

NCC EDUCATION

**INTERNATIONAL DIPLOMA
IN
COMPUTER STUDIES**

COMPUTER TECHNOLOGY

4th September 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 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.

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 one of the following can be regarded as a secondary activity in a company?

- A) manufacturing a product
- B) human resource management
- C) delivery of a product to the customers
- D) marketing

Answer B

QUESTION 2

1

A decision support system is used at which of these levels of operation in a business?

- A) operational level
- B) management level
- C) strategic level
- D) board of director level

Answer B

QUESTION 3

1

Which of the following business activities can be carried out by a transaction processing system?

- A) payroll
- B) planning expansion
- C) report writing
- D) financial modelling

Answer A

QUESTION 4

1

Which of the following events would be likely to generate an interrupt?

- A) a program requires input from a user
- B) a file is written to disk
- C) a printer runs out of paper
- D) a spreadsheet recalculates a cell's content

Answer C

QUESTION 5

1

In a disk drive, the time taken for the read-write head to move to the required track is called

- A) rotational delay
- B) seek time
- C) data transfer delay
- D) latency

Answer B

QUESTION 6

1

Software that converts a user's typed instructions to machine code for the computer to carry out is called

- A) a compiler
- B) an editor
- C) an interpreter
- D) a linker

Answer C

QUESTION 7

1

One reason why multiprogramming operating systems are popular is

- A) they maximise the usage of the processor
- B) they allow a wide variety of programs to be loaded
- C) they provide a useful directory structure
- D) they provide a more intuitive interface than single program operating system

Answer A

QUESTION 13

3

Three recognised levels of management are:

- A) top
- B) middle
- C) supervisory

Each level of management usually requires a particular type of information. Examples of types of information are:

- i) informal and external
- ii) repetitive and largely internal
- iii) structured and regular

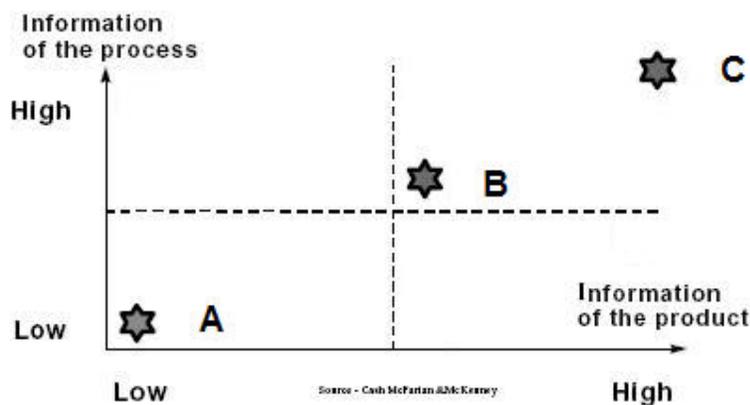
Match the types of information to the management level most likely to require them.

Answer A) i), B) iii), C) ii)

QUESTION 14

3

The following diagram shows three industries as stars, positioned on a grid. Those further to the right have a high information content *in* their products. Those higher up have a high *requirement* for information.



Identify the industries A, B and C. Choose from:

- i) consulting
- ii) airlines
- iii) gas exploration
- iv) travel agent
- v) banks
- vi) mining

Answer A vi), B iv), C ii)

QUESTION 15

4

The ASCII code for the upper case letter “A” is 65 (denary).

- A) What letter is represented by the denary number 76?
- B) Express the denary number 65 as a hexadecimal number.
- C) Express the denary number 65 in BCD form.
- D) Express the denary number 65 as an eight-bit binary number.

Answer A) L, B) 41, C) 01100101 D) 01000001

(Note: c) and d) must have all eight bits present.)

QUESTION 16**3**

The following are all devices that can be used in computer network operations:

- A) modem
- B) switch
- C) bridge

Identify the purpose of each of these devices. Choose from the following descriptions:

- i) determines the destination of a data packet
- ii) converts analogue signals to digital signals
- iii) connects two networks that use the same protocol
- iv) separates parts of a network into independent segments
- v) constructs data packets
- vi) generates electrical signals to send on the network

Answer A) ii), B) iv) C) iii

QUESTION 17**3**

Which THREE of the following actions would be carried out by a computer's operating system?

- A) keep records of user's activities
- B) perform a calculation in a spreadsheet
- C) prevent double bookings in a hotel reservation system
- D) control the timings in computer-controlled traffic lights
- E) stop a program running after its allocated time period
- F) allocate saved data space on a disk

Answer A), E), F)

QUESTION 18**2**

The following activities can all benefit from specialist IT applications.

