TEVETA

ADVANCED CERTIFICATE IN COMPUTER STUDIES

LEVEL 5 EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATION

NOVEMBER/DECEMBER 2019

SUBJECT: PROGRAMMING II

TIME ALLOWED: 3 HOURS   TOTAL MARKS: 100%

PASS MARK: 50%

INSTRUCTIONS TO CANDIDATES

1. Time Allowed three (3) hours

2. Write the examination number and the National Registration Card Number on the answer booklet provided

3. There are Seven (7) questions in this paper

4. Attempt any five (5) questions of your choice

5. Cell phones and programmable calculators are not allowed in the examination room

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO**

QUESTION 1

a) Explain the main difference between selection sort and bubble sort   (4 marks)

b) Write the following algorithms in pseudo code

     i)   Binary search   (5 marks)

     ii)   Selection sort   (5 marks)

c) Discuss the worst-case scenarios for binary search and sequential search.

     (6 marks)

[Total: 20 Marks]

QUESTION 2

a) Write a program that lets you enter 20 numbers in an array. The program then displays all the numbers that have been entered. The program then uses one of the sorting algorithms to sort the numbers in descending order and then displays the numbers in reverse order from the highest to the lowest index in the array.   (14 marks)

b) Write an algorithm in pseudo code for sequential search   (6 marks)

[Total: 20 Marks]

QUESTION 3

a) Given the following tree, produce the sequence of nodes when we traverse it inorder, preorder and postorder.   (9 marks)
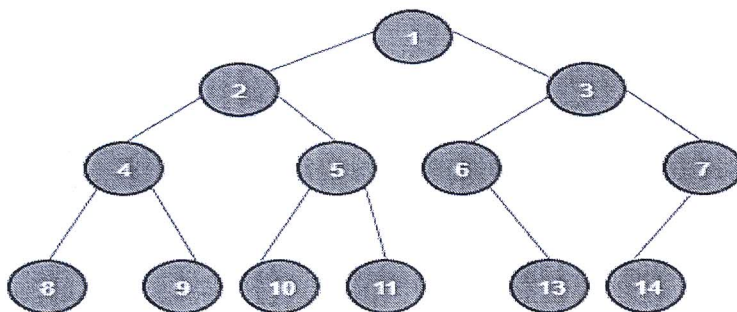
b) Discuss the difference and the relationship between primitive data types and composite data types.   (6 marks)

c) Explain the difference between pre-test and post-test loops used in programming.

     (5 marks)

[Total: 20 Marks]

QUESTION 4

a) Examine the following program and write down its output.   (12 marks)

```cpp
#include <iostream>
using namespace std;
void Example(int y)
{
  cout<<"Example 2"<<endl;
  cout<<y+2<<endl;
  y = y + 2;
  cout<<y<<endl;
}
int main() {
  int x = 8;
  cout<<x+1<<endl;
  cout<<"example"<<endl;
  Example(x);
  cout<<x<<endl;
  return 0;
}
```

b) Explain two (2) areas of application for each of the following data structures
   i)   Trees   (2 marks)
   ii)   Stacks   (2 marks)
   iii)   Queues   (2 marks)
c) Define the term structured programming.   (2 marks)

[Total: 20 Marks]

QUESTION 5

a) Perform a merge sort operation of the following list of integers: 0, 15, 75,27,32, 4, 10, 5.
    Show your working.   (8 marks)
b) Describe the term recursion. Give examples of where it is appropriate to use recursive
    algorithms.   (6 marks)
c) A hash tables is a kind of data structure. Explain briefly what harsh tables are and the
    operations that can be done on them.   (6 marks)

[Total: 20 marks]

QUESTION 6

Study the following algorithm

    Variables: a,b,c,d, Min (integers)
    Enter a,b,c,d
    Min = a
    If b<Min
        Min = b
    If c<Min
        Min = c
    If d < Min
        Min = d
    Print Min

a) What is the purpose of this algorithm?   (3 marks)

b) Write the C++/Java/VB program for this algorithm   (6 marks)

c) Write C++/Java/VB program that lets a use enter a number, and then the program
   displays the first 10 multiples of this number.   (6 marks)

d) Explain the term debugging as used in programming   (2 marks)

e) Give three examples of data types   (3 marks)

[Total: 20 marks]

QUESTION 7

a) Compare the performance of the following algorithms;

    i)   Binary search and sequential search.   (4 marks)

    ii)   Quicksort and bubble sort.   (4 marks)

b) Write short notes on the following data structures;

    i)   Heaps   (5 marks)

    ii)   Data dictionaries   (5 marks)

    iii)   Arrays.   (2 marks)

[Total: 20 marks]