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

<u>**SECTION A (COMPULSORY)**</u>

<u>**QUESTION ONE [COMPULSORY, 30 MARKS]**</u>

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)

<u>**QUESTION TWO[MATLAB] [20 marks]**</u>

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 =

<u>**QUESTION THREE [20 marks]**</u>

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]