ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Advanced Level

COMPUTING   **9195/2**
PAPER 2: WRITTEN PRACTICAL

NOVEMBER 2017 SESSION   3 hours

Additional materials:
Answer paper
Non-programmable calculator

TIME   3 hours

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces provided on the answer paper/answer booklet.

Answer **all** questions in Section A and any **two** questions from Section B.

Write your answers on the separate answer paper provided.

If you use more than one sheet of paper, fasten the sheets together.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

You are reminded of the need for good English and clear presentation in your answers.

SECTION A

Answer **all** questions in this section.

1   The following is a fragment of a computer program *Integer n-records*.

-
-
-

Procedure display-records(*n*)
Integer linemax
-
-

If (*n* < *n*-records) then
Display-error-message-box(.)
Endif
-

End procedure

   (a)   Describe the following terms:

       (i)   local variable,   [1]

       (ii)   global variable,   [1]

       (iii) parameter.   [1]

   (b)   Identify the **three** terms in **(a)** from the program fragment.   [3]

2   Given that:

$$T(0) = 1$$
$$T(1) = 1$$
$$T(2) = 2$$
$$T(3) = T(2) * T(1) = 2$$
$$T(4) = T(3) * T(2) = 4$$
$$T(n) = T(n - 1) * T(n - 2)$$

Write a recursive function in pseudocode that takes any number as input and displays the value of T as output.   [6]

3   A variable name is defined in a particular system as:

-   one or two letters, followed by
-   any number of digits (including zero) followed by either a
    • $ sign if there are no digits
    •   & sign if there are any digits

(a)   Draw a syntax diagram which describes a variable name.   [6]

(b)   INPUT A, B
      IF B = 0 THEN C = A
              ELSE C = A/B
      ENDIF
      PRINT A, B
      PRINT C
      END

      Write down the outputs produced by the algorithm if

      (i)   A = 8, B = 2   [2]

      (ii)   A = 6, B = 0   [2]

(c)   An automatic fan is designed so that it turns on only when a person is in the
      room and the temperature is above a set value (D).

      The fan receives information from two sensors.

      1.   A motion sensor which retains a value (M), dependent upon a person being
              sensed in the room,

      2.   A thermistor (electronic thermometer) which retains the temperature
              in the room (T).

      Produce an algorithm to control the fan. The algorithm may be expressed
      in any form.   [6]

[Turn over

4   Given the following interface, code a program that calculates and displays the roots
     of a quadratic equation.

                    INTERFACE: FORM BASED

```
A                              [              ]

B                              [              ]

C                              [              ]

ROOT 1                         [              ]

ROOT 2                         [              ]
[ COMPUTE ]                    [ CLOSE FORM ]
```
                                                                    [10]

5   Create a Visual Basic program using the SELECT CASE that displays a message
     on a message box depending on the day temperature input, through a textbox using the
     following temperature ranges:

     Temperature < = 0: freezing
     Temperature > = 1 and < = 20: moderate
   Temperature > = 21: Hot   [12]

SECTION B

Answer any **two** questions in this section.

6   **(a)**   Explain the following units of storage giving examples:

       (i)   bit

       (ii)   word

       (iii)   nibble

                                                [3]

   (b)   **(i)**   Describe the operation of a *static* data structure.   [1]

       (ii)   Identify and explain an application in the operation of a computer system where a static data structure would be required.   [4]

   (c)   Convert the following to base 10.

       (i) 27_8

       (ii) $4\,307_8$

       (iii) $2F_{16}$

       (iv) $BC12_{16}$

                                                [7]

   (d)   Suppose the Array A is defined as

33	54	87	90	101

Trace the values using a binary search to find

       (i)   101,   [5]

       (ii)   88.   [5]

[Turn over

7   **(a)**   Describe the following database terms clearly;

        (i)   Tuple,   [2]

        (ii)   relation,   [2]

        (iii)   SQL,   [2]

        (iv)   schema.   [2]

  (b)   Illustrate using diagrams, the

        (i)   Hierarchical database model,   [6]

        (ii)   Network database model.   [6]

  (c) **(i)**   Illustrate **three** major challenges of database management systems.

        (ii)   Prescribe solutions for any **two** of the challenges in **(i)**.

                                                                   [5]

8   A systems analyst is designing the Human Computer Interface [HCI] for a control room in a work site.

  (a)   Analyse any **three** factors the analyst should consider when designing the HCI.   [6]

  (b)   Modularity has become a very popular programming concept.

       Justify this statement, giving appropriate examples of where modularity is suitable.   [7]

  (c)   Explain any **four** advantages of using a *bottom up approach*.   [4]

  (d)   A complex problem is to be solved. The analyst has split the problem up into a number of different tasks to be carried out.

        A   -   represents the collection of information about the problem.
        B   -   represents the analysis of the information.
        C   -   represents the design of the solution.
        D   -   represents the creation of data files.
        E   -   represents the writing of the software.
        F   -   represents the testing of the software.
        G   -   represents the creation of the documentation.
        H   -   represents the installation of the finished project.

(The units used on the chart are days.)
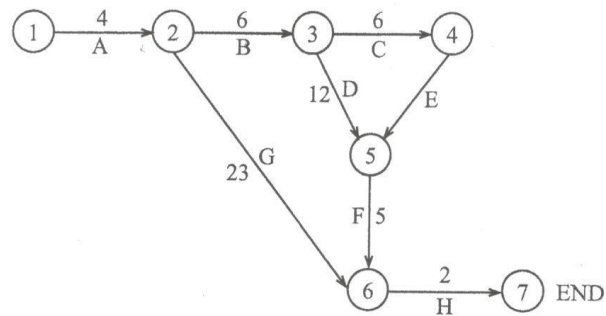
The Program Evaluation and Review Technique chart (PERT) has been drawn to allow critical path analysis of the problem.

(i) Explain what the chart shows about the relationships between the various tasks. [6]

(ii) Write the critical path and the least time required to complete the project. [2]