- A) medical diagnosis
- B) placing orders with different suppliers

Identify the specialist IT system suited to these activities. Choose from:

- i) EDI
- ii) text processing
- iii) multimedia
- iv) expert system

Answer A) iv), B) i)

QUESTION 19**3**

The following are components of a computer's processor:

- A) ALU (arithmetic logic unit)
- B) control unit
- C) general purpose register

For each component, identify a task that it carries out from the following list:

- i) store the address of the next instruction to be processed
- ii) compare two values
- iii) instruct an input device to accept data
- iv) store an intermediate value produced during a calculation
- v) store all the instructions of a program
- vi) indicate when a calculation has produced a negative value

Answer A) ii), B) iii), C) iv)

QUESTION 20

The following are storage media.

- A) floppy disk
- B) CD-R
- C) hard disk

For each of these media, select a statement from the list below that is true.

- i) can only be read, not written to
- ii) usually stores the operating system and the user's current data
- iii) has a capacity of 1.44 Mb
- iv) useful for making daily backups of large volumes (>10 Mb) of data
- v) is a WORM medium
- vi) used to distribute full length feature films

Answer A) iii), B) iv), C) ii)

Total 40 Marks

SECTION B
ANSWER ANY THREE QUESTIONS

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

- a) Operating systems have become more and more complex over time.
- i) State TWO reasons why this increase in complexity has happened. 2
- *users' expectations have increased*
 - *enables applications writers to produce more capable applications*
- 1 mark each point*
- ii) State TWO disadvantages that can be caused by this increase in complexity. 2
- *increased likelihood of errors*
 - *increased demands on processor*
 - *may be excessive for small devices (e.g. hand-held devices)*
- 1 mark per point to a maximum of 2 marks*
- b) i) Distinguish between a **job** and a **process**. 4
- job:*
- *a program*
 - *and its data*
- *ready to run*
- 1 mark each point – maximum 2*
- process:*
- *a program*
 - *and its data*
- *in execution*
- *includes the register contents*
- any 2 points, 1 mark each point (but credit 'a program and its data' once only)*
- ii) Explain what is meant by a *batch process*. 2
- *gathering together*
 - *sets of programs*
 - *sets of data*
 - *to be run without further human intervention*
- any 2 points, 1 mark each*
- iii) State TWO applications that can be sensibly run in a batch process environment. 2
- examples (accept any other suitable answers that involve a standard set of data or collection of programs)*
- *payroll*
 - *bill processing*
 - *order processing*
 - *exam results processing*
 - *backup/archiving*
- any 2 points, 1 mark each*

- c) i) Explain what is meant by a *client-server operating system*. 2
- *concerned with network environment*
 - *some computers (servers) provide services for others*
 - *client computers make requests to the server*
- any 2 points, 1 mark each*
- ii) Give TWO examples of facilities needed by the operating system installed on a client computer to enable it to work in client-server mode. 2
- *intercept requests to run server based applications/other facilities*
 - *enable login to server*
 - *receive communication/signals from server*
- any 2 points, 1 mark each*
- iii) Explain what is meant by a distributed computer system. 2
- *networked system*
 - *resources are located on various devices*
 - *any example of resource (e.g. disk drive, printer, CPU, data file)*
 - *various locations are transparent to user*
- any 2 points, 1 mark each*
- iv) Explain how a multiprocessor based system can benefit the operation of a complex system. 2
- *many processors share the execution of the program*
 - *different parts of the program are allocated to different processors*
 - *this increases processing speed*
- any 2 points, 1 mark each*

Total 20 Marks

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

- a) i) Explain how a record is added to a serial file. 2
- *move to end of file*
 - *write record*
- 2 points, 1 mark each*
- ii) Explain how a record is added to a sequential file. 3
- *copy records of old file to new file*
 - *until insertion point is reached*
 - *write new record*
 - *copy remainder of old file to new file*
- any 3 points, 1 mark each*
- b) A bank holds the details of all its customers in an indexed sequential file. An index file is held separately from the main customer data file in order of account number.
- i) What two fields **must** be present in the index file? 2
- *key field/account number*
 - *pointer to location of data in main file*
- 1 mark each, max 2*
- ii) Explain how the details of one particular customer may be accessed. 4
- *search index sequentially*
 - *for account number*
 - *read location of data in data file*
 - *access customer data directly*
- 1 mark each, max 4*
- iii) State, with a reason, the type of backing storage that must be used to hold this data store. 2
- *disk*
 - *sequential media such as tape do not permit direct access / disk permits direct access*
- 1 mark each, max 2*
- iv) Sometimes, it is not possible to store the data for a new customer at the desired location on the storage medium. Explain why this is so and what can be done to overcome this difficulty. 2
- *home area is full / no room for new record*
 - *overflow area provided*
- 1 mark each, max 2*

