SOUTH EASTERN KENYA UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE, STATISTICS, ACTUARIAL SCIENCE, ELECTRONICS & BACHELOR OF INFORMATION TECHNOLOGY

SCI 102: PROGRAMMING METHODOLOGY

DATE: 11TH DECEMBER, 2017   **TIME: 4.00 -6.00 PM**

INSTRUCTIONS TO CANDIDATES

    a) **Answer <u>ALL</u> questions from section A(Compulsory)**

    b) **Answer <u>ANY TWO</u> questions from section B**

SECTION A, COMPULSORY: QUESTION ONE: 30 MARKS

    a) Explain the following concepts as used in programming:

        (i)   Software Development Life Cycle;

        (ii)   Algorithms.   **(2 Marks)**

    b) Outline two qualities of a good algorithm.   **(4 Marks)**

    c) Differentiate between semantic errors and syntax errors.   **(2 Marks)**

    d) Write a program to convert your surname from uppercase to lower case and vice versa. Hint use ASCII system A=65, a=97. Apply XOR.   **(3 Marks)**

    e) Explain the software crisis of 1960s' that led to the introduction of High Level Languages.   **(3 Marks)**

    f) Distinguish between linking and compiling as used in programming.   **(4 Marks)**

    g) Perform the following operations from programming point of view.

        (i)   5%2

        (ii)   5/2   **(2 Marks)**

    h) Enumerate four rules to be followed when naming variables.   **(2 Marks)**

i) Write the meaning of the following escape codes.

        (i)   \a

        (ii)   \!   **(2 Marks)**

j) Write a C/C++ program to evaluate $2^2+4^2+6^2+8^2+10^2\ldots\ldots+q^2$ **(3 Marks)**

k) Given the program , re-write it using the for loop:

```
int product = 3;
while ( product <=   100 )
    product = 3 * product;
```
                                                                           (3 Marks)

SECTION B (40 MARKS)
*Answer **two** questions from this section*

QUESTION TWO

a) Difference between local and global variables.   **(2 Marks)**

b) Explain the difference between the following set of terms/symbols as used is programming:

        (i)   "=" and " ==";

        (ii)   #include<stdio.h> and #include <iostream.h>   **(4 Marks)**

c) A meal card module in an accounting system at starehe girls high school performs the following tasks:

    i.   captures name, admission number, class, termly-fees and amount paid;

    ii.   allocates meal cards to students according to the following criteria:
-     if the fee balance is above 50000, the student is not allocated a meal card;
-     if the fee balance is between 20000 and 50000, a one week's meal card is allocated to the student;
-     if the fee balance is below 20000, a one month's meal card is allocated;
-     otherwise, a full term's meal card is allocated.

    iii.   displays the fee balance .

                  Required

   I.   Represent the logic of the module using a flowchart.   **(6 Marks)**

    II.   Write a C/C++ program that will implement the flowchart drawn in (I).

                                                                                           (8 Marks)

QUESTION THREE

    a) Highlight three merits of modular programming. **(3 Marks)**

    b) Giving one area of application for each, explain the difference between one dimensional array and multi-dimensional array. **(4 Marks)**

    c) Whenever solving a problem that requires the development of a software solution in any field, the programmers are faced with challenging task of justifying the choice of a programming language that gives the expected solution. Enumerate four factors to consider in evaluating a programming language to settle on. **(4 Marks)**

    d)   The Figure below shows a pictorial view of a plot where CHINA WU YI CO. is constructing XYZ TOWERS. The building measuring x by y is to be build inside the plot as shown. Use it to answer the question that follows.
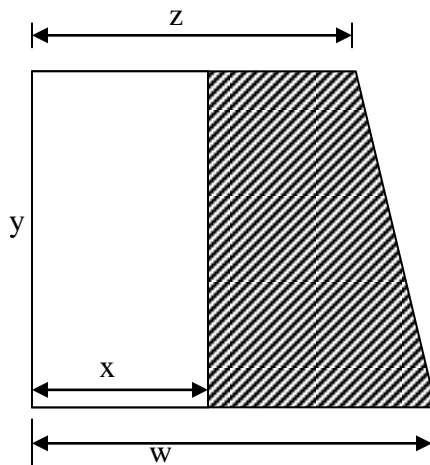
Write one C/C++ program that will accept the appropriate input calculate and output
        a. area of the whole plot,
        b. area covered by the building;
        c. area of shaded region. **(9 Marks)**

QUESTION FOUR

    a) CHINA WU YI Company that is constructing XYZ towers wish to have a program that will convert feet (ft) to inches, inches to cm, cm to meters. Given 1feet=12 inches, 1 inch= 2.54cm and 100cm= 1m. Use function prototype in which the worker is prompted for ft through the keyboard. **(6 Marks)**

b) Engineers Sacco allows its customers to make deposits in a savings account. The amount deposited earns a 12% annual interest. Given that P is deposit, A is the amount accumulated in n years and r is the interest rate. Write a C/C++ program that prompts the user to enter the initial P and n in years, then computes A given $A=P \times (1+r/100)^n$.

(6 Marks)

c) The following matrix contains the number of computers sold at an Electronic shop in the month of June.

$$\begin{pmatrix} 1 & 2 & 4 & 7 & 2 \\ 7 & 5 & 2 & 9 & 1 \\ 4 & 5 & 2 & 8 & 3 \\ 4 & 7 & 8 & 8 & 2 \end{pmatrix}$$

Write a C++ program that will initialize a two-dimensional array with the values in the matrix and use a function to determine the total number of computers sold in the month of June. The program should then output the total number of computers sold. Use a *function prototype* and the *for loop* structure. **(8 Marks)**