

NCC EDUCATION

INTERNATIONAL DIPLOMA
IN
COMPUTER STUDIES

COMPUTER TECHNOLOGY

26th NOVEMBER 2006

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 Education 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 is a whole mark.

SECTION A - 1

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

For each question enter ONE capital letter ONLY in your answer booklet.

Marks

QUESTION 1

A “set of connected things, working together” is one definition of

1

- A) inputs
- B) outputs
- C) a system
- D) a database

Answer C

QUESTION 2

Which of these information processing systems is the most recent type to be developed?

1

- A) transaction processing system
- B) strategic system
- C) technical system
- D) managerial system

Answer B

QUESTION 3

Which of the following is an input device?

1

- A) hard disk
- B) flat bed scanner
- C) processor
- D) disk controller

Answer B

QUESTION 4

Which of the following holds the instructions of a program whilst the program is running?

1

- A) control unit
- B) main memory
- C) secondary storage
- D) general purpose register

Answer B

QUESTION 5

Which of the following storage media can be described as ‘Write Once, Read Many’?

1

- A) floppy disk
- B) hard disk
- C) memory stick
- D) CD-R

Answer D

QUESTION 6

Which of the following devices contains an analogue to digital converter?

1

- A) laser printer
- B) keyboard
- C) flat bed scanner
- D) hard disk drive

Answer C

QUESTION 7

The management of a company requires information on current economic trends in order to make successful plans. This information can be described as

1

- A) environmental
- B) internal plans
- C) internal performance
- D) competitive

Answer A

QUESTION 8

Which of the following is a function of a computer's operating system?

1

- A) compiling a program
- B) locating a web site
- C) processing interrupts
- D) processing a payroll

Answer C

QUESTION 9

Which of these hexadecimal numbers is equivalent to the decimal number 46?

1

- A) 2E
- B) F1
- C) 1F
- D) E2

Answer A

QUESTION 10

Which of these components of a network is a part of the physical layer?

1

- A) the protocol
- B) the application
- C) optical fibre
- D) a data packet

Answer C

Total 10 Marks

SECTION A – 2

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

QUESTION 11

The outbound logistics of an organisation involve which THREE of these activities?

3

- A) machining
- B) packaging
- C) warehousing
- D) order processing
- E) material handling
- F) advertising

Answer C), D), E)

3 points, 1 mark each

QUESTION 12

Which THREE of the following are located in a computer's processor?

3

- A) ALU
- B) stack pointer register
- C) RAM
- D) secondary storage
- E) CU
- F) input buffer

Answer A), B), E)

1 mark each, max 3

QUESTION 13

Data is retrieved from storage at different rates depending upon the storage medium. Arrange the following types of storage in order, the fastest first and the slowest last.

3

- A) hard disk
- B) floppy disk
- C) memory stick
- D) RAM

Answer D), C), A), B)

all four in order - 3 marks

one correct sequence of three – 2 marks

at least one correct sequence of two – 1 mark

QUESTION 14

For information to be of value in an organisation, it has to have which THREE of the following characteristics?

3

- A) timely
- B) extensive
- C) text based
- D) complete
- E) consistent
- F) numerical

Answer A), D), E)

1 mark each max 3

QUESTION 15

Which THREE of the following items of software are used in the creation of an executable program?

3

- A) loader
- B) linker
- C) scheduler
- D) editor
- E) compiler
- F) process manager

Answer B), D), E)

1 mark each, max 3

QUESTION 16

Convert the decimal number 69 into

3

- A) hexadecimal
- B) BCD (binary coded decimal)
- C) Binary

Answer a) 01000101

b) 01101001

c) 45

1 mark each correct answer max 3

QUESTION 17

When data is being transmitted, *connection-mode* is suitable for which THREE of these applications?

3

- A) direct connection of a terminal to a remote computer
- B) file transfer
- C) email
- D) transmission of web pages
- E) interactive databases in e-commerce
- F) long term attachment of job entry stations

Answer A), B), F)

1 mark each max 3

QUESTION 18

TCP/IP corresponds roughly to which THREE layers of the OSI network model?

3

- A) physical layer
- B) transport layer
- C) network layer
- D) data link layer
- E) application layer
- F) presentation layer

Answer B), C), D)

1 mark each max 3

QUESTION 19

Which THREE of the following are particularly associated with the internet?

