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

PIONEER JUNIOR COLLEGE
JC 2 PRELIMINARY EXAMINATION

COMPUTING H2   **9754/2**

Monday   **19** SEP 2011

TIME   2 hours 30 min (1400 - 1630)

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 6 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		**50**
Section B		**50**
TOTAL		**100**

SECTION A (50 marks)

1   A company specialises in staging exhibitions. Each exhibition is based around a theme, for instance once a year the company organises an educational exhibition aimed at administrators and teachers in colleges. The company hires a suitable venue and then sells exhibition space to appropriate businesses. It then advertises the event to a suitable audience.

The company would like to computerise the production of the layouts for its exhibitions. A systems analyst is employed to oversee the production of the new software. The analyst adopts a top-down approach to the problem.

(a)   Explain what is meant by a top-down approach.   [4]

(b)   The finished software is subjected to black box and white box testing and also to alpha and beta testing. State what is meant by

(i)   black box testing;   [2]

(ii)   white box testing;   [2]

(iii)   alpha testing;   [2]

(iv)   beta testing.   [2]

2   The company wants to set up a new computer network. Although many staff currently uses stand-alone desktop systems the company has no experience of networking. As an IT consultant, the system analyst has been asked to prepare a report for the company director, outlining the issues, and the potential benefits, to communications and productivity that such network could bring. The report should include:

(a)   A recommendation of a Local Area Network (LAN) to the company.
What is LAN?   [4]

(b)   A description of the various network topologies with diagrams as in the following:

(i)   bus;   [2]

(ii)   ring;   [2]

(iii)   star.   [2]

3 After the new system had been implemented, the sales peoples and customers are discussing in the partitions in the hired venue. Network terminals are used by the sales peoples who work at each partition. Details of exhibition space sold are input at the terminal which is then used to complete the transaction. The data collected by the terminal at the partition is stored for later transmission and processing at a central location. When a customer book an exhibition space at one of the partition the data is sent immediately for processing. At then end of each week, statements of all transactions will be printed and send to the customers the following Monday. With reference to these examples, explain the need for and describe the main characteristics of a:

(a) batch operating system; [2]

(b) multi-user operating system; [2]

(c) distributed operating system. [2]

4 Customers can book an appointment by accessing the customer area of the company website.

(a) Describe how a new customer could use the Internet to find the company website. [2]

(b) The customer has to give various details in order to book.

(i) Explain why the website might use a forms dialogue interface to obtain the details of the booking. [2]

(ii) State two features, on the form, which may be designed to help the user input data correctly and accurately. Give an example of data which would be input using each feature. [4]
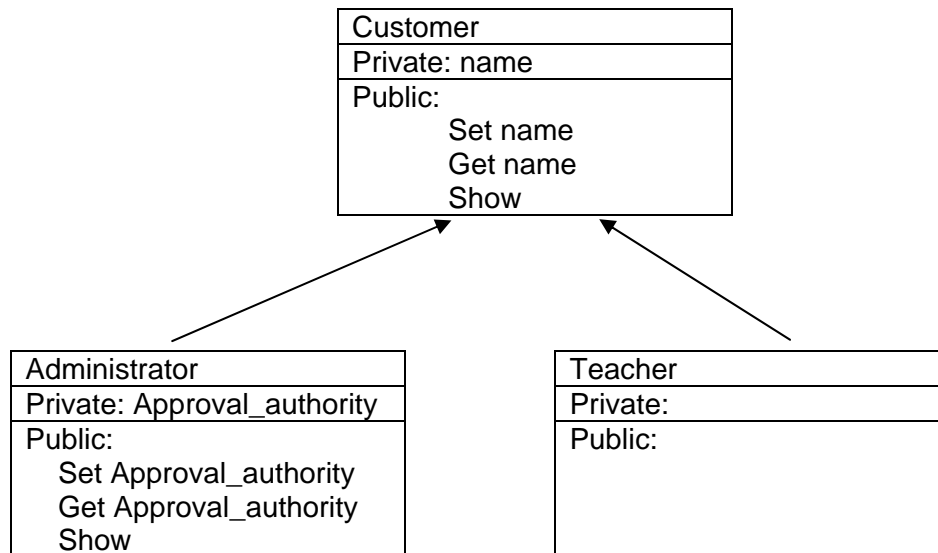
(iii) Explain why a graphical user interface would not be suitable for this application. [2]

(c) One piece of information which members should input when booking an appointment is their membership number.

(i) State what is meant by validation of data input. [2]

(ii) Explain why an existence check would be a sensible validation check to use for membership number, while a presence check would not. [4]

5 The figure shows three classes and some of their private attributes and public methods.

```
┌─────────────────────────┐
│ Customer                │
├─────────────────────────┤
│ Private: name           │
├─────────────────────────┤
│ Public:                 │
│         Set name        │
│         Get name        │
│         Show            │
└─────────────────────────┘
```

```
┌──────────────────────────┐      ┌──────────────────────────┐
│ Administrator            │      │ Teacher                  │
├──────────────────────────┤      ├──────────────────────────┤
│ Private: Approval_authority│    │ Private:                 │
├──────────────────────────┤      ├──────────────────────────┤
│ Public:                  │      │ Public:                  │
│    Set Approval_authority│      │                          │
│    Get Approval_authority│      │                          │
│    Show                  │      │                          │
└──────────────────────────┘      └──────────────────────────┘
```

Use this example to explain the following terms:

(a) encapsulation; [2]

(b) inheritance; [2]

(c) polymorphism. [2]

Start this section on a new sheet of writing paper.

6   The company maintains a list of business classifications which bought exhibition spaces from it. The list of business classifications is organised as a linked list in alphabetical order.

    (a)   Describe, with the aid of a diagram, the state of this linked list when the following [4] business classifications have been inserted as test data.
- FINANCIAL
- MANUFACTURING
- EDUCATION
- SERVICE

    (b)   Write an algorithm to

        (i)   add data to the list; [5]

        (ii)   remove data from the list. [4]

    (c)   Write a recursive routine for outputting the data in the linked list in reverse order. [4]

7   A particular exhibition hall that the company hires regularly uses a computer to control the environment.

    (a)   Describe suitable input and output hardware that will allow a computer to control [4] such a system.

    (b)   The computer system has the required temperature (T) input. The system is programmed to maintain the temperature in the hall to within two degrees of T.

        (i)   Explain why the system is set up in this way and not to keep the [2] temperature equal to T.

        (ii)   Using pseudocode, write an algorithm to control the temperature in the hall, [10] given that the actual temperature is A, and that the processor can switch both a heater (H) and an air conditioner (C) to be ON or OFF.

8 The company keeps information about the people that work for it. This file containing information about personal data of its employees is known as the employee file. Each week a transaction file is created which contains amendments that need to be made to records on the employee file. These amendments are placed on the transaction file in the order in which they arrive.

(a) Describe situations where changes would be made on the transaction file when

    (i) a new record is added,

    (ii) a record is deleted,

    (iii) a record is altered

    in the employee file. [3]

(b) Write an algorithm to show how the transaction file is used to produce an updated copy of the employee file. [8]

(c) Explain why the company needs to make back-ups of the employee file. [2]

(d) The company needs to ensure the privacy and integrity of the personal data of its employees. Explain what is meant by

    (i) privacy,

    (ii) integrity

    of data and suggest measures the company could take to do so. [4]

End of Paper