

# NCC INTERNATIONAL DIPLOMA IN COMPUTER STUDIES

## COMPUTER TECHNOLOGY

**5<sup>th</sup> September 2004**

### MARKING SCHEME

Markers are advised that many answers in Marking Schemes are **examples only** of what we might expect from candidates. Unless a question **specifically states** that an answer is demanded in a particular form, then an answer that is correct, factually or in practical terms, must be given the available marks.

If there is doubt as to the correctness of an answer the relevant NCC textbook should be the first authority.

This Marking Scheme has been prepared as a guide only to markers. This is **ABSOLUTELY NOT** a set of model answers; **NOR** is the Marking Scheme exclusive, for there will frequently be alternative responses which will provide a valid answer.

#### Notice to Markers

**Where markers award half marks in any part of a question they should ensure that the total mark recorded for a question should be a whole mark.**

<b>SECTION A - 1</b>
<b>ANSWER ALL QUESTIONS FROM THIS SECTION EACH QUESTION REQUIRES ONE RESPONSE ONLY</b>

<b>For each question enter ONE letter ONLY in your answer booklet.</b>
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**Marks**

**QUESTION 1**

**1**

Which of the following is a business support activity?

- |                |                      |
|----------------|----------------------|
| a) Procurement | c) Inbound logistics |
| b) Operations  | d) Marketing         |

**Answer A**

**QUESTION 2**

**1**

Which of the following information systems is made use of at the management level of a business?

- |                              |                                   |
|------------------------------|-----------------------------------|
| a) Decision support systems  | c) Control systems                |
| b) Office automation systems | d) Transaction processing systems |

**Answer A**

**QUESTION 3**

**1**

The Arithmetic and Logic Unit is part of a computer's:

- |                |                 |
|----------------|-----------------|
| a) Main memory | c) System clock |
| b) Processor   | d) Control unit |

**Answer B**

**QUESTION 4**

**1**

What is the largest decimal value that can be manipulated in one operation by an eight-bit processor?

- |        |                  |
|--------|------------------|
| a) 8   | c) 65,535        |
| b) 255 | d) 4,294,967,295 |

**Answer B**

**QUESTION 5**

**1**

What division of a magnetic disk is the smallest unit that can be written to in one operation?

- |           |             |
|-----------|-------------|
| a) Sector | c) Cylinder |
| b) Track  | d) Cluster  |

**Answer A**

**QUESTION 6**

**1**

Which of the following is an impact printer?

- |            |               |
|------------|---------------|
| a) Ink jet | c) Laser      |
| b) Thermal | d) Dot matrix |

**Answer D**

**QUESTION 7**

**1**

Which of the following operations is most suited to a batch processing operating system?

- |                          |                                              |
|--------------------------|----------------------------------------------|
| a) Airline bookings      | c) Cheque processing                         |
| b) Car engine management | d) Cash machine (ATM) transaction processing |

**Answer C**

Which of the following types of file would be suitable for storing details of all the CDs stocked by a music shop?

- a) Transaction file                      c) Master file  
b) Security file                          d) Work file

### QUESTION 9

A media player application is running on a computer that is connected to the Internet. It needs to access a remote music file that is stored on a website. Which of the following items of data does the media player application need in order to locate the music file?

- The URL of the relevant website
- The route taken by the data
- The network protocol
- The nature of the connection media

### QUESTION 10

A valid IP address is of the form: a.b.c.d where a, b, c and d are numbers between 0 and 255. How many bytes are needed to store an IP address?

- a)** 1                      **c)** 4  
**b)** 2                      **d)** 8

## SECTION A - 2

**ANSWER ALL QUESTIONS FROM THIS SECTION  
EACH QUESTION REQUIRES MORE THAN ONE RESPONSE**

### QUESTION 11

The following are descriptions of different types of information.

- Unstructured and informal
- Regular and concerned with the near future
- Repetitive and short term

Match each of these types of information to the level of management most likely to make use of them. Choose from:

- Supervisory management
- Top management
- Middle management

**Answer** a) iii, b) i, c) ii

**1 mark each – max 3**

## QUESTION 12

Which THREE of the following are essential requirements of a multitasking operating system? It must:

- a) Be able to deal with unpredictable events
- b) Be able to work with multiprocessors
- c) Minimise unused CPU time
- d) Be interactive
- e) Reduce the occurrence of peripheral-bound operations
- f) Minimise total elapsed time

**Answer** *c), e), f)*

**1 mark each – max 3**

**QUESTION 13****4**

Convert the hexadecimal number 5F into each of the following?

