NCC EDUCATION

INTERNATIONAL DIPLOMA
IN
COMPUTER STUDIES

COMPUTER TECHNOLOGY

2nd MARCH 2008

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
<u>total</u> mark recorded for a question is a whole mark.**

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

Marks

QUESTION 1   **1**

An interconnection between two subsystems is called

A)   a system boundary   **C)**   an input
B)   an interface   **D)**   an output

Answer   B

QUESTION 2   **1**

One type of computer system often used in business is connected to real world signals and then processes these signals to drive an electro-mechanical device. This type of system is a

A)   decision support system   **C)**   management support system
B)   control system   **D)**   management information system

Answer   B

QUESTION 3   **1**

Which of the following is a type of secondary storage?

A)   RAM   **C)**   DVD
B)   ROM   **D)**   CPU

Answer   C

QUESTION 4   **1**

A work station on a network that has no hard disk of its own is called a

A)   server   **C)**   dumb terminal
B)   thin client   **D)**   peer to peer terminal

Answer   B

QUESTION 5

The diagram shows the layout of a magnetic disk.
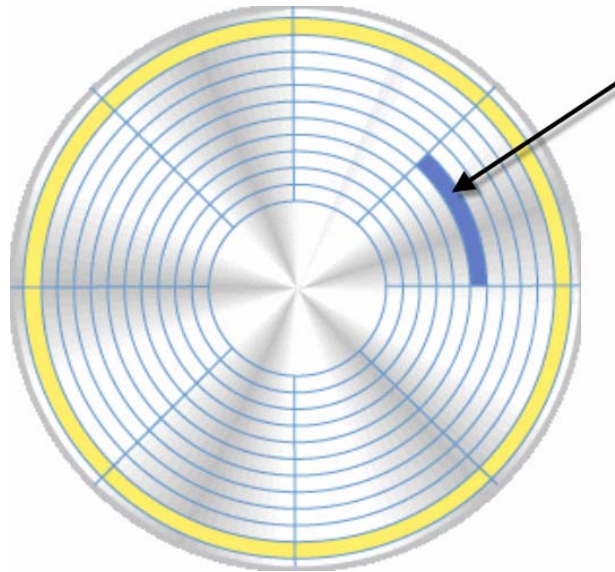
The part of the disk indicated by the arrow is a

A) Track   **C)** Cylinder

B) Cluster   **D)** Sector

Answer   D

QUESTION 6   1

Which of the following industries is the most dependent upon its Information Systems?

A) airlines   **C)** education

B) mining   **D)** consulting

Answer   A

QUESTION 7   1

Which of the following translates a source code program and executes it line by line?

A) a compiler   **C)** an assembler

B) a linker   **D)** an interpreter

Answer   D

QUESTION 8   1

One way that computers can store a number is to store each of the digits 0-9 as a 4-bit group. This form of representation is called

A) hexadecimal   **C)** two's complement binary

B) binary coded decimal   **D)** octal

Answer   B

QUESTION 9   1

Which of the following is a suitable application for connectionless mode data transmission?

A) a terminal directly accessing a remote computer   **C)** email

B) file transfer   **D)** analogue telephone call

Answer   C

QUESTION 10   1

Which of the following is a text-based way of describing the structure of a web page?

A) HTML   **C)** FTP

B) HTTP   **D)** UDP

Answer   A

Marks

QUESTION 11   3
Which THREE of the following may be features of a transaction processing system?
A) the data is gathered prior to input
B) many users are accommodated simultaneously
C) users work on the same set of data
D) the data is processed at times when the users are offline
E) the data is all output together at the end of processing
F) errors are handled in a consistent manner
Answer   b), c), f)
             3 points, 1 mark each

QUESTION 12   3
Which THREE of the following involve transaction processing systems?
A) airline booking processing
B) bank cheque processing
C) exam mark processing
D) electricity bill generation
E) an ATM dispensing cash
F) hotel booking
Answer   a), e), f)
             3 points, 1 mark each

QUESTION 13   3
During a session when a computer is being used, which THREE of the following are likely to be held in primary storage?
A) archived company data
B) part of the operating system
C) the application being used
D) data currently being worked on
E) backed up data
F) last month's master file
Answer   b), c), d)
             1 mark each max 3

QUESTION 14   3
Which THREE of the following actions require the conversion of analogue signals to digital signals?
A) scanning a document with flat bed scanner
B) connecting to the Internet via a router
C) connecting to the Internet via a modem
D) keyboard input
E) detecting temperature for computer display with temperature sensor
F) playing a music CD
Answer   a), c), e)
             1 mark each max 3

QUESTION 15 3

Which THREE of the following are characteristics of information required by the top management of a company?
A) regular
B) certain
C) internal
D) ill-structured
E) ad hoc
F) concerned with the future
Answer   d), e), f)
         1 mark each, max 3