- v) After it has been in use for a time, the processing of an indexed sequential file may slow down. **4**
Explain why this can happen and what can be done to correct the problem.

problem:

- *more records will not fit into home area*
- *more records are written to the overflow area*
- *the overflow area has to be sequentially searched*
- *this is slower than using the index*

any 2 points, 1 mark each

cure:

- *read all existing records sequentially*
- *re-write them to new indexed sequential file*
- *ensure adequate packing density*
- *to reduce likelihood of further overflow*

any 2 points, 1 mark each

- vi) Give an example of when the bank may want to process the file sequentially. **1**

- *when producing bank statements / calculating annual interest / any other process that requires access to all records*

Total 20 Marks

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

- a) i) State THREE different communications services that a business can access through its local PSTN provider. **3**
- *(analogue) voice telephone*
 - *fax*
 - *digital data communications*
 - *ADSL Internet connection*
- any 3 points, 1 mark each*
- ii) State THREE different uses that a business might make of an ISDN connection. **3**
- *video conferencing*
 - *a WAN*
 - *Internet connection*
 - *voice and data communication*
 - *multimedia connections*
- any 3 points, 1 mark each*
- b) Explain the meaning of the term VPN and why a VPN may be chosen in preference to a WAN. **4**
- definitions*
- *virtual private network*
 - *sealed off / private part of a larger network / WAN / Internet*
 - *functionality of an intranet*
 - *encrypted data (for privacy)*
- any 2 points, 1 mark each*
- reasons for choosing VPN*
- *cheaper than dedicated WAN*
 - *easily extended to other users / partners / extranet*
 - *used to connect teleworkers/mobile workers/discussion groups/customers*
- any 2 points, 1 mark each*
- c) i) Explain what is meant by a *data packet*. **2**
- *unit of data*
 - *transmitted over a network*
- 1 mark each point, max 2 marks*
- ii) State THREE possible components of a data packet. **3**
- *source address*
 - *destination address*
 - *the data itself*
 - *packet sequence number*
 - *checksum*
- any 3 points, 1 mark each*

iii) Explain the difference between *circuit switching* and *packet switching*.
circuit switching

5

- *dedicated link established*
- *between sender and receiver*
remains open for (at least) the duration of the session

packet switching

- *no exclusive link*
 - *data divided up (into packets)*
 - *may be sent by different routes*
 - *data reassembled at destination*
- any 5 points, 1 mark each*

Total 20 Marks

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

- a) i) In a computer, what is a register? 2
- *memory location*
 - *in CPU*
 - *high speed*
 - *not general purpose / special purpose*
- any 2 points, 1 mark each*
- ii) Program instructions are nearly always made up of at least two parts. State what the two parts are and in each case, what their purpose is. 4
- *opcode / operation code / command / operation*
 - *purpose is the action to perform*
 - *operand / address / data*
 - *purpose is what to perform the action on*
- 1 mark each point to a maximum of 4 marks*
- iii) Describe what happens in the registers during the performance of the fetch-execute cycle. 5
- *program counter holds address of the next instruction*
 - *the instruction whose address is held in the PC is copied / fetched into the CPU/instruction register / (MDR)*
 - *the contents of the program counter are incremented*
 - *the instruction in the instruction register is decoded*
 - *the instruction in the instruction register is executed / carried out*
 - *program counter may be reset after jump instruction*
- any 5 points, 1 mark per point to a maximum of 5 marks*
- iv) State TWO types of data item that might be stored in one byte of computer main memory. 2
- *number*
 - *code for a character*
 - *(part of) an instruction*
 - *code for a part of a graphic*
 - *code for a part of a sound*
- any 2 points, 1 mark each*
- v) State TWO common uses for ROM. 2
- *storage of start-up / boot up instructions in a computer*
 - *storage of i/o functions*
 - *storage of program instructions in a non-computer device (embedded system)*
- any 2 points, 1 mark each*

- b) i)** In the context of computers, explain what a *bus* is. **2**
- *(set of) wires*
 - *parallel*
 - *connect components of a computer system*
 - *only one device can transmit on a bