

**NCC EDUCATION**

**INTERNATIONAL DIPLOMA**  
**IN**  
**COMPUTER STUDIES**

**COMPUTER TECHNOLOGY**

**27<sup>th</sup> November 2005**

**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**

**1**

Which of these sequences correctly shows the development of computer system usage over time. The sequences run from left (earliest) to right (latest).

- A) managerial → technical → strategic
- B) technical → managerial → strategic
- C) strategic → technical → managerial
- D) technical → strategic → managerial

**Answer B**

**QUESTION 2**

**1**

“A set of connected things that work together”. Which of the following best fits this description?

- A) a program
- B) a database
- C) a system
- D) a processor

**Answer C**

**QUESTION 3**

**1**

Which of these actions is a part of the CPU’s fetch-execute cycle?

- A) the program counter is incremented
- B) data is stored to disk
- C) space is allocated in memory for data
- D) the general purpose register is cleared

**Answer A**

**QUESTION 4**

**1**

Which of these is an input device at a Point of Sale (POS) terminal?

- A) receipt printer
- B) customer display screen
- C) credit card swiper
- D) mouse

**Answer C**

**QUESTION 5**

**1**

A storage medium has a capacity of 100Gb. It is most likely to be

- A) a floppy disk
- B) a CD-ROM
- C) a CD-RW
- D) a hard disk

**Answer D**

**QUESTION 6**

**1**

Which of these examples of information of interest to a company could be described as *internal performance information*?

- A) economic trends
- B) stock turnover
- C) customer demand
- D) budgets

**Answer B**

**QUESTION 7**

**1**

Which of the following is an example of system software?

- A) firmware
- B) editor
- C) microwave oven control program
- D) airline booking program

**Answer B**

**QUESTION 8**

**1**

The numeric value 4.7 is stored in a computer system in which of these formats?

- A) floating point
- B) integer
- C) ASCII
- D) EBCDIC

**Answer A**

**QUESTION 9**

**1**

A master file

- A) is always stored sequentially
- B) is always stored in chronological order
- C) always contains data
- D) is always a direct access file

**Answer C**

**QUESTION 10**

**1**

A sorting algorithm takes an item at random from a list. Then it divides the list into two sub lists – one containing items bigger than the chosen item and one containing smaller items. The process is then repeated. This algorithm is called

- A) the bubble sort
- B) the quick sort
- C) the Shell sort
- D) the insertion sort

**Answer B**

**SECTION A – 2**

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

**Note: if you give more than the required number of responses you may lose marks!**

**QUESTION 11**

**3**

Which THREE of the following are uses of main memory (RAM)?

- a) storing data after the computer has been switched off
- b) storing the Basic Input / Output System (BIOS)
- c) storing the initial boot-up routines
- d) storing a program currently being executed
- e) storing data about to be output
- f) storing data currently being processed

**Answer d), e), f)**

**1 mark each, max 3.**

**QUESTION 12**

**3**

Which THREE of these examples of information can be described as operational?

- a) largely external
- b) detailed
- c) quite old
- d) highly current
- e) very frequent
- f) low accuracy

**Answer b), d), e)**

**1 mark each, max 3.**

**QUESTION 13****3**

Which THREE of the following are file attributes?

- a) file size
- b) file name
- c) file extension
- d) locked flag
- e) read-only flag
- f) file location

**Answer** a), d), e)

*1 mark each max 3.*

**QUESTION 14****3**

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

- a) the time of construction
- b) the source address
- c) the packet number
- d) the user id
- e) the operating platform id
- f) a checksum

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

*1 mark each max 3.*

**QUESTION 15****3**

The following are protocols associated with the internet:

- a) Internet Protocol
- b) Transmission Control Protocol
- c) Domain Name System.

Match each of the above protocols to its correct description. Choose from:

- i) translation of text web addresses to IP numerical addresses
- ii) guarantees the order of delivery of data packets
- iii) defines the rules for packet delivery
- iv) high performance protocol with no guarantee of delivery
- v) governs the rules of file compression
- vi) ensures the correct display of HTML code in a browser

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

*1 mark each, max 3.*

**QUESTION 16****3**

More and more people are accessing the internet. Which THREE of the following are likely consequences of this?