QUESTION 16 3

Which THREE of the following activities are carried out by a computer operating system?
A) hiding the complexity of the hardware from the user
B) incrementing the program counter
C) detecting the flow rate of a chemical in an industrial process
D) allocating memory for a process
E) sending data to a printer
F) making a calculation in a spreadsheet program
Answer   a), d), e)
         1 mark each, max 3

QUESTION 17 3

Convert the hexadecimal number 4F to
A) 8-bit binary
B) decimal (denary)
C) octal
Answer   a) 01001111
         b) 79
         c) 117
         1 mark each max 3

QUESTION 18 3

Which THREE of the following are functions of the transport layer of the 7 layer OSI model?
A) issues requests to the presentation layer
B) provides a standard interface to the application layer
C) provides reliable data transfer to upper layers
D) ensures complete data transfer
E) optimises use of network resources
F) provides physical connectivity between network entities
Answer   c), d), e)
         1 mark each max 3

QUESTION 19   **3**

The following are hardware devices found in computer networks

A) hubs

B) bridges

C) network interface cards

Match each of these devices to the activity that it undertakes from the list below.

Choose from the following activities:

i) connect a LAN to another LAN using the same protocol

ii) determine the next network point to send a data packet

iii) provide a unique network segment

iv) connect multiple users to a single device

v) provide a dedicated full time connection to a network

Answer   *a)(hub) = (iv)*

          b)(bridge) = (i)

          c) (network interface card) = (v)

          1 mark each max 3

QUESTION 20   **3**

Which THREE of the following resources must be available for the effective display of a multimedia presentation on a PC?

A) a web browser

B) at least 12 Mb RAM

C) a mouse

D) a graphics-capable operating system

E) loudspeakers or a headphone

F) presentation software

Answer   *b), d), e)*

          1 mark each max 3

Total 40 Marks

QUESTION 21 **Marks**

<mark>Throughout the question, please credit any valid alternative point.</mark>

a) **i)** State the number of kilobytes in 1 megabyte. **1**
- *1024*

1 mark

ii) State the value in decimal of the largest integer that can be stored in a 16-bit register. **1**
- *65535*

1 mark

iii) State the value in binary and in decimal of the smallest (most negative) number that can be stored in a 16-bit register, using two's complement storage. **2**

binary:
- *1000000000000000*

decimal:
- *-32768*

1 mark each, max 2 marks

b) **i)** Explain how the provision of *processor cache memory* can improve the performance of a computer system. **4**
- *fast memory*
- *placed between processor and main memory*
- *processor first looks in cache to see if required bytes are there*
- *if so, the data is transferred to the processor*
- *if not, the data is copied from RAM to the cache first*

1 mark each, max 4 marks

ii) Identify and describe THREE signals that may be sent over a computer's control bus. **6**
- *name: memory write*
- *function: send data to memory*
- *name: memory read*
- *function: get data from memory*
- *name: i/o write: send data to i/o port*
- *function: i/o read: get data from i/o port*
- *name: transfer acknowledge*
- *function: to confirm that the data signals have been transferred either on or off the data bus*
- *name: bus request*
- *function: when a component is requesting control of the system bus*
- *name: bus grant*
- *function: when control of the system bus has been granted to a component*
- *name: interrupt request*
- *function: to indicate that an interrupt is pending*
- *name: interrupt acknowledge*
- *function: to confirm that an interrupt has been acknowledged*
- *name: clock*
- *function: to synchronise operations*
- *name: reset*
- *function: initialises all the components.*

any 3 named signals, 1 mark each, max 3 marks
any 3 correct descriptions, 1 mark each, max 3 marks
total 6 marks for question

c) **i)** Explain what is meant by *an interrupt*. **2**
- *a signal*
- *causes processor to suspend processing*

any 2 points, 1 mark each, max 2.

ii) Describe TWO examples of interrupts. **4**
- *program interrupt*
- *condition caused by program execution*
- *timer interrupt*
- *controls actions that need to be performed at regular intervals*
- *i/o interrupt*
- *indicates completion of data transfer or i/o error condition*
- *hardware failure interrupt*
- *hardware malfunction / parity error*

any 2 interrupts identified, 1 mark each, max 2 marks
any two correct descriptions of interrupts, 1 mark each, max 2 marks
total 4 marks for question.

Total 20 Marks

QUESTION 22 **Marks**

<mark>Throughout the question, please credit any valid alternative point.</mark>

a) **i)** State TWO outputs from a payroll computer system. **2**
- *pay slip*
- *cheques*
- *lists/files of payments*
- *lists/files of tax paid*
- *details of payments to banks*

any 2 points, 1 mark each

ii) Payroll data can be stored on tape. Explain why tape is a suitable storage medium for payroll data and why disk storage is not necessary. **4**
- *payroll data is the same for each employee*
- *the operation is the same for each employee*
- *payroll processing is usually for all employees*
- *this makes it suitable for batch processing*
- *tape held data is necessarily serial access*
- *serial access is suitable for batch processing*

any 4 points, 1 mark each, max 4 marks

iii) Some of the output from a payroll system is produced using a *dot matrix printer*. Explain why *dot matrix printers* are still used in many business systems despite being slow and of low quality. **4**
- *impact printers*
- *this allows carbon copies to be made*
- *duplicates can be filed that are the same as original*
- *useful for legal purposes*

any 4 points, 1 mark each, max 4 marks

b) **i)** Describe how data is transmitted in a *serial data link*. **2**
- *data is transmitted one bit at a time*
- *single wire is used*
- *transmission in either direction*

