EGERTON UNIVERSITY

UNIVERSITY EXAMINATIONS

NAKURU TOWN CAMPUS

SECOND SEMESTER 2011/2012

THIRD YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ENGINEERING

COMP 305: SCIENTIFIC PROGRAMMING

STREAM: BSC AGEN, MENT, CEEN **TIME:** 2 HRS

DAY: FRIDAY 3.00 – 5.00PM **DATE:** 04/05/2012

INSTRUCTION:
*Answer **Question ONE** and **any other 2** questions.*

Question ONE (30mks)

a) Define the following terms used in computer programming:

i) Algorithm
ii) Source code
iii) Function

6 Marks

b) Differentiate between low-level and high-level programming languages, giving three advantages of each.

8 Marks

c) Distinguish between the following terms in relation to programming:

i) Compiler
ii) Assembler
iii) Interpreter

3 Marks

d) Using an appropriate loop structure, write a FORTRAN program that prints cumulative sum of the integers from 1 through n where n is any positive integer.

5 Marks

e) i) Develop a logical machine to compute the factorial of a number **n** given by

$n! = 1 \times 2 \times \ldots \times n-1 \times n$

4 Marks

ii) Using a subprogram, implement the above algorithm in a FORTRAN program.

4 Marks

Question TWO (20mks)

a) Explain the following characteristics of programming languages:
   i) Expressivity
   ii) Generality
   iii) Portability

3 Marks

b) What is meant by 'dry running' as used in program development?

2 Marks

c) State the six basic steps involved in program development.

6 Marks

c) i) Develop an algorithm to find the smallest positive integer x for which the sum
$1 + 2 + \ldots + x$
is greater than any value Limit.

5 Marks

ii) Write a FORTRAN program for c (i) above.

4 Marks

Question THREE (20mks)

a) State any two types of documentation in program development, giving the purpose of each.

4 Marks

b) Evaluate the following FORTRAN expressions:
   i) sqrt (4) .LE. 5
   ii) (12 + 3) / 2 – (8 – 5 + 1)
   iii) int (5 / 2)

3 Marks

c) State the significance of problem analysis in computer-aided problem solving.

3 Marks

d) i) What is an array in high-level programming?

2 Marks

ii) Write a high-level program that reads 10 values into a one-dimensional array and computes and displays their average.

8 Marks

Question FOUR (20mks)

a) Distinguish between the following phrases used in high-level programming:
   i) Global variable and Local variable
   ii) Actual parameter and Formal parameter

4 Marks

b) Rewrite the following FORTRAN 77 declaration by introducing an array type:
integer Num1, Num3, Num3, Num4, Num5

2 Marks

c) Giving examples, illustrate the three types of control structures used in programming.

6 Marks

d) State the output of the following FORTRAN program segment:

```
j = 1
DO WHILE ( j .LE. 5)
  WRITE (*,*) ' A '
  j = j + 1
  END DO
```

4 Marks

e) Develop a flowchart solution for a problem to read an integer value and determine if the number is even or odd.

4 Marks

Question FIVE (20mks)

a) Describe the two main types of errors that can be found in a high-level program.

2 Marks

b) Explain the meaning of each of the following terms:

i) Modular programming

ii) Scope of a variable

4 Marks

c) What is the difference between a function and a subroutine in FORTRAN?

2 Marks

d) i) Develop an algorithm for reading integer scores of a student in a given number of tests. Each score ranges between 0 and 100 marks. Your algorithm should compute the average score and assign a remark as follows:

80 – 100, display 'Excellent'
60 – 79, 'Good'
40 – 59, 'Fair'
Otherwise, display 'Fair'

6 Marks

ii) Write a FORTRAN program using a repetitive structure to compute the average score and assign a remark as shown in d (i) above.

6 Marks

********** GOOD LUCK **********