- a) Eight bit binary
- b) BCD
- c) Octal
- d) Decimal (denary)

**Answer** a) 01011111 (must have all 8 bits), b)1001 0101, c)137, d) 95

**1 mark each – max 4**

**QUESTION 14****3**

In a college, which THREE of the following are entities?

- a) A student
- b) A student's surname
- c) A course
- d) A course code
- e) A primary key
- f) A lecture room

**Answer** a), c), f)

**1 mark each – max 3**

**QUESTION 15****3**

A bank intends to store details of its customers in a random access file on a disk. Each disk address can hold just one customer record. The disk address is calculated by taking the last three digits of the account number. The following account records are stored on the disk in the following order:

127565  
119785  
354565  
765785  
978565

State the disk addresses that will be occupied by each of the following THREE new records:

- a) 127566
- b) 675785
- c) 867565

**Answer** a) 568, b) 787, c) 569

**1 mark each – max 3**

**QUESTION 16****3**

Which THREE of the following are components of a data packet?

- a) The type of parity being used
- b) The source address
- c) The destination address
- d) The address of the next node on its route
- e) The protocol being used
- f) The packet number

**Answer** b), c), f)

**1 mark each – max 3**

**QUESTION 17**

**3**

The following are file standards associated with the Internet:

- i) Shockwave
- ii) HTML
- iii) Java
- iv) XML
- v) JPEG
- vi) PDF

Identify, by choosing the correct number (i) to (vi) which individual standard is referred to by each of the following descriptions:

- a) A programming language for producing browser-run applets
- b) A compressed graphics standard
- c) A proprietary multimedia format

**Answer** a) iii, b) v, c) i

**1 mark each – max 3**

**QUESTION 18**

**2**

Which TWO of the following statements about multimedia systems are true?

- a) They are an all digital environment
- b) They are always interactive
- c) They always include sound
- d) They can be implemented on web pages
- e) They require a Windows platform on which to run

**Answer** a), d)

**1 mark each – max 2**

**QUESTION 19**

**3**

Which THREE of the following processes are functions of a computer's operating system?

- a) Allocating memory to processes
- b) Controlling a set of traffic lights
- c) Sending data to a printer
- d) Performing calculations in a payroll application
- e) Comparing two values during program execution
- f) Scheduling processes

**Answer** a), c), f)

**1 mark each – max 3**

**QUESTION 20**

**3**

Which THREE of the following involve control systems?

- a) Engine management
- b) An expert system
- c) A microwave oven
- d) A burglar alarm
- e) Hotel bookings
- f) Document processing

**Answer** a), c), d)

**1 mark each – max 3**

**Total 40 Marks**

SECTION B	
ANSWER ANY THREE QUESTIONS	

### QUESTION 21

Marks

Throughout the question, please credit any valid alternative point.

- a) Describe the events that occur during the fetch execute cycle in:
- the program counter 3
    - Holds address of next instruction*
    - To be fetched from memory*
    - Incremented after fetch*
    - Increment depends upon the nature of the instruction*

1 mark per point to a maximum of 3 marks.
  - the instruction register 3
    - Holds instruction currently being processed*
    - Where it is decoded*
    - And executed*

1 mark per point to a maximum of 3 marks.
- b) i) Explain the difference between *word addressable* and *byte (character) addressable* computers. 4
- Word addressable*
- Fixed number of bits*
  - Used for each address location*
- Byte addressable*
- Each location*
  - Can be individually accessed*
- 1 mark per point to a maximum of 4 marks.
- ii) A certain computer has a word length of 32 bits. Calculate how many words would be required to store the following phrase: *This examination is easy* 4  
Show your working.
- Phrase is 24 characters (including spaces)*
  - 32 bit word is 4 x 8 bit bytes*
  - Therefore divide 24 by 4*
  - 6 words*
- 1 mark per point to a maximum of 4 marks.
- c) i) Explain what is meant by an *interrupt*. 2
- A signal*
  - That causes the processor to suspend current activity*
- 1 mark per point to a maximum of 2 marks
- ii) Describe what processor actions occur as a result of an interrupt. 2
- Control passed to interrupt service routine*
  - Previous condition saved / registers saved so that control can be passed back again*
- 2 marks
- iii) State TWO common types of interrupt. 2
- Program / generated as a result of an instruction*
  - Timer / time slice used up*
  - i/o / as a result of completion of i/o operation or error*
  - Hardware - error condition*
- 1 mark per type of interrupt to a maximum of 2 marks.

