INNOVA JUNIOR COLLEGE
JC 2 PRELIMINARY EXAMINATIONS 2
in preparation for General Certificate of Education Advanced Level
Higher 2

CANDIDATE NAME			
CLASS		INDEX NUMBER	

COMPUTING 9754/02

Paper 2 **15 September 2008**

2hours 30 minutes

Additional Materials: Answer Paper

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** the questions.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

Answer **all** questions.

Robin Tyres is a medium size company dealing with distribution of **tyres** in Singapore. It has about ten outlets. It also supplies new car tyres to other company car fleets and car hire firms.

1 When a car from a car hire firm is brought to an outlet, the required information is captured on the computer.

a) Three of the fields are car registration number, company ID, and type of tyre fitted.

What data types would be used for the fields car registration number and type of tyre fitted ? [4]

Justify your answers.

b) Suggest one other field **regarding the car** which you would expect to find in the record. [1]

c) When the original data were placed on the file they were validated.

i) Explain what is meant by *validating* the information. [2]

ii) Describe two suitable validation routines, one for the car registration number and one for the type of tyre fitted. [4]

d) Company ID number is a 6 digit number whose sixth digit is a check digit.

i) What is meant by the term *check digit?* [1]

ii) Describe how a check digit could be calculated for the company ID numbers. Assume that the calculation uses modulus 11. [5]

2 Each outlet stocks a large number of tyres. These tyres are of three types:

High performance tyres (H);
Maximum grip tyres (M);
General purpose tyres (G).

Each type of tyre comes in four different sizes: 14, 15, 16, 17.

Tyres are priced according to their type and size.

a) The company also entertains walk in customer. A computer terminal is installed on the forecourt at each of the outlets which will allow prospective customers to input their requirements and will then output the price of the tyres.

Explain how the information may be stored in the computer system. [2]

b) In addition to requiring input of type of tyre (T) and size of tyre (S), the system also asks for the number of tyres required (N). One tyre or two tyres are standard requests and have no effect on the price output, four tyres carries a discount of 20% on the cost of each tyre, while three tyres is considered unsafe because one old tyre will still be left on the car.

Using pseudocode, or otherwise, write an algorithm which will ask for three inputs from the customer and which will output a suitable response. [6]

c) It is found that many customers do not know what tyre type or tyre size are recommended for their particular make of car. Outline the changes which would need to be made to the system to ensure that such customers receive a satisfactory quote. [3]

3 A local area network is to be created in the main office with connection to the Internet. The company is considering either the bus network topology or the ring network topology.

a) Describe using a diagram

i) a bus network;

ii) a ring network topology. [4]

b) Give one advantage and one disadvantage of each topology. [2]

c) Explain what a protocol is and why it is needed in a computer network. [3]

d) Describe the collision detection and avoidance methods in each topology. [6]

e) The network designer can possibly make use of the following network hardware:

i) Switch;

ii) Bridge;

iii) Router.

Explain the purpose of each of these items of hardware. Give one situation where each could be used. [6]

The company has a manufacturing plant in China and currently the manufacturing process is manually controlled. The company employs a systems analyst to plan the introduction of a computerised control system.

4 a) The systems analyst will need to analyse the requirements of the new system.

i) What decisions will need to be made by the analyst about the data in the new system? [3]

ii) Describe two restrictions which the analyst will need to consider. [4]

b) The system to control the production line is implemented. It is controlled from an operation room.

Describe three ways in which information could be presented to the operator. [3]

c) After the system has been running for a short time, it should be evaluated. Give **three** factors which could be looked at in this evaluation. [3]

d) Suggest **three** reasons why the system may need maintenance in the future. [3]

e) Give **three** items of documentation which would be necessary for effective maintenance of your system. [3]

5 The plant has about 1000 workers and their personnel records are stored on a sequential file in order of each worker's payroll number, which is a five digit number. Information about each worker is collected over the course of the week and stored on a transaction file which is a serial file. The information includes hours worked, overtime, promotion, sick leave, holidays taken, complete details about new employees and a marker on a record to indicate if an employee has left the firm. At the end of the week this file is used to update the personnel file and produce the payroll. Assuming

- all the keys in the transaction file are different;
- each record in the transaction file has a flag to represent whether it is an insertion (I), an amendment (A) or a deletion (D);
- for each amendment and deletion in the transaction file there exists a record in the personnel file;
- for each insertion in the transaction file there does not exist a record in the personnel file.

a) Describe the difference between a serial file and a sequential file. [2]

b) Explain how the information stored on the transaction file can be collected. [3]

c) Write an algorithm on how the transaction file and the personnel file are used to produce the payroll. State any assumptions you make. [8]

d) Pay cheques are no longer produced for workers. Instead, their bank accounts are updated electronically. Describe how this can be done, mentioning any safeguards that would be necessary. [5]

6 For business diversification the company acquired a local company in China that manufactures standard car carburettors that are to be installed in new cars. As each type of car requires carburettors to be set to a different air-to-fuel mixture ratio for maximum operating efficiency, the company hired fifty testers to test the finish products. The testers use a device that measures the air-to-fuel ratio inside the carburettor and compares the reading with a pre-defined value for the type of car in which the carburettor is to be installed. If the ratio is too high, the mixture control screw is turned by the tester in a clockwise direction, if it is too low, the screw is turned anti-clockwise. The tester decides how much the screw should be adjusted. The process is repeated until the required air-to-fuel ratio in the carburettor is obtained. If the air-to-fuel ratio does not change, or changes incorrectly for the adjustment that is made, the carburettor is assumed to be faulty and it is rejected. Testers test and adjust a batch of carburettors for one type of car at a time.

The company intends to replace the human testers by a computer-controlled testing device.

a) What advantages will the computer-controlled system have over the manual testers? Will there be any disadvantages? [5]

b) Describe an algorithm that might be used by the testing device to test and adjust a batch of carburettors. [7]

c) Suggest how the program might be tested without using the testing device or carburettors. [2]

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