3

- A) HTML
- B) RTF
- C) MIDI
- D) XML
- E) Java
- F) CSV

Answer A), D), E)

1 mark each max 3

QUESTION 20

Which THREE of the following are benefits of using multimedia when making a presentation?

3

- A) it is always interactive
- B) it helps the audience retain information
- C) it can ensure consistency with other presentations
- D) it can make use of simulations
- E) it does not use text
- F) it takes very little storage capacity

Answer B), C), D)

1 mark each max 3

Total 30 Marks

| |
|-----------------------------------|
| SECTION B |
| ANSWER ANY THREE QUESTIONS |

QUESTION 21**Marks****Throughout the question, please credit any valid alternative point.**

- a) i) Describe, using an example, the process of **circuit** switching in a network. 3
- *Path is created between two entities*
 - *It lasts as long as the transmission lasts*
 - *Example – telephone call*
- 1 mark each, max 3*
- ii) Describe, using an example, the process of **packet** switching in a network. 4
- *Paths can be shared*
 - *Can be used simultaneously by different channels*
 - *Data can travel by different routes*
 - *Data packets may arrive in different order from that in which they were sent*
 - *Data packets reconstructed into message at destination*
 - *Example, internet/email*
- 1 mark each, max 4*
- iii) State FOUR components of a data packet. 4
- *Source address*
 - *Destination address*
 - *Data*
 - *Sequence number*
 - *Checksum*
- 1 mark each, max 4*
- b) i) Distinguish between a token ring network and an Ethernet network. 6
- Token ring**
- *Circular design*
 - *Tokens passed*
 - *May contain data or be empty*
 - *Token addressed to a node*
 - *Tokens can be removed if not collected*
 - *No data collisions*
- Any 3 points, 1 mark each max 3*
- Ethernet**
- *Conceptually a single cable*
 - *Cable has terminator*
 - *To prevent reflections*
 - *May use co-axial cable*
 - *May use UTP cable*
 - *Prone to collisions*
- Any 3 points, 1 mark each max 3*
- ii) Explain how a modem may be used in a WAN. 3
- *Converts digital signals to analogue signals / vice versa*
 - *Analogue signals sent along telephone link*
 - *Telephone link connects parts of the WAN*
 - *Computer works with digital signals*
- any 3 points, 1 mark each, max 3*

Total 20 Marks

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

- a) Operating systems continue to become more complex as newer versions are produced.
- i) State TWO reasons why increasingly complex operating systems can benefit the user. 2
- *More functionality*
 - *Easier to use*
 - *Leads to more powerful applications*
- any 2 points, 1 mark each, max 2*
- ii) Describe TWO reasons why increasing complexity in operating systems can be a disadvantage to the user. 4
- Example answers:*
- *Bigger programs*
 - *Leads to storage issues*

 - *Take up more processor time*
 - *Leading to slow operation*
 - *Need frequent hardware upgrades*

 - *Compatibility issues*
 - *May need to upgrade software to work with new systems*

 - *Security issues*
 - *May be new weaknesses in new coding*

 - *Expense*
 - *May need to upgrade operating system often*

 - *Reliability issues*
 - *New coding may have new errors*
- any 2 reasons, 1 mark each, max 2, plus any two further comments, 1 mark each, max 2. Total max 4*
- b) i) Explain the meaning of the term *batch processing*. 2
- *Collection of jobs / data before processing*
 - *Processing done without further human intervention*
 - *Similar process applied to items of batched data*
- any 2 points, 1 mark each*
- ii) Identify TWO business applications that are suitable for batch processing. 2
- Examples:*
- *Payroll*
 - *Cheque processing*
 - *Exam results processing*
 - *Any example of billing*
 - *Data backup*
- any 2 acceptable applications, 1 mark each*

| | | Marks |
|----|--|-------|
| c) | <p>i) Explain the meaning of the term <i>multiprogramming</i>.</p> <ul style="list-style-type: none"> • <i>More than one program simultaneously held in memory</i> • <i>Apparently running simultaneously</i> <p><i>2 points, 1 mark each</i></p> | 2 |
| | <p>ii) State FOUR objectives of a multiprogramming operating system.</p> <ul style="list-style-type: none"> • <i>Minimise unused CPU time</i> • <i>Reduce the incidence of peripheral-bound operations</i> • <i>Minimize total elapsed time</i> • <i>Prevent single programs from dominating the CPU</i> <p><i>4 points, 1 mark each</i></p> | 4 |
| | <p>iii) Explain how interrupts are used to process jobs in a multiprogramming operating system.</p> <ul style="list-style-type: none"> • <i>Interrupt is a signal to the processor to make it stop current process</i> • <i>Generated when process time is up</i> • <i>Control passed to operating system</i> • <i>Program state saved</i> • <i>Example such as registers saved to stack</i> • <i>Control passed to next process</i> • <i>System of priorities used</i> <p><i>4 points, 1 mark each</i></p> | 4 |

