DIPLOMA IN COMPUTING   **5218**

Module 3

October/November 2006

2 hours

Additional Materials: Answer Booklet/Paper

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
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** 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.

This document consists of **4** printed pages.

[Turn over

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1 **(a)** Describe the purpose of the following registers in a processor:

    (i) Current instruction register (CIR), **[2]**

    (ii) Memory address register (MAR), **[2]**

    (iii) Program counter (PC), **[2]**

    (iv) Index register (IR). **[2]**

  (b) **(i)** Explain how a parallel processor system differs from a sequential processor system. **[2]**

    (ii) Give an example of an application for which it would be sensible to use parallel processing, justifying your choice. **[2]**

2 **(a)** State what is meant by the terms:

    (i) primary key,

    (ii) secondary key,

    (iii) foreign key

    in the context of a table in a relational database. **[3]**

  (b) State **three** advantages of using a relational database rather than a set of flat files. **[3]**

3 An examinations board has decided to update the computer system which is used to process examination grades for candidates and print out their results.

The system has been designed and the software has been installed on the new hardware.

Three methods of implementation of the new system are considered.

    (i) Parallel

    (ii) Pilot

    (iii) Direct

Explain each of these methods of implementation and consider the effects of each method in this application. **[9]**

4 **(a)** Explain the purpose of the code generation phase of compilation, including the principle of optimisation. **[3]**

  (b) Explain the purpose of

    (i) linkers,

    (ii) loaders

    in the running of a computer program. **[4]**

5 **(a)** Express the decimal number 109 as

    (i) a binary number stored in an 8 bit byte; **[2]**

    (ii) a number in binary coded decimal (BCD); **[2]**

    (iii) a hexadecimal number. **[2]**

(b) A particular computer stores numbers as 8 bit, two's complement, binary numbers. 01011101 and 11010010 are two numbers stored in the computer.

    (i) Write down the decimal equivalent of 11010010. **[2]**

    (ii) Add the two binary values together and comment on your answer. **[3]**

6 The use of computers has changed patterns of working. One change has been that many people now work from home.

Describe **other** changes in patterns of working which occur as a result of introducing computer systems. **[8]**

7 **(a)** Explain what is meant by a hypertext mark up language. **[2]**

(b) Describe **three** features of a hypertext mark up language that could be used when designing a web page. **[6]**

8 A robot is designed to move over a surface. It must be aware of the immediate environment in order to avoid obstacles.

(a) The robot is designed to travel around the floor of a factory. State **two** input and **two** output devices that would be necessary for the robot to move safely. **[4]**

(b) Another robot is designed to travel on the surface of the planet Mars.

    (i) Describe how a map of its environment can be created in the computer memory of the robot. **[2]**

    (ii) Explain the need for simulation in the design and testing of this robot. **[2]**

(c) Each of the robots can be controlled by a human being.

Explain why one robot would be controlled in real-time while the other is given instructions as a batch. **[2]**

9 **(a)** Explain why the operating system of a multi-access computer system needs to schedule the processing of jobs. **[2]**

(b) Describe how the operating system manages the throughput of jobs. Your answer should contain references to scheduling, job queues and priorities. **[5]**

10 (a) Explain how the use of procedures and functions can assist a programming team when a piece of software is being developed. **[4]**

(b) State what is meant by each of the following:

(i) a local variable;

(ii) a global variable;

(iii) a parameter passed by value;

(iv) a parameter passed by reference. **[4]**

(c) Explain how a stack is used to handle procedure calling and parameter passing. **[4]**

[TOTAL 90]

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