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**W1-2-60-1-6**

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

# **UNIVERSITY EXAMINATIONS 2017/2018**

THIRD YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INDUSTRIAL MATHEMATICS

**ICS 2207: SCIENTIFIC COMPUTING**

**DATE: DECEMBER 2017 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE [COMPULSORY] AND ANY OTHER TWO QUESTIONS**

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**QUESTION ONE [20 MARKS]**

1. Define the following terms:
2. Scientific computing [2 marks]
3. Mathematical modeling [2 marks]
4. Effective procedure [2 marks]
5. Write a code to solve for the roots of  [3 marks]
6. Outline common features of all programming languages [5 marks]
7. Differentiate between high level programming language and low level programming language. Where does MATLAB lie and why [4 marks]
8. Write a progress that prompts the user to enter a value assigned to a variable  and then computes the new = value =  [4 marks]
9. State the functions of the following commands in MATLAB.
10. Who [2 marks]
11. Clear [2 marks]
12. Give four examples where scientific computing and then simulation is used in real life. [4 marks]

**QUESTION TWO [20 MARKS]**

1. State the overall steps for problem solving in computational simulation [5 marks]
2. The three phases of a project must be undertaken sequentially. We know that the cost of each of the phases beaks down into a fixed cost, independent as its duration and a variable cost, which depends on the duration. The following table summarizes the situation.

|  |  |  |  |
| --- | --- | --- | --- |
| Phase | 1 | 2 | 3 |
| Fixed cost | 312 000 kshs | 212 000 kshs | 220 000 kshs |
| Variable cost | 15 000 per day | 14 000 per day | 16 000 per day |

The designer of the project must propose a price for the project he would like to set a price that ensures a profit margin of at least 10%. Express the total cost of the project and the price the designer should propose in function to the duration of each phase. [10 marks]

1. Define the term magic square and write a code to generate a 3x3 magic square and also write a code to determine its determinate and inverse. [5 marks]

**QUESTION THREE [20 MARKS]**

1. Define the following terms
   1. Algorithm [2 marks]
   2. Pseudo code [2 marks]
   3. Model [2 marks]
2. State and discuss good properties of an algorithm [10 marks]
3. A car movement can be represented by the function . Write the algorithm to solve for the velocity and acceleration of the car at time t=4. [4 marks]

**QUESTION FOUR [20 MARKS]**

1. Write a code to draw a bar graph to represent the following scores of ten students 75, 53, 90, 87, 50, 85, 92, 75, 60 and 95. [ 7 marks]
2. Write a code to represent the following sequence  [5 marks]
3. Write a code to determine the area enclosed between  and the curve  and the ordinances x=1 and x=2. [5 marks]
4. Write the syntax of if and while conditioned statements, giving examples of each. [2 marks]