



**COMPUTER SCIENCE
STANDARD LEVEL
PAPER 2**

Friday 10 November 2000 (morning)

1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.

1. Data from a file storing details about 5168 books are read into three parallel arrays; AUTHOR (which is sorted), TITLE and CODE. Some of the entries are:

AUTHOR		TITLE		CODE
Aapfel, P	[1]	Happy Days	[1]	3742196
Abel, M	[2]	Computer Science I	[2]	962381X
Abel, M	[3]	Computer Science II	[3]	9742489
Abel, M	[4]	Travelling Light	:	100002X
Abwami, Z	[5]	Rocks Are Hard	:	2386222
	:		:	
Zykoni, H	[5168]	Deep Sea Diving	[5168]	0001290

A programmer has written two search functions:

SEQUENTIAL(NAME) uses a sequential (linear) search to return the subscript of the first location where the parameter is found in AUTHOR, or -1 if NAME is not found in the array.

BINARY(NAME) uses a binary search to return the subscript if the parameter is found in AUTHOR, or -1 if NAME is not found.

For example: LOCATION <-- SEQUENTIAL("Abel, M") would place 2 in LOCATION
 LOCATION <-- BINARY("Abel, M") could place 2, 3 or 4 in LOCATION.

- (a) Construct the algorithm for the procedure DISPLAY(NAME) (which will use SEQUENTIAL) to output all the details about the first book in the arrays written by NAME; or an error message if NAME is not in AUTHOR. [5 marks]
- (b) Construct the algorithm for the procedure ALL(LOCATION) which could be called from DISPLAY after the details about the first book written by NAME have been displayed. The procedure will output the details of **all** the other books (if there are any) written by NAME. [4 marks]
- (c) Describe the method used by BINARY, and outline why it might return **any** of the valid subscripts, rather than always the first like SEQUENTIAL. [3 marks]
- (d) Construct the algorithm for BINARY. [9 marks]
- (e) Outline how all of the books written by an author can be displayed when using BINARY rather than SEQUENTIAL. [4 marks]
- (f) (i) Describe how SEQUENTIAL could be adapted to search the data using the book's title rather than the author's name. [2 marks]
- (ii) Describe how BINARY could be adapted to search the data using the book's title rather than the author's name. [3 marks]

This question requires the use of the Case Study.

2. (a) (i) State why the PIN might be stored on the user’s card, rather than in a central database. *[1 mark]*
- (ii) Outline how the encrypted PIN on the card is used by the ATM. *[3 marks]*
- (b) Describe **one** advantage of using a graphical user interface rather than a command line interface at an ATM. *[2 marks]*
- (c) At the Bank “staff are consulted before the process of change is initiated”. Explain why some staff might view the consultation in a negative way. *[2 marks]*
- (d) State why a smartcard is used to store the details of a customer’s “eye-print”, rather than a magnetic stripe. *[1 mark]*
- (e) Suggest **two** reasons why some people may not like having extra information (such as medical information) along with their banking details on a smartcard. *[4 marks]*
- (f) Draw the systems flowchart, including what data is required, for a customer obtaining a printed mini-statement at an ATM. *[5 marks]*
- (g) Discuss the implications of a system failure at
- (i) an ATM
- (ii) one of the mainframe computer centres. *[5 marks]*
- (h) Identify **one** situation where analog to digital conversion is required in the case study. *[2 marks]*

3. A company sells a range of items to customers over the telephone. Each customer is given a credit limit. Orders are taken by many operators using a PC as a terminal attached to a LAN. Operators are not allowed to change customers' credit limits, only a manager can. When an order is taken, the system checks that enough items are available using the stock file.
- (a) Describe **one** security measure to make sure that credit limits can only be changed by managers. *[2 marks]*
 - (b) Discuss the importance of maintaining the integrity (correctness) of the customer data. *[3 marks]*
 - (c) (i) State and describe a suitable LAN topology for the system. *[3 marks]*
(ii) Describe the consequence of a cable failure on the system using the topology given in (c) (i). *[3 marks]*
 - (d) Explain, with reference to **two** specific functions, why operators will not be allowed to use all of the file manager utility options on the stock file. *[4 marks]*
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