

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
Cambridge International Diploma in Computing
Advanced Level

DIPLOMA IN COMPUTING

5218

Module 3

October/November 2006

Additional Materials: Answer Booklet/Paper

2 hours

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.



- 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]