the following two sets of matrices in matlab form [4 marks]

```
    A=
     1    2    3
     4    5    6
     7    8    9
    10   11   12
    B=
     0    2    4    6    8   10
     1    3    5    7    9   11
```

d) Give a matlab expression for solving the following set of equations [5 marks]

$$a1\ x + b1\ y + c1\ z = d1$$
$$a2\ x + b2\ y + c2\ z = d2$$
$$a3\ x + b3\ y + c3\ z = d3$$

e) Show the output the following matlab loop [3 marks]

```
>> for i = 1:10;
>> a(i) = i*i;
>> end
>> a
a =
```

QUESTION THREE [20 marks]

a) Define the term dynamic memory allocation and demonstrate how is achieved in c++

[5 marks]

b) Write a C++ program that calculates the perimeter of a circle of radius 5   [5 marks]

c) Write a program that outputs the following: 1, 2,3, FIRE! Using
   i.   A while loop
   ii.   A for loop   [6 marks]

 d) List four benefits of objected oriented programming   [4 marks]

QUESTION FOUR [20 marks]

a) List four characteristics of a function   [4 marks]

b) Differentiate between passing parameters by value and by reference   [6 marks]

c) Write a c++ program that uses a function prototype to get the product of two numbers
                                                                               [5 marks]

d) Demonstrate the concept of overloaded functions using a code snippet   [5 marks]

QUESTION FIVE [20 marks]

a) Define the following terms
   i.   Class
   ii.   Object
   iii. Method
   iv.   Abstraction   [8 marks]
b) Write a C++ program that uses a class called Spheres to calculate the volume of a sphere
                                                                               [6 marks]
c) Given that the class Spheres above is subclasses of a class called polygon, demonstrate with code
   snippet how inheritance can be implemented   [6 marks]