Total 20 Marks

QUESTION 23**Marks****Throughout the question, please credit any valid alternative point.**

- a) i) Explain what is meant by a *random access file*. 4
- *Records not stored in any particular sequence*
 - *Relationship established between record key and disk address*
 - *Records can be written /read directly / without moving through earlier records*
 - *Fast data access*
 - *Not suitable for tape storage*
- any 4 points, 1 mark each, max 4*
- ii) In a random access file, the location of a record is determined by taking the last three digits of the record key and using this as the address of the location. Each file location can hold only one record. In a new file, the following records are be written in this order: 4
- 453643
876545
567643
874644
- Identify the locations where each of these records will be stored.
- *453643 - 643*
 - *876545 - 545*
 - *567643 - 644*
 - *874644 - 645*
- 1 mark each location correctly identified, max 4*
- b) i) Some organisations guard against data loss by performing full periodic data backups. State THREE 3
- problems that can result from relying on this method to prevent data loss.
- *Data entered since the last backup may be lost*
 - *Re-entry of lost data may take a long time*
 - *The system may need to be shut down during backups*
 - *The backup process may take a long time*
- Any 4 points, 1 mark each, max 4*
- ii) Explain how an incremental backup can help prevent the problems involved in a full backup. 3
- *Only changes since the last backup are backed up*
 - *Quicker to backup*
 - *Fewer records written*
- 1 mark each, max 3*

- c) A table named STUDENT in a relational database contains the following attributes (fields) concerning each student:
- Student number
 - Student name
 - Course taken
 - Lecturer name
- i) Explain why this table structure could lead to data redundancy. **2**
- *Lecturer name will appear more than once*
 - *As some students will share the same lecturer*
- 1 mark each, max 2*
- ii) Explain how data redundancy can lead to unreliable data. **2**
- *Multiple entries of same data item*
 - *Easy to make transcription errors*
- 1 mark each, max 2*
- iii) Explain what should be done in order to prevent the problem of data redundancy in this case. **2**
- *Create new table – Lecturer*
 - *Create link from student table – e.g. lecturer number*
- 1 mark each, max 2*

Total 20 Marks

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

- a) i) Identify THREE registers that are present in a typical processor. 3
Examples:
- *Program counter*
 - *Instruction register*
 - *Stack pointer*
 - *Data pointer*
 - *General purpose register / accumulator / data register*
 - *Flags register*
- any 3 correct registers, 1 mark each, max 3*
- ii) Describe the stages of the fetch-execute cycle. 5
- *Address of next instruction is held in program counter*
 - *Instruction pointed to is copied into instruction register*
 - *Via memory data register*
 - *Contents of program counter incremented*
 - *To point to next instruction*
 - *May be redirected following a jump instruction*
 - *Instruction in instruction register is decoded*
 - *Instruction is executed*
- any 5 points, 1 mark each, max 5*
- b) Explain what *Processor Cache Memory* is and how it can help increase the speed of program execution. 5
- *High speed memory*
 - *Placed between processor and main memory*
 - *Required data is first searched for in cache*
 - *If there, it is read*
 - *This removes the need to access main memory*
 - *If not, block of data copied from main memory into cache*
- any 5 points, 1 mark each, max 5*
- c) i) Describe the purpose of the data bus. 2
- *Moves data / instructions*
 - *Between system components*
- 2 points, 1 mark each, max 2*
- ii) Explain how the size (width) of the data bus can affect the speed of operation of a computer. 3
- *Width determines size of data that can be transferred in one operation*
 - *If data wider than the bus width, data is split*
 - *Transferred in more than one operation*
 - *This takes more time*
- any 3 points, 1 mark each, max 3*
- iii) Describe the purpose of the address bus. 2
- *Processor places the address on the address bus*
 - *Of the data word required*
- 2 points, 1 mark each*

Total 20 Marks