

**NCC EDUCATION**

**INTERNATIONAL DIPLOMA  
IN  
COMPUTER STUDIES**

**COMPUTER TECHNOLOGY**

**2<sup>nd</sup> SEPTEMBER 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 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.**



**QUESTION 8**

Which process is suitable for batch processing?

- A) traffic light control
- B) patient monitoring
- C) a computer game
- D) production of electricity bills

*Answer D*

**QUESTION 9**

In a particular file, the location of a record is determined by a mathematical process applied to the record key. This type of file is a

- A) serial file
- B) sequential file
- C) random access file
- D) indexed sequential file

*Answer C*

**QUESTION 10**

Which network layer provides the transparent transfer of data between systems?

- A) transport layer
- B) session layer
- C) physical layer
- D) application layer

*Answer A*

**SECTION A – 2**

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

**Marks**

**QUESTION 11**

**3**

The following are all types of information systems. Which THREE of them are used at the operational level of a business?

- A) transaction processing systems
- B) management information systems
- C) decision support systems
- D) executive support systems
- E) control systems
- F) knowledge, work and office automation systems

*Answer a), e), f)*

*3 points, 1 mark each*

**QUESTION 12**

**3**

Which THREE of the following are examples of secondary storage?

- A) ROM
- B) memory stick
- C) CD-ROM
- D) hard disk
- E) RAM
- F) processor cache

*Answer b), c), d)*

*3 points, 1 mark each*

**QUESTION 13**

**3**

Which THREE of the following statements about CD-ROMs are true?

- A) they are read by a laser beam
- B) they store data on concentric tracks
- C) they are volatile storage media
- D) they hold more data than a typical PC hard disk
- E) they are optical storage media
- F) they store less data than a DVD

*Answer a), e), f)*

*1 mark each, max 3*

**QUESTION 14**

**3**

Which THREE of the following activities are the most dependent upon having effective information systems for them to function properly?

- A) education
- B) mining
- C) fashion
- D) airline bookings
- E) banking
- F) oil exploration

*Answer d), e), f)*

*1 mark each, max 3*

**QUESTION 15**

Which THREE of the following activities are carried out by a computer's operating system?

- A) calculating gas bills
- B) managing memory
- C) processing interrupts
- D) maintaining print queues
- E) operating a microwave oven
- F) controlling traffic lights

*Answer b), c), d)*

*1 mark each, max 3*

**QUESTION 16**

Which THREE of the following are examples of Windows utilities?

- A) notepad
- B) grep
- C) man
- D) calendar
- E) scan disk
- F) vi

*Answer a), d), e)*

*1 mark each, max 3*

**QUESTION 17**

Convert the binary number 01100111 into the following three numbers

- A) hexadecimal
- B) decimal (denary)
- C) octal

*Answer a) 67*

*b) 103*

*c) 147*

*1 mark each, max 3*

**QUESTION 18**

Which THREE of the following activities are suitable for connectionless data transmission?

- A) email
- B) direct use of a mainframe computer by a terminal
- C) file transfer
- D) remote job entry
- E) accessing web pages
- F) internet phone calls

*Answer a), e), f)*

*1 mark each, max 3*

**QUESTION 19**

Which THREE of the following are important internet protocols?

- A) HTTP
- B) NETBEUI
- C) TCP
- D) IPX
- E) DECnet
- F) IP

*Answer a), c), f)*

*1 mark each, max 3*

**QUESTION 20**

Which THREE of the following file formats could be used to store a still image for a multimedia presentation?

- A) JPEG
- B) XML
- C) CFM
- D) GIF
- E) BMP
- F) MIDI

*Answer a), d), e)*

*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) Distinguish between a *LAN* and a *WAN*. 4
- *LAN = Local Area Network*
  - *confined to one site*
  - *communication links owned by the business/LAN owner*
  - *WAN = Wide Area network*
  - *covers large geographical area*
  - *communications links owned by communications providers*
- 1 mark each, max 4*
- ii) Explain what is meant by the term *teleworking*. 3
- *working at home / away from the office*
  - *may be for part of the time*
  - *may use a local business centre*
  - *communication by IT means to office*
- any 3 points, 1 mark each, max 3*
- iii) Explain why *teleworking* is advantageous to a company. 3
- *less office space required*
  - *cost savings*
  - *improved morale of work force*
  - *may be greater productivity*
- any 3 points, 1 mark each, max 3*
- b) i) Distinguish between a *token ring* network and an *ethernet* network. 8
- *both allow the connection of devices*
- Token Ring**
- *token ring – devices are attached to a circular configuration*
  - *token ring sends data packets / tokens around the ring*
  - *messages attached to empty tokens*
  - *device removes data from tokens addressed to it*
  - *sends on the empty token*
  - *if not addressed to it, device passes token on*
  - *vulnerable to network failure*
- Ethernet**
- *ethernet uses terminators at end of run*
  - *terminators prevent messages being reflected*
  - *may use UTP or co-ax cable*
  - *hubs / switches used to connect nodes to common resources / servers*
  - *conceptually a single cable*
  - *messages sent when there is a gap in transmissions*
  - *collisions possible*
  - *when collisions, devices wait a random length of time*
  - *retransmission when collisions*