Total 20 Marks

**QUESTION 22****Marks****Throughout the question, please credit any valid alternative point.**

- a) Systems software includes *compilers, interpreters, linkers and editors*. Explain the purpose of each of these during the process of software development. **8**

**Compiler**

- *Translates source code*
  - *Into object code / machine code*
  - *Provides error checking and diagnostic facilities*
- 1 mark per point to a maximum of 2 marks.*

**Interpreter**

- *Translates and executes source code*
  - *No object code produced*
  - *Useful during development / debugging*
- 1 mark per point to a maximum of 2 marks.*

**Linker**

- *Joins together*
  - *Previously compiled modules*
  - *Creates single symbol table*
  - *Resolves naming conflicts*
- 1 mark per point to a maximum of 2 marks.*

**Editor**

- *For entering / amending source code*
  - *Produces text / ASCII file*
- 1 mark each to a maximum of 2 marks.*

- b) i) Explain what is meant by **real-time** operation of a computer. **2**
- *The computer responds immediately*
  - *To a stimulus*
  - *Fast enough to influence the next input*
- Any two points, 1 mark each*

- ii) State TWO characteristics of a real-time operating system. **2**
- *Has to deal with events at unpredictable times*
  - *Has to deal with non-sequential operations*
  - *Has to produce a response within a specified / short period of time*
  - *May deal with safety critical situations / operate in fail-safe mode*
- Any two points, 1 mark each*

- c) i) Explain what is meant by a *client-server* operating system. **2**
- *A network operating system*
  - *That processes requests from client computers*
  - *Requests made to server computer*
- Any two points, 1 mark each*

- ii) Explain what is meant by *distributed processing*. **2**
- *Resources are located at various locations*
  - *Such as programs*
  - *Data*
  - *User's view is unaware of location / transparent*
- Any 2 points, 1 mark each*

**d)** In a multiprogramming system, there may be several *processes* currently in a state of execution. The operating system has to schedule them to give them fair access to the processor.

i) State what is meant by a *process*. **2**

- *An instance of a program*
- *Currently in execution*

*1 mark per point to a maximum of 2 marks*

ii) State TWO algorithms that can be used for scheduling processes. **2**

- *Round robin*
- *Shortest job first*
- *Priority scheduling*

*any 2 points, 1 mark each*

**Total 20 Marks**



**QUESTION 23****Marks**

Throughout the question, please credit any valid alternative point.

- a) i) Explain how a *data file* made from variable length records is arranged on a *backing storage medium*. **2**
- *Fields/records separated by markers*
  - *Byte count at beginning of each field*
  - *End of record marker*
- any 2 points, 1 mark each*
- ii) Explain why fixed length records are easier to search than variable length records. **2**
- *Location of required record can be calculated*
  - *By multiplying record size*
  - *By record number*
- any 2 points, 1 mark each*
- b) i) Describe the differences between a *full backup* and an *incremental backup*. **2**
- *Full backup is where all the files on the system are backed up*
  - *Incremental backup is where only the files changed since the last backup are backed up*
- 1 mark each point*
- ii) State TWO disadvantages of relying only on full backups. **2**
- *Data entered between backups may be lost*
  - *Data restoration can take a long time*
  - *System may need to be shut down during backup*
  - *Re-entering lost data can be time consuming*
- any 2 points, 1 mark each*
- iii) State the frequency with which an organisation is likely to use each of these types of backup. **2**
- *Full backup – at relatively long intervals such as weekly*
  - *Incremental backup – short intervals such as daily*
- 1 mark each point*

- c) A college stores details of its students and the names of the examinations that they take in a data table with the following structure:

student\_number, student\_name, date\_of\_birth, subject1, subject2, subject3

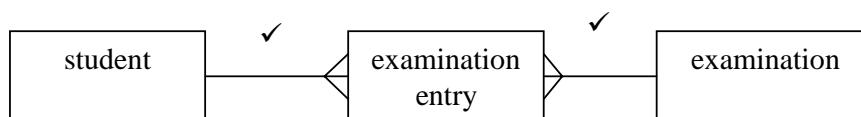
The examination details are stored in a separate table with the structure:

examination\_number, subject, date, time

- i) Explain how this arrangement is inefficient. 2
- *It has data redundancy*
  - *Subjects repeated in two locations*
  - *Repeated data in student table*
  - *Subjects are repeated*
- any 2 points, 1 mark each
- ii) State THREE problems that could result from the use of this database. 3
- *Problem if student takes more than three examinations*
  - *Wasted space if student takes fewer than three examinations*
  - *Examination details might be updated in one table but not in the other*
  - *Examination details might be stored in an inconsistent way in the two tables*
- any 3 points, 1 mark each
- iii) Describe with the help of a relationship diagram how the database can be altered in order to remedy the inefficiencies. 5
- *Create new table*
  - *Table is examination entry / or show examination entry on diagram*
  - *Link exam entry to students / or show link on diagram*
  - *Link exam entry to examinations / or show link on diagram*
  - *Remove exam subjects from student table*
- any 3 points, 1 mark each

on diagram:

