Candidate Name: _____ CT Group: _____
Index no. _____

# PIONEER JUNIOR COLLEGE
## JC 2 PRELIMINARY EXAMINATION

**COMPUTING H2** **9754/1**

**Monday** **12 SEP 2011**

**TIME 3 hours (0800 - 1100)**

**INSTRUCTIONS TO CANDIDATES**

Do not open this booklet until you are told to do so.
Write your name, CT Group, and Index No. in the spaces provided on this cover page and on your answer scripts.
Attach this cover sheet to Section A.
Submit answers to Section A and B separately.

Write your answers on the writing paper provided and **NOT** on the question paper
Answer **all** questions.

**INFORMATION FOR CANDIDATES**

This question paper consists of 5 printed pages (inclusive of this page).
The number of marks is given in brackets [ ] at the end of each question or part question.
The use of an electronic calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.

| FOR EXAMINER'S USE | | |
|---|---|---|
| | **Scored** | **Marks** |
| **Section A** | | **70** |
| **Section B** | | **50** |
| **TOTAL** | | **120** |

## SECTION A (70 marks)

**1** A computer processor consists of the Control Unit, the Arithmetic Logic Unit and some registers.

**(a)** What is a register? [1]

**(b)** Describe the roles of the Control Unit and the Arithmetic Logic Unit. [2]

**(c)** Name **five** registers and describe their roles in a fetch-execute cycle. [5]

**(d)** A processor can be found embedded in devices other than a typical computer. Identify a device where a processor is embedded and explain the purpose of an embedded processor. [2]

**(e)** Explain what clock speed means in reference to a computer processor. [2]

**2** **(a)** Describe and implement the following sort routines on the following data

37, 23, 49, 11, 54, 78, 11, 22, 45

into its final ascending order:

**(i)** bubble sort, [6]

**(ii)** quick sort. [6]

**(b)** Describe the circumstances when the use of bubble sort is preferable to quick sort. [2]

**3** A phone directory is implemented by using a hash table. The phone directory consists of records with *names* and *phone numbers*.

**(a)** Explain how a hash table can be implemented with the following data set: [6]

[Lim Kevin, 6782 4837]
[Tan Hong Sing, 6394 6053]
[Chan Johnson, 6862 4939]
[Diana Tang, 6453 2403]

**(b)** A hash function ***500 mod table_size*** is used to map the key. Explain why this is not a good hash function and how you would improve it. [3]

**(c)** Compare a hash table search to that of a sequential search. Explain which is a better search method. [2]

**4** ***Pioneer Rap*** is a mail order retailer of hardware parts. Customers can buy products from the ***Pioneer Rap*** catalogue through a website. Customers must pay for goods being ordered using their credit cards. In response to customer orders, ***Pioneer Rap*** verifies credit card details with the bank and prepares the orders and dispatches them by courier. Details of all customers are kept on file. ***Pioneer Rap*** buys parts from different wholesalers when stocks drop to set levels.

**(a)** Draw a Data Flow Diagram for the retailing system described. [8]

**(b)** A relational database with three tables is implemented by ***Pioneer Rap*** to store data on its customers, stock, and customer order.

**(i)** For each table, specify the attributes and state the primary key for each table. [6]

**(ii)** Write a statement to query for customers who ordered products in September 2011. [2]

**5** A bank holds a file of customer account details. This file is used in the production of monthly statements for customers.

**(a)** Explain why this file is accessed sequentially. [2]

**(b)** Customers expect to be able to enquire about the details of their accounts over the telephone. Explain what type of access to the data would be suitable for this. [2]

**(c)** Customer transactions are stored on a temporary file in the order in which they occur. State a type of file access most suitable for the data in this file, justifying your answer. [2]

**(d)** A sequential file contains the following data:

Alvin, Benson, Candy, Elson, Jenny, Perry, Roger

**(i)** Explain how a sequential search for “Danny” would be done. [4]

**(ii)** Explain how a binary search for “Perry” would be done. [4]

**(iii)** Explain whether a sequential search or a binary search would be better when used for searching a sequential file of 50000 data items. [3]

## SECTION B (50 marks)

**Start this section on a new sheet of writing paper.**

**6** An importer intends to computerise the production of monthly outstanding statements sent by office to customers. A systems analyst has been employed to develop a computerised system.

**(a)** Give **three** reasons why a clear statement of the needs of the task should be produced. [3]

**(b)** State **two** groups who should be consulted in the investigation of this task and for each indicate the information that could be collected. [4]

**(c)** State **three** methods the systems analyst could use to collect information on the current system. Give an advantage and disadvantage for each of the stated methods. [9]

**(d)** All computers in the office are allowed to access data from a server located overseas.

**(i)** What may cause errors to occur during data transmission? [1]

**(ii)** Why is parity check useful in data transmission? [2]

**(iii)** What is check sum in data transmission? How is check sum used in data transmission? [4]

**(e)** Internet access is not allowed for office staff.

**(i)** What is Internet? [1]

**(ii)** What hardware and software are used for supporting Internet access? [6]

**(iii)** List some reasons why staff is not allowed access to Internet in the office. [4]

**(f)** When the programmers design modules for the computerised system, the calling environment will pass data either by value or by reference to the parameters of the called modules.

**(i)** What is pass by value? [2]

**(ii)** What is pass by reference? [2]

**(g)** Describe two debugging techniques that a programmer could use and include details of errors that might be detected. [4]

**7** A file contains the details of all the subject combinations that are available. The record for each combination is identified by a key which is made up of

- a letter which identifies the main subject
- a one or two digits number which is a code for the other subjects.

**(a)** Draw a syntax diagram to define the key. [3]

The rule for creating a key changes slightly. The first digit must not be zero.

**(b)** Given that [5]

<LETTER> ::= A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|Y|Z

<DIGIT> ::= 0|1|2|3|4|5|6|7|8|9

Give rules in Backus-Naur form (BNF) which will define the new version of the key.

(You do not need to define LETTER and DIGIT again).

**End of Paper**