*8 points, 1 mark each, max 8. If only one configuration discussed, max 4*

**Marks**

**2**

**ii)** Explain what is meant by a VPN.

- *Virtual Private Network*
- *makes use of internet connectivity*
- *encryption used to keep it private*
- *cheaper option than a LAN/WAN*
- *a private intranet*

*2 points, 1 mark each, max 2*

**Total 20 Marks**

**QUESTION 22**

Marks

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

- a) i) State TWO actions that are carried out in the ALU of a computer. 2
- *arithmetic / calculations*
  - *comparisons*
- 2 points, 1 mark each*
- ii) Identify THREE functions of a computer's main memory. 3
- *holds data currently being processed*
  - *holds data in transit (buffer)*
  - *holds program instructions of program currently being executed*
- 3 points, 1 mark each, max 3*
- b) i) Describe the stages of the fetch-execute cycle. 6
- *address of next instruction to be processed held in program counter*
  - *instruction fetched from RAM*
  - *via the MDR*
  - *copied into instruction register*
  - *program counter contents incremented by 1*
  - *instruction is decoded*
  - *by logic circuits*
  - *instruction is executed*
  - *program counter is reset if a jump instruction is executed*
- Any 6 points (in correct order), 1 mark each, max 6. If order is incorrect, allow best correct sequence.*
- ii) Distinguish between a *word addressable* computer and a *byte addressable* computer. 4
- Word addressable*
- *fixed number of bits used*
  - *at each location*
  - *may be made up of several bytes*
  - *whole word processed in one operation*
- Byte addressable*
- *each byte is addressed separately*
  - *each byte is processed independently*
- any 4 distinguishing points, 1 mark each, max 4*
- iii) Explain how the use of processor cache memory can speed up the operation of a computer. 5
- *processor cache memory is extra memory positioned between processor and RAM*
  - *faster than normal RAM*
  - *processor looks in PCM when data required*
  - *if in PCM then this is read*
  - *otherwise RAM is accessed*
  - *and required bytes transferred to PCM*
  - *then passed to processor*
  - *data is thus often held closer to processor, hence faster speed*
- 1 mark each point, max 5*

**Total 20 Marks**

**QUESTION 23**

Marks

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

- a) i) Explain what is meant by a multi access computer system. 2
- *more than one user is connected to the system*
  - *simultaneously*
  - *via a terminal*
- any 2 points, 1 mark each, max 2*
- ii) State THREE considerations that have to be incorporated into an operating system that supports multi access. 3
- *users must be protected from each other*
  - *users must get a fast response*
  - *users are likely to behave unpredictably*
- 3 points, 1 mark each, max 3*
- iii) Explain what is meant by the term *multiprogramming*. 2
- *apparently simultaneous execution of programs*
  - *held in memory at the same time*
- 1 mark each point, max 2*
- iv) State FOUR objectives of an operating system that supports multiprogramming. 4
- *minimise unused CPU time*
  - *reduce incidence of peripheral-bound operations*
  - *minimise total elapsed time*
  - *prevent single programs from dominating the CPU*
- 1 mark each, max 4*
- v) Explain how an operating system uses interrupts in order to allow efficient multiprogramming. 6
- *interrupts alter the sequence of instructions being processed*
  - *interrupt generated when process has completed its time slot*
  - *by timer*
  - *OS stores the state of the process*
  - *context switch*
  - *register values pushed onto stack*
  - *priorities*
  - *control passed to next process*
- any 6 points, 1 mark each, max 6*
- b) i) State what is meant by a real-time operating system. 2
- *supports computer immediate response*
  - *to a stimulus*
  - *output is fast enough to influence next input*
- any 2 points, 1 mark each, max 2*
- ii) State one situation which requires a real-time operating system. 1
- *examples (accept any correct response)*
  - *patient monitoring*
  - *engine management*
  - *autopilot*
  - *traffic light control*
  - *computer game*
  - *any booking system*
- any 1 correct point, 1 mark*

**Total 20 Marks**

**QUESTION 24**

Marks

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

- a) i) Explain how a floating point number is stored in a computer. 4
- *binary representation*
  - *mantissa*
  - *exponent*
  - *sign*
- 1 mark each, max 4*
- ii) Explain why floating point storage may not always be accurate. 2
- *may not be enough bits*
  - *to store the mantissa*
  - *rounding may occur*
  - *resulting in an approximation*
- Any 2 points, 1 mark each, max 2*
- iii) Explain how a character is stored in a computer. 3
- *represented by a number*
  - *in binary*
  - *character looked up in a table*
  - *ASCII/EBCDIC/Unicode*
- 1 mark each valid point, max 3*
- b) i) Explain the meaning of the term *transaction file*. 2
- *records of events*
  - *stored as they happen*
  - *in no particular order / chronological order*
  - *used to update a master file*
- Any 2 points, 1 mark each, max 2*
- ii) Compare and contrast a serial file with a sequential file. 3
- *both store records one after another*
  - *serial file is in no particular order*
  - *sequential file is in some order*
- 3 points, 1 mark each, max 3*
- iii) Explain how a binary search is used to find a record in a sequential file. 6
- *go to mid point*
  - *compare record with key*
  - *report if found*
  - *if key < record at midpoint, binary search records to the left (lower)*
  - *else binary search records to the right (higher)*
  - *repeat until found*
  - *or no records higher or lower*
  - *report key not found*
- any 6 points in order, 1 mark each, max 6*

**Total 20 Marks**