

**NCC EDUCATION**  
**INTERNATIONAL DIPLOMA**  
**IN**  
**COMPUTER STUDIES**  
**COMPUTER TECHNOLOGY**

**3<sup>rd</sup> JUNE 2007**

**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.**



**QUESTION 8**

1

If the ASCII code for the character "A" is binary 01000001, the binary code that represents the character "D" is

- A) 11000100
- B) 01000100
- C) 01000010
- D) 01000101

*Answer B*

**QUESTION 9**

1

The hardware device that separates network segments on each of its ports is a

- A) switch
- B) hub
- C) router
- D) bridge

*Answer A*

**QUESTION 10**

1

Which of the following protocols is concerned with the sequencing of data packets on a network?

- A) TCP
- B) DNS
- C) IP
- D) UDP

*Answer A*

**Total 10 Marks**

<b>SECTION A – 2</b>
<b>ANSWER ALL QUESTIONS FROM THIS SECTION EACH QUESTION REQUIRES MORE THAN ONE RESPONSE</b>

**QUESTION 11**

3

Which THREE of the following make use of control systems?

- A) engine management in a car
- B) warehousing
- C) DVD recorder
- D) washing machine
- E) stock control
- F) payroll

*Answer A), C), D)*

*3 points, 1 mark each*

**QUESTION 12**

3

Which THREE of the following are input devices?

- A) a barcode scanner
- B) a loudspeaker
- C) a motor
- D) a heat sensor
- E) a CD
- F) a microphone

*Answer A), D), F)*

*3 points, 1 mark each*

**QUESTION 13****3**

Which THREE of the following may be held in RAM while a computer is working?

- A) the program instructions
- B) the data being input
- C) the data being output to a printer
- D) archived data
- E) the contents of the program counter
- F) an interrupt

*Answer A), B), C)*

*1 mark each max 3*

**QUESTION 14****3**

Which THREE of the following factors affect the performance of a monitor?

- A) power consumption
- B) resolution
- C) dot pitch
- D) scan rate
- E) operating system
- F) compression standard

*Answer B), C), D)*

*1 mark each max 3*

**QUESTION 15****3**

Which THREE of the following types of information can be regarded as “environmental”?

- A) political scene
- B) social climate
- C) sales performance
- D) competitor performance
- E) budget plans
- F) economic trends

*Answer A), B), F)*

*1 mark each, max 3*

**QUESTION 16****3**

Which THREE of the following are examples of system software?

- A) linker
- B) editor
- C) interpreter
- D) word processor
- E) traffic light control program
- F) booking system

*Answer A), B), C)*

*1 mark each, max 3*

**QUESTION 17**

**3**

Which THREE of the following are compression standards?

- A) PDF
- B) XML
- C) CFM
- D) JPEG
- E) MPEG
- F) MP3

*Answer D), E), F)*

*1 mark each max 3*

**QUESTION 18**

**3**

Which THREE of the following are concerned with the making and transmission of telephone calls?

- A) PSTN
- B) ethernet
- C) PBX
- D) VoIP
- E) VPN
- F) Token Ring

*Answer A), C), D)*

*1 mark each max 3*

**QUESTION 19**

**3**

Which THREE of the following are valid IP addresses?