Any 2 points, 1 mark each, max 2 marks

ii) Describe how data is transmitted in a *parallel data link*. **2**
- *more than one bit transmitted at a time*
- *often 1 byte / 8 bits at a time*

any 2 points, 1 mark each, max 2 marks

iii) Explain why problems can occur with *parallel data transmission*. **2**
- *cross talk*
- *interference between adjacent lines*
- *cable is thick so distances may be limited*

any 2 points, 1 mark each, max 2 marks

iv) Explain why USB connections have become popular as a means of connecting devices to modern PCs. **4**
- *fast connection*
- *plug and play / no set up concerns*
- *can plug equipment in while computer is running*
- *can use hubs to add more devices*
- *contains power supply*
- *less need for power cables*

any 4 points, 1 mark each, max 4 marks

Total 20 Marks

QUESTION 23   **Marks**

a) **i)** Explain the meaning of the term *data integrity*.   **2**
- *data is free from unintended changes*
- *data is fit for its purpose*

2 points, 1 mark each, max 2 marks

ii) State FOUR requirements of data in order for it to be useful to a business.   **4**
- *accurate*
- *complete*
- *timely*
- *consistent*
- *secure*

any 4 points, 1 mark each, max 4 marks

iii) Explain, using an example, what is meant by *immediate data throughput*.   **2**
- *'immediate' is very fast response*
- *example such as control processes (e.g. manufacturing, aircraft control, engine management etc)*

1 mark each point, max 2 marks

iv) A theatre booking agency must be able to check the availability of seats while customers are waiting. If   **3**
requested, a booking is made. State and explain the level of data throughput necessary for this situation.
- *conversational*
- *quick response needed*
- *similar to human responses*
- *too long and user will get impatient*
- *too short and user will be intimidated*

any 3 points, 1 mark each, max 3 marks

v) In the theatre booking agency in question **iv)**, explain how the response requirements will influence the   **4**
hardware used in the system.
- *sufficient RAM*
- *this is to allow rapid processing of data*
- *fast processor*
- *large hard disk*
- *hard disk needed for random access*
- *sufficient bus width*

any 4 points, 1 mark each, max 4 marks

b) **i)** Explain what is meant by a *transaction file*.   **2**
- *record of events*
- *stored in chronological order / as they happen*

2 points, 1 mark each, max 2 marks

ii) Explain how a record is found in an *indexed sequential file*.   **3**
- *get key*
- *access index*
- *get location / pointer to data item in main file*
- *may need to go to overflow area if home area is full*

any 3 correct points, 1 mark each max 3 marks

                                                                                                  Total 20 Marks

QUESTION 24   **Marks**

a) **i)**   In terms of databases, define the term *entity*.   **2**
- *an object / something in the real world*
- *about which we store data*

1 mark each, max 2 marks

ii) In a relational database, state what is meant by the term *table*.   **1**
- *a store of data about 1 entity*

1 mark

iii) A database stores details about employees in a company. In the table EMPLOYEE, there are details   **6**
such as names, addresses, dates of birth and departments. In the table PAYROLL, there are details of
employee names and departments.

Explain how this situation could lead to errors and how these could be avoided.
- *there is data redundancy*
- *name / department in two tables*
- *may be updated in one but not the other*
- *inconsistent / out of date data*
- *fix by keeping personal details in separate table*
- *linked to others as necessary*

any 6 points, 1 mark each, max 6 marks

b) **i)**   Data from an employee database is sent over the internet to another branch of the company. It may   **4**
travel by different routes using packet switching. Explain how the original data arrives at the
receiving branch without loss of integrity.
- *data split into packets*
- *packets may travel by different routes*
- *each packet contains a packet id / sequence number*
- *packet contains some of the data*
- *data reconstructed at receiving end using sequence number*
- *checksum used to verify integrity*

any 4 points, 1 mark each, max 4 marks

ii) Explain how the company can make use of a VPN (*Virtual Private Network*) in order to keep its data   **3**
secure.
- *network is part of a WAN*
- *private to owner*
- *data is encoded*
- *only accessible to those with access rights*

any 3 points, 1 mark each, max 3 marks

iii) State FOUR ways in which a company can benefit by conducting some of its business electronically   **4**
on the world wide web.
Examples: reward other reasonable responses
- *wider advertising*
- *wider customer base*
- *can sell goods / services over the web*
- *can collect customer information / habits*
- *can reduce costs associated with premises*
- *can keep a wider range of stock*
- *can communicate easily with business partners*

any 4 points, 1 mark each. max 4 marks

Total 20 Marks