OLLSCOIL NA hÉIREANN GAILLIMH

NATIONAL UNIVERSITY OF IRELAND GALWAY

SEMESTER II
AUTUMN 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:

moscow, pusan, porto, oviedo, trieste, malmo

(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 **trieste**?

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

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

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

(b) Describe the Selection Sort Algorithm. Use it to sort the six words given in question 1. (a), writing down the intermediate steps.

3. (a) Explain the difference between procedures and functions in Visual Basic.
   (b) Explain what is meant by the precedence of an operator. Which of the following has lowest precedence: `XOR`, $<$, $\wedge$, $+$?
   (c) Calculate the result of the following expressions:
      (i) $4 + 1 < 6$ `XOR TRUE`
      (ii) `TRUE AND NOT` $5 - 2 = 2 * 2$
      (iii) `NOT FALSE AND` $5 + 4/2 > 7$

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 **two** of the following in Visual Basic, indicating any events and properties associated with them: (1) Label, (2) TextBox, (3) CheckBox.

Section B

5. (a) Describe the difference between the two main file types in Visual Basic.
   (b) For each file type, give an example of a situation where their use would be appropriate and the use of the other would be inappropriate.
   (c) For each of the file types give code that finds the fourth element in the file. Which file type is most suited to this kind of operation?

6. (a) What is Object Linking and Embedding (OLE)?
   (b) What is the difference between a linked object and an embedded object?
   (c) List five object types that could be linked or embedded into a Visual Basic program. For each highlight the advantages of linking or embedding the object.

7. (a) What is the purpose of the Timer control?
   (b) Give an example of a situation where the timer control would be useful.
   (c) What is the Interval Property of a Timer and how is it set?
   (d) What is the AutoRedraw property?
   (e) When should the AutoRedraw property be set to flase?

8. Write Visual Basic code for each of the following.
   (a) Extract the first three elements in a string.
   (b) Check if an integer is between 10 and 20.
   (c) Sum the integers in a 10 element array.
   (d) Search an unsorted array of integers for the value 12.
   (e) Search a sorted array of integers for the value 16.