- a) increased computer literacy
- b) increased reliability of the information contained on the internet
- c) decrease in the use of the internet for criminal purposes
- d) increase in the numbers of people working from home
- e) increased use of telephones
- f) increased difference between internet haves and have-nots

**Answer** a), d), f)

*1 mark each max 3.*

**QUESTION 17**

**3**

Which THREE of the following is compression standards associated with multimedia files?

- a) MPEG
- b) MP3
- c) BMP
- d) JPEG
- e) PDF
- f) TIFF

**Answer** a), b), d)

*1 mark each max 3.*

**QUESTION 18**

**3**

Which THREE statements about hard disks are true?

- a) they rotate continuously while the computer is switched on
- b) their data is stored on a single spiral track
- c) they deliver data to the processor with no time delay
- d) they are read-only media
- e) their data is stored magnetically
- f) they usually have more than two disk surfaces

**Answer** a), e), f)

*1 mark each max 3.*

**QUESTION 19**

**3**

Which THREE of the following are components of the Central Processing Unit (CPU)?

- a) RAM
- b) instruction register
- c) stack pointer
- d) BIOS
- e) ALU
- f) hard disk controller

**Answer** b), c), e)

*1 mark each max 3.*

**QUESTION 20**

**3**

Which THREE of the following problems are likely to occur in a business that has no coherent IT strategy?

- a) computer systems are likely to fail
- b) computer systems will not be up to date
- c) departments will lack 'ownership' of their systems
- d) systems will be incompatible
- e) business goals may be unachievable
- f) there will be duplication of effort

**Answer** d), e), f)

*1 mark each max 3.*

**Total 40 Marks**

<b>SECTION B</b>
<b>ANSWER ANY THREE QUESTIONS</b>

**QUESTION 21**
**Marks**

Throughout the question, please credit any valid alternative point.

- |    |      |   |          |
|----|------|---|----------|
| a) | i)   | <p>Explain the basic difference between operating system software and applications software.</p> <p><i>OS</i></p> <ul style="list-style-type: none"> <li>• <i>Controls the hardware / manages the computer application.</i></li> </ul> <p><i>AS</i></p> <ul style="list-style-type: none"> <li>• <i>Solves problem for user.</i></li> </ul> <p><i>1 mark each, max 2.</i></p>   | <b>2</b> |
|    | ii)  | <p>Describe what is meant by <i>batch processing</i>.</p> <ul style="list-style-type: none"> <li>• <i>Jobs / data collected together (don't allow the word "batch").</i></li> <li>• <i>Jobs / data items processed one after another.</i></li> <li>• <i>No human intervention required once started.</i></li> </ul> <p><i>Any 2 points, 1 mark each, max 2.</i></p>   | <b>2</b> |
|    | iii) | <p>State THREE objectives of a multiprocessing operating system.</p> <ul style="list-style-type: none"> <li>• <i>Minimise unused CPU time.</i></li> <li>• <i>Reduce incidence of peripheral bound operations.</i></li> <li>• <i>Minimise total time taken.</i></li> <li>• <i>Prevent single programs dominating CPU.</i></li> </ul> <p><i>1 mark each max 3.</i></p>  | <b>3</b> |
| b) | i)   | <p>What is an interrupt?</p> <ul style="list-style-type: none"> <li>• <i>A signal</i></li> <li>• <i>From a device / process.</i></li> <li>• <i>To get attention of the processor.</i></li> <li>• <i>Causes current process to stop.</i></li> </ul> <p><i>Any 3 points, 1 mark each, max 3.</i></p>  | <b>3</b> |
|    | ii)  | <p>Describe what happens when an interrupt is processed.</p> <ul style="list-style-type: none"> <li>• <i>Current process stops (allow only if not used in b) i).</i></li> <li>• <i>Control passed to interrupt service routine.</i></li> <li>• <i>Status / registers saved.</i></li> <li>• <i>Priority determined.</i></li> <li>• <i>Control handed back to original process when finished.</i></li> </ul> <p><i>Any 4 points, 1 mark each max 4.</i></p> | <b>4</b> |
|    | iii) | <p>Explain how the use of interrupts allows multiprogramming to be carried out.</p> <ul style="list-style-type: none"> <li>• <i>Each process has allocated time slice / period.</i></li> <li>• <i>Interrupt is generated when a process times out.</i></li> <li>• <i>Passes control to next process.</i></li> </ul> <p><i>Any 2 points, 1 mark each, max 2.</i></p>   | <b>2</b> |
| c) | i)   | <p>Distinguish between a job and a process.</p> <ul style="list-style-type: none"> <li>• <i>A job is a program ready to run.</i></li> <li>• <i>A process is a program that is running.</i></li> </ul> <p><i>1 mark each max 2.</i></p>  | <b>2</b> |

