OLLSCOIL NA hÉIREANN GAILLIMH

NATIONAL UNIVERSITY OF IRELAND GALWAY

SEMESTER II

SUMMER EXAMINATIONS 2000

Second University Examination in Arts

PROGRAMMING (CT218)

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Time allowed: *three* hours.
Attempt *five* questions.
Please use a separate answer book for each section

Section A

1. (a) Draw the binary tree that results from inserting into an initially empty tree the following words in the order given:

   cracow, pisa, aachen, aalborg, metz, jaen

   (b) Calculate the depth of the tree in part (a). For the six words given, what is the (i) minimum, (ii) maximum depth for all possible orderings? Draw a sample tree which has minimum tree depth.

   (c) For the initial tree in part (a), how many comparisons need to be made using Binary Tree Search to find the word **jaen**?

2. (a) Draw the graph corresponding to the adjacency matrix

$$\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 2 \\ 1 & 0 & 0 \end{pmatrix}$$

   Use matrix multiplication to calculate how many distinct ways there are of going from vertex (node) 1 to vertex 2 in three steps (i.e. paths of length 3)

   (b) Describe the Selection Sort Algorithm. Use it to sort the five numbers **5, 9, 1, 7, 6** writing down the intermediate steps.

3. (a) Explain the difference between procedures and functions in Visual Basic.
   (b) Out of the three families of operators in Visual Basic (Arithmetic, Relational, Logical) which has (i) lowest, (ii) highest precedence?
   (c) Calculate the result of the following expressions:
      (i) $4 + 2 < 6$ `XOR TRUE`
      (ii) `TRUE AND NOT` $5 - 1 = 2 * 2$
      (iii) `NOT FALSE AND` $5 + 4/2 > 6$

4. (a) Give examples of Visual Basic code to illustrate the difference between a `MessageBox` and an `InputBox`. Illustrate also the difference between a `MessageBox` used in procedure and in function format.
   (b) Describe, with examples, two methods and two properties of the `ListBox` control.

Section B

5. (a) Visual Basic supports two main file types. Describe the use and benefits of both file types, giving examples of relevant applications.
   (b) For each file type give examples of the code for opening, closing and accessing files.

6. (a) Describe selection statements, giving examples and highlighting the role of relational and logical operators.
   (b) Explain the difference between the different repetition loops. Give an example of each.

7. (a) Write Visual Basic code to moves an object to the current position of the graphics cursor.
   (b) Write Visual Basic code that will draw a sequence of 10 rectangles, each of the rectangles being half as tall and wide as the previous one.
   (c) Present a Visual Basic program that will change the colour of the background in a form to a random value every 10 seconds.

8. (a) Explain the differences between procedural languages (such as C and Pascal) and event-driven languages (such as Visual Basic). Use examples as necessary.
   (b) Describe the necessary steps to create a program in an event-driven language.
   (c) Explain the difference between modal and modeless Dialog Boxes in Visual Basic.