TECHNICAL UNIVERISTY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR DEGREE IN:
BACHELOR OF SCIENCE IN ELECTRICAL & ELECTRONIC ENGINEERING
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
(BSEE Y3 S2 – 6A & 6B & BSCE Y3 S2)

SMA 2276: COMPUTER PROGRAMMING II

END OF SEMESTER EXAMINATION
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*
This paper consists of **FIVE** questions. Attempt question **ONE (Compulsory)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One (Compulsory)

a) Define the following terms in relation to computer programming;
    (i) Computer program
    (ii) Program control
    (iii) Programming Language compiler
    (iv) Array
    (v) Sub-program   **(10 marks)**

b) State the FIVE steps that can be used to plan a programming task   **(5 marks)**

c) Describe the FOUR main elements of a FORTRAN program   **(8 marks)**

d) Write a computer program in FORTRAN that requests TWO 2 x 2 Integer Matrices from the keyboard, and then multiplies them. Using references to individual array elements, display the input matrices and the results in the order:

(1, 1) (1, 2)
(2, 1) (2, 2) **(7 marks)**

Question Two

a) Briefly explain the term "Unit Identifier" as used in FORTRAN programming **(4 marks)**

b) Write the syntax for "format statement" in FORTRAN. **(4 marks)**

c) Differentiate between the following terms/commands as applied to FORTRAN programming:
   (i) REAL & COMPLEX data types
   (ii) OPEN (unit, file) and CLOSE (Unit)
   (iii) Do Loops and IF statements **(6 marks)**

d) Write a FORTRAN program called FACTORIAL which reads in an integer, n from the keyboard and then uses an integer function to calculate n! (the factorial of n). The program should display the result on the screen.
   [Hint: $n! = n * (n - 1) * (n - 2) * (n - 3) * ..... * 3 * 2 + 1$] **(6 marks)**

Question Three

a) Define the following concepts as used in FORTRAN programming:
   (i) IMPLICIT NONE statement
   (ii) NAG Library
   (iii) Modules **(6 marks)**

b) Differentiate between the following terms/commands as applied to FORTRAN programming:
   (i) Testing and Debugging
   (ii) Variable and Constant
   (iii) INTENT and SAVE attributes
   (iv) Function and subroutine **(8 marks)**

c) Write a computer program (using FORTRAN)to compute projectile motion. The program computes the horizontal, x, and vertical y, position of the projectile after a time, t:where $x = ut\ cosa$ and $y = ut\ sin\ a - gt^2/2$

Question Four

a) Compare and contrast the following as used in FORTRAN:
   (i) EXIT and STOP statements
   (ii) GLOBAL and LOCAL variables
   (iii) INTERNET and SAVE attributes
   (iv) PUBLIC and PRIVATE attributes **(8 marks)**

b) Briefly discuss the role of functions and subroutines in computer program organization **(6 marks)**

c) Give the syntax for the "formal definition" of the structures of:
   (i) A function
   (ii) A subroutine **(6 marks)**

Question Five

a) Briefly describe any FIVE features of a good computer program **(10 marks)**

b) Briefly explain the role of GNUPLOT application in FORTRAN graphics and visualization **(4 marks)**

$$r'en = \sqrt{V\left(r_1^2 + r_2^2 + r_3^2\right)}$$

c) The length of a vector r, is given by   where r1, r2, and r3 are the components of the vector. Construct a computer program (using FORTRAN) to find the length, rlen of the vector **(6 marks)**