# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

**FACULTY OF ENGINEERING &TEHNOLOGY**

**Department of Mechanical & Automotive Engineering**
**BACHELOR OF SCIENCE IN MECHANICAL ENGINERING (BSC YR2 SEM2)**

**Second Year Semester TWO Exam**
**Nov/Dec 2011**
**Computer programming for engineers (Matlab, Visual Basic, LabView, Object oriented C++)**

**Code: EMG 2210**
**Time 2 Hours**

**Instructions**

**Answer Question <u>ONE</u> & any other <u>TWO</u> questions**

## 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]

## 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]

      $a_1 x + b_1 y + c_1 z = d_1$
      $a_2 x + b_2 y + c_2 z = d_2$
      $a_3 x + b_3 y + c_3 z = d_3$

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]