- A) 192.168.0.1
- B) 192.267.0.1
- C) 192.168.0
- D) 192.168.0.1.4
- E) 192.192.192.192
- F) 1.1.1.1

*Answer A),E), F)*

*1 mark each max 3*

**QUESTION 20**

**3**

Convert the hexadecimal number 4F into

- A) eight bit binary
- B) decimal (denary)
- C) octal

*Answer*

*A) 01001111*

*B) 79*

*C) 117*

*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) Computer processors contain a number of registers. Explain the meaning of the term *register*. **3**
- *memory location / unit*
  - *store data read from memory*
  - *location of processing actions*
  - *usually bigger than ordinary memory locations*
- any 3 points, 1 mark each, max 3*
- ii) Describe the purpose of the stack pointer register. **3**
- *holds the address of the (start of) stack*
  - *a LIFO structure*
  - *stack holds return addresses*
  - *used when interrupt or jump occurs*
- any 3 points, 1 mark each, max 3*
- iii) Describe the purpose of the program counter register. **3**
- *holds the address of the next instruction to be fetched*
  - *ensures that instructions are executed in correct order*
  - *incremented after each instruction is executed*
  - *altered by jump instructions*
- any 3 points, 1 mark each, max 3*
- b) i) A certain memory stick has a capacity of 256 Mb. Calculate how many memory sticks of this type would be necessary to back up a complete hard disk with a capacity of 80 Gb. Show your workings. **3**
- *convert 80 Gb to Mb:  $80 \times 1024$*
  - *= 81920 Mb*
  - *divide 81920 by 256*
  - *= 320*
- 1 mark for the answer (320) plus any 2 other points 1 mark each, max 3*
- ii) What are the largest and the smallest integers that can be stored in an eight bit memory location, using two's complement storage format? **2**
- *largest = 127*
  - *smallest = -128*
- 2 points, 1 mark each, max 2*

- c) i) Explain how processor cache memory can increase the operating speed of a computer. **4**
- *extra memory placed between processor and RAM*
  - *when processor needs to read memory, it first checks the processor cache*
  - *if required bytes are in cache, they are read*
  - *if not, data is read from RAM*
  - *and placed into the cache*
  - *processor then reads from cache*
  - *speed increased because direct RAM access not always necessary*
- any 4 points, 1 mark each, max 4*
- ii) State TWO possible hardware interrupt conditions. **2**
- examples:*
- *hardware failure*
  - *timer (process completion)*
  - *i/o (completion of some input or output process)*
- any 2 points, 1 mark each, max 2*

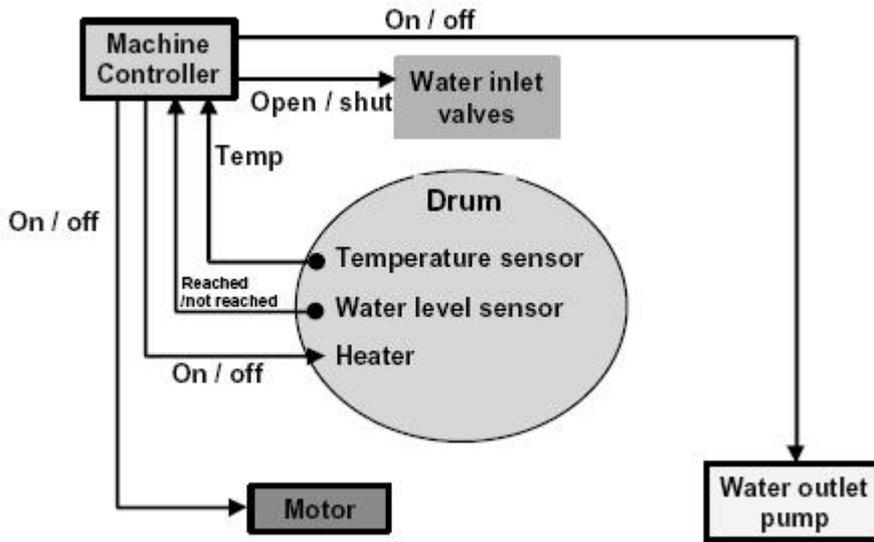
**Total 20 Marks**

**QUESTION 22**

**Marks**

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

a) The diagram shows the flow of data in a domestic washing machine.



- i) Identify the source AND destination of an analogue input signal. 2
  - *source: temperature sensor*
  - *destination: machine controller*

2 points, 1 mark each
  
- ii) Identify the source AND destination of a digital input signal. 2
  - *source: water level sensor*
  - *destination: machine controller*

2 points, 1 mark each
  
- iii) Identify the source AND destination of one digital output signal. 2
  - *source: machine controller*
  - *destination: water inlet valve / motor / water outlet pump / heater*