1 mark each for the correct one to many links:



Total 20 Marks

**QUESTION 24****Marks****Throughout the question, please credit any valid alternative point.**

- a) i) Distinguish between data and information. 2
- *Data is encoded (information)*
  - *Information is data in context / with meaning / in a given situation*
- 1 mark each point to a maximum of 2 marks*
- ii) Explain with an example, what is meant by *dynamic* data. 2
- *Data that regularly changes*
  - *Any suitable example such as stock levels, bookings etc*
- 1 mark each point to a maximum of 2 marks*
- b) i) One type of information required by any company is known as *internal company performance information*. Give TWO examples of such information that would be useful to the management of a small shop. 2
- Examples are*
- *Sales made*
  - *Income generated*
  - *Items purchased*
  - *Wages paid*
  - *Hours open / worked*
  - *Bills paid*
- 1 mark each point to a maximum of 2 marks*
- ii) A small shop, just like any other business is subject to information flows from the outside. Specify THREE external sources of information of importance to running the shop. 3
- Examples are*
- *Customer orders*
  - *Supplier invoices*
  - *New products*
  - *Government regulations*
- 1 mark each point to a maximum of 3 marks*
- iii) State THREE qualities of good information. 3
- *Consistent*
  - *Timely*
  - *Accurate*
  - *Secure*
  - *Complete*
- 1 mark each point to a maximum of 3 marks*

- c) i) State THREE ways that a small shop could benefit from using ecommerce. 3
- *Expand market / reach more customers*
  - *Improve communications with customers*
  - *Improve communications with trading partners*
  - *Reduce overheads / premises costs*
  - *Improve advertising*
- 1 mark each point to a maximum of 3 marks*
- ii) Describe THREE problems faced by a shop that is introducing ecommerce. 3
- *Credit card security issues*
  - *Expense of setting up*
  - *Expertise required*
  - *Customer privacy issues*
- 1 mark each point to a maximum of 3 marks*
- iii) Setting up an ecommerce operation might require a shop to provide an on-line database. Describe one example of an on-line database that would be useful to the shop. Give your reasons. 2
- *Customer database; for contacting customers with offers / gather data on personal shopping habits*
  - *Goods database; to allow customers to search for goods required*
  - *Transaction database; to allow on-line ordering*
- 1 mark for a database described plus one mark for a reason*

**Total 20 Marks**

**Specification Grid IDCS CT September 2004**

Section A1	Obj A	Obj B	Obj C	Obj D	Obj E	Obj F	Obj G	Obj H	Obj I	Page reference “Computer technology” (NCC Education Ltd, 2001)
Q1	1									8-9
Q2				1						13
Q3		1								37
Q4		1								45
Q5			1							60
Q6			1							81
Q7					1					117
Q8						1				159
Q9							1			192
Q10								1		222
total A1	1	2	2	1	1	1	1	1		10 marks
Section A2	Obj A	Obj B	Obj C	Obj D	Obj E	Obj F	Obj G	Obj H	Obj I	page reference
Q11				3						96
Q12					3					118
Q13						4				153
Q14						3				151
Q15						3				165
Q16							3			200
Q17								3		224
Q18									2	244
Q19					3					115-134
Q20	3									20-28
total A2	6			3	6	10	3	3	2	30 marks
Section B	Obj A	Obj B	Obj C	Obj D	Obj E	Obj F	Obj G	Obj H	Obj I	page reference
Q21a)		6								43
Q21b)i), ii)		8								45
Q21c) i), ii), iii)		6								50
Q22a)					8					113
Q22b) i), ii)					4					120
Q22c) i), ii)					4					122
Q22d) i), ii)					4					128
Q23 a) i), ii)						4				158
Q23b) i), ii), iii)						6				168
Q23c) i), ii), iii)						10				170-175
Q24a) i), ii)				4						92
Q24b) i), ii), iii)				8						95
Q24c) i), ii), iii)								8		233-235
total B		20		12	20	20		8		