

# **THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE**

**FACULTY OF ENGINEERING &TEHNOLOGY**

**Department of Mechanical & Automotive Engineering  
BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING (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 ONE & any other TWO 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]

$$\begin{aligned} a_1 x + b_1 y + c_1 z &= d_1 \\ a_2 x + b_2 y + c_2 z &= d_2 \\ a_3 x + b_3 y + c_3 z &= d_3 \end{aligned}$$

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]
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**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]