2 points, 1 mark each

- b) i) State FOUR qualities that data should have if it is to be useful. 4
- *accurate*
  - *complete*
  - *timely*
  - *consistent*
  - *secure*
- any 4 points, 1 mark each, max 4*
- ii) Some computer systems require a response performance that is described as *immediate*. Other responses are described as *conversational*. Using an example of each, explain the difference between these responses. 4
- *immediate is where the response takes place with minimal delay*
  - *example from engineering / manufacture / medicine / transport such as autopilot or similar*
  - *conversational is reasonably fast*
  - *example such as a booking or enquiry system*
- 4 points, 1 mark each, max 4*
- iii) Top, middle and supervisory management have different information requirements. For each of these levels of management, state TWO characteristics of the information that they require. 6
- top*
- *ill structured*
  - *ad hoc*
  - *informal*
  - *external*
  - *concerned with the future*
- any 2 points, 1 mark each, max 2*
- middle*
- *structured*
  - *formal*
  - *internal*
  - *regular*
  - *concerned with near future*
- any 2 points, 1 mark each, max 2*
- supervisory*
- *repetitive*
  - *programmable*
  - *internal*
  - *short time horizon*
- 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 the meaning of the term *utility software*. 2
- *software with a well-defined / straightforward task*
  - *found as part of larger system / application*
- 1 mark each, max 2*
- ii) State THREE **utilities** that are found in Windows based computer systems and for each, state its **purpose**. 6  
**examples**
- *notepad*
  - *simple text editor*
  
  - *paint*
  - *graphics editor*
  
  - *scandisk*
  - *check disk for errors / correct disk errors*
  
  - *calendar / clock*
  - *show / change current date / time*
  
  - *virus checker*
  - *detect / remove viruses*
- reward any other correct answers in a similar way, i.e. 1 mark for each correct utility and 1 mark for a reasonable use, max 6*
- b) i) Explain how a program differs from a process. 4
- *a program is a stored set of instructions*
  - *a process is a program in the course of execution*
  - *a program may be in execution multiple times*
  - *a program changes its form when in execution*
  - *memory addresses may change when loaded and running*
  - *processes can communicate with each other*
- Any 4 points, 1 mark each, max 4*
- ii) Processes may be *running*, *runnable* or *suspended*. Explain what each of these situations involve. 3
- *running: actually using the processor*
  - *runnable: ready to run but waiting for the OS to allow it to start*
  - *suspended: unable to run until an external event happens*
- 1 mark each, max 3*

- c) i) State THREE objectives of a scheduler. **3**
- *maximise system throughput*
  - *be fair to all users*
  - *provide rapid response to interactive users*
  - *provide acceptable response time for batch users*
  - *degrade performance without crashing (e.g. if overloaded)*
  - *make maximum use of hardware resources*
- Any 3 points, 1 mark each, max 3*
- ii) State TWO methods by which a scheduler can allocate priorities. **2**
- *shortest job first*
  - *shortest remaining time*
  - *round robin*
- 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) Explain how a new record is added to a serial file. 2
- *go to end of file*
  - *write record*
- 1 mark each, max 2*
- ii) Explain how a new record is added to a sequential file. 4
- *start at the beginning of file*
  - *write old records to new file*
  - *until required position of new item*
  - *write new item to new file*
  - *write the remainder of old file to new file*
- Any 4 points in correct sequence, 1 mark each, max 4*
- b) i) Describe how a record key can be used to access that record in a random access file. 2
- *record key is transformed*
  - *using an algorithm*
  - *transformed key is disk address*
- Any 2 points, 1 mark each, max 2*
- ii) Explain why *hashing* is often necessary when allocating records to the storage medium in a random access file. 3
- *use of record key alone leads to many gaps*
  - *this wastes disk space*
  - *hashing leads to many record keys being allocated to the same addresses*
- 3 points, 1 mark each, max 3*
- c) i) Explain what is meant by *data redundancy*. 2
- *unnecessary*
  - *duplication of data*
- 1 mark each, max 2*
- ii) Explain why data redundancy is avoided as far as possible when designing a database. 2
- *data can be inconsistent*
  - *wasted storage space*
  - *uncertainty if data is the updated version*
- any 2 points, 1 mark each, max 2*
- iii) Explain what is meant by *data independence*. 3
- *data format is not dependent upon the application that is using it*
  - *data is manipulated by a DBMS*
  - *applications have to work through the DBMS*
- 3 points, 1 mark each, max 3*
- iv) Explain how data independence can lead to a reduction in programming effort. 2
- *no need to re-write data handling software*
  - *if data format is changed*
  - *only need to produce new application*
- any 2 points, 1 mark each, max 2*

**Total 20 Marks**