



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL INFORMATICS AND INNOVATIVE SYSTEMS**  
**UNIVERSITY EXAMINATION FOR THE DEGREE OF SCIENCE**  
**ACTUARIAL SCIENCE**  
**1<sup>ST</sup> YEAR 2<sup>ND</sup> SEMESTER 2013/2014 ACADEMIC YEAR**  
**CENTRE: MAIN**

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**COURSE CODE: SAS 104**

**COURSE TITLE: PROGRAMMING METHODOLOGY**

**EXAM VENUE: LR 1**

**STREAM: BSc. Actuarial**

**DATE: 11/12/2013**

**EXAM SESSION: 9.00 – 11.00 AM**

**TIME: 2 HOURS**

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**Instructions:**

- 1. Answer question 1 (Compulsory) and ANY other 2 questions.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

## QUESTION ONE (COMPULSORY)

[30 MARKS]

- (a) What is *programming methodology*? Why is it considered an important study for actuarial science students? [4 Marks]
- (b) Define the following terms and concepts as applies to computer programming. [4 Marks]
- |                 |                 |
|-----------------|-----------------|
| (i) Source Code | (iii) Debugging |
| (ii) Linking    | (iv) Pointers   |
- (c) “In order to get a computer perform a specific task it must be given a sequence of unambiguous instructions called *program*”
- (i) Do you agree with the above statement? Support your answer [2 Marks]
- (ii) What relationship does a program has with *programming*, *programmer* and *programming language*? Explain. [3 Marks]
- (d) Give a reason why *comments* are considered useful when writing a computer programming code. Use an example to show how it is used in C programming language. [2 Marks]
- (e) Explain the three components of a programming structure. [3 Marks]
- (f) Name and explain the key characteristics of an algorithm. Use an example to support your answer. [5 Marks]
- (g) Develop an algorithm that can be used to solve the roots of a quadratic equation. Convert the provided algorithm into programming codes compilable by C compiler. [7 Marks]

## QUESTION TWO

- (a) In reference to programming language, explain the meaning of the term *paradigm*. Give any TWO such paradigms you know. [4 Marks]
- (b) Differentiate between the following as applies to computer programming. [4 Marks]
- |                               |
|-------------------------------|
| (i) Algorithm and Program     |
| (ii) Compiler and Interpreter |

- (c) “Data representation refers to methods used internally to represent information stored in a computer”. Use appropriate conversions examples between number systems (binary, octal, denary and hexadecimal) to support the above statement. [6 Marks]
- (d) “Study of algorithm can be classified in four distinct areas”. Explain in support of this statement. [4 Marks]
- (e) Distinguish between *top down design model* and *bottom up design model* as applied in problem solving process. [2 Marks]

### QUESTION THREE

- (a) “There are three types of control flow in *structured programming* ”
- (i) What is structured programming? [2 Marks]
- (ii) Using appropriate diagrams, explain the three types of control flow as indicated above. [3 Marks]
- (iii) Provide sample programming codes to support your explanation in (ii) above. [3 Marks]
- (b) Write programming codes in C that can be used for solving; [12 Marks]
- (i) the factorial of n
- (ii) reversing integer digits
- (iii) the maximum out of 1000 integers

### QUESTION FOUR

- (a) “Programming is a process of problem solving”. Use a suitable example the problem solving process [5 Marks]
- (b) Explain the following as applies to C programming [4 Marks]
- (i) Executable Statements
- (ii) Preprocessor Directive
- (iii) Operator Precedence
- (iv) Primitive Data Types

- (c) Give a command that can be used to compile the file *test1.c*. [1 Mark]
- (d) Write a C program that accepts two integers, compares them and display the relationship between them i.e. whether they are the same or one is greater than the other. [6 Marks]
- (e) Name and explain any TWO C Standard Library you know. [4 Marks]

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### QUESTION FIVE

- (a) Define the following terms and concepts [4 Marks]
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|--------------------------|------------------|
| (iii) Library Procedures | (iv) Subroutines |
| (ii) Recursions          | (v) Functions    |
- (b) Fibonacci numbers are the numbers in the Fibonacci sequence 0, 1, 1, 2, 3, 5, 8, 13, 21, . . ., each of which, after the second is the sum of the two previous ones.
- (i) Develop an algorithm that can be used to generate and display the first 'n' Fibonacci numbers, where 'n' is specified by the user. [6 Marks]
- (ii) Convert the algorithm in (i) above into C programming codes that can generate a Fibonacci sequence. [10 Marks]

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