**Marks**

- ii) Explain what it means when a process is *runnable*.
- *Not running at the moment.*
  - *May have been (temporarily) stopped by the OS.*
  - *To allow another process to run.*
  - *It is capable of being run.*
- Any 2 points, 1 mark each, max 2.*

**2**

**Total 20 Marks**

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

- a) i) Distinguish between a computer's serial and parallel port. 4  
serial  
  - *Transmits data 1 bit at a time.*
  - *Transmits in both directions.*
  - *Uses 1 wire for a data stream.*
  - *Additional connectors for electrical power / control signals.*

Any 2 points, 1 mark each, max 2.

parallel  
  - *Transmits many bits at once.*
  - *Often 8 bits / 1 byte in a PC.*
  - *May be signal leakage across wires.*
  - *Used for printers.*
  - *Limited length.*

Any 2 points, 1 mark each, max 2.
- ii) State THREE advantages to users of having a USB (Universal Serial Bus) port on their computers. 3  
  - *Supplies power as well as signals.*
  - *This reduces cable clutter.*
  - *High speed.*
  - *Can plug in many devices to USB port via hub.*
  - *Can plug equipment in when computer is running.*
  - *No need to set up most USB devices.*
  - *Useful for card readers / USB storage devices.*

1 mark each stage identified, max 4.
- b) i) Explain why it is an advantage that data can be stored on CDs and DVDs, using the same technology as for audio and movie storage. 4  
  - *Keeps costs down.*
  - *Economy of scale.*
  - *Same factories can produce media for both.*
  - *Can use same hardware for both purposes.*
  - *E.g. play music or films on your PC.*

Any 4 points, 1 mark each, max 4.
- ii) Explain what is meant by a WORM storage medium. 2  
  - *Write once, read many.*
  - *Refers to medium that can be written to only once.*
  - *E.g. CD-R, DVD-R.*

Any 2 points, 1 mark each, max 2.



- c) A PC user is considering the purchase of a new video display adapter in order to improve the computer's ability to run video games.
- i) What is the purpose of a video display adapter? 2
- *Creates signals.*
  - *Needed for generating text and graphics on a screen.*
- 1 mark each, max 2.*
- ii) State THREE considerations that the user should take into account when choosing a video display adapter. 3
- *Resolution.*
  - *Number of colours per pixel.*
  - *Amount of memory.*
  - *Speed.*
  - *Cost.*
  - *Compatibility.*
- Any 3 points, 1 mark each, max 3.*
- iii) State TWO reasons why a PC user might choose a liquid crystal video display in preference to a cathode ray tube display. 2
- *Takes less desk space.*
  - *Runs cold.*
  - *Uses less power.*
  - *Less prone to breakdown.*
- Any 2 points, 1 mark each, max 2.*

**Total 20 Marks**

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

- a) i) Explain how a single character is stored using the ASCII system. 2
- *Stored as binary code / pattern.*
  - *Represents a number.*
  - *Number converted to character by looking up in ASCII table.*
  - *One byte=1 character.*
- Any 2 points, 1 mark each, max 2.*
- ii) Explain how Unicode is an improvement on ASCII. 2
- *Uses 16 bits.*
  - *Therefore more codes possible.*
  - *65537 combinations / only 257 with ASCII.*
  - *Allows encoding of all languages.*
  - *And many other symbols (e.g. maths).*
  - *Not just western alphabet.*
- Any 2 points, 1 mark each, max 2.*
- b) A certain database uses fixed length records to store customer details. The surname field is set to store 15 bytes.
- i) Explain how the surname “Smith” would be stored. 2
- *Name stored in first five bytes / positions.*
  - *Remainder filled with other character / spaces.*
- 1 mark each, max 2.*
- ii) Explain the advantages of storing data in fixed length instead of variable length records. 2
- *Easier to find a record.*
  - *Because position of each record can be calculated.*
  - *Can more easily predict size of a file.*
- Any 2 points, 1 mark each, max 2.*
- iii) Explain the advantages of storing data in variable length records. 2
- *Saves storage space.*
  - *Because no wasted padded spaces.*
- 1 mark each, max 2.*
- iv) Explain how records can be located when they are variable length. 2
- *Marker between fields / records.*
  - *Example such as comma.*
  - *Byte count at beginning of each field.*
  - *End of record marker.*
- Any 2 points, 1 mark each, max 2.*

- c) Explain what is meant by a relational database. **4**
- *Store of data.*
  - *In tables.*
  - *Linked.*
  - *Primary key in each table.*
  - *Linked to foreign key in other tables.*
- Any 4 points, 1 mark each, max 4.*
- d) Relational databases provide data independence and security protection.
- ii) Explain the meaning of data independence. **2**
- *The data is manipulated by a database management system.*
  - *Access must be through the DBMS.*
  - *Applications do not access the data directly.*
  - *This facilitates making changes to the applications.*
- Any 2 points, 1 mark each, max 2.*
- iii) Explain how a relational database can provide security protection to data. **2**
- *Different permissions given to different tables.*
  - *Or data sets.*
  - *Set by database administrator.*
  - *Data stored centrally therefore allowing control.*
- Any 2 points, 1 mark each, max 2.*

**Total 20 Marks**

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

- a) i) Communication systems are designed in *layers*. Explain the benefit of dividing such systems into layers. 2
- *Aids thinking about network components.*
  - *Aids designing network components.*
  - *Allows concentration on one layer while ignoring others.*
- Any 2 points, 1 mark each, max 2.*
- ii) The highest level in any network model is the application layer. Describe what the application layer is concerned with. 2
- *The name or address of some resource.*
  - *Available on the network.*
  - *How to request that resource.*
- Any 2 points, 1 mark each, max 2.*
- b) i) Explain the difference between connection and connectionless modes of communication on a network. 4
- connection**
- *Dedicated channel opened between source and destination.*
  - *Remains open for the duration of data transfer.*
  - *Channel closed at end of session.*
- Any 2 points, 1 mark each, max 2.*
- connectionless**
- *No direct route established.*
  - *Data divided into units (packets).*
  - *Packet contains details of route.*
  - *Packet takes one of a number of possible routes.*
- Any 2 points, 1 mark each, max 2.*
- ii) State one practical example of where connection mode is suitable and one where connectionless mode is suitable for data transfer. 2
- connection**
- *Any long-lived stream oriented transactions such as direct terminal use of a remote computer, telephone call, file transfer, remote data entry station.*
- connectionless**
- *Any occasional connection, particularly involving the internet e.g. e-mail, web page access*
- 1 mark each, max 2.*
- iii) State TWO *physical* media that can be used for connecting entities on a network. 2
- *Copper wire / UTP wire.*
  - *Co-axial cable.*
  - *Optical fibre.*
  - *Infra red.*
  - *Radio.*
- Any 2 points, 1 mark each, max 2.*

- c) i) What is an intranet? 2
- *An internal communication system.*
  - 1 mark.*
  - *Based on the internet.*
  - *Uses HTML pages.*
  - *Uses TCP/IP.*
  - Any 1 point, max 1.*
- ii) Explain how a VPN (Virtual Private Network) differs from an intranet. 3
- *Intranet is physically owned by / located within the business.*
  - *VPN is part of the internet / WAN.*
  - *Made available only to authorised users.*
  - *Encryption for security.*
  - Any 3 points, 1 mark each, max 3.*
- iii) Explain the differences between a hub and a switch. 3
- hub
- *Connect many users to single resource on a network.*
  - *Regenerate signal as it passes through the hub.*
  - *Works at layer 1 (physical).*
- switch
- *Provides unique network segment on each port.*
  - *Separates physical network domains.*
  - *Reduces collisions.*
  - *Provides faster performance than hubs.*
  - *Provides greater bandwidth than hubs.*
  - Any 3 points, 1 mark each, max 3.*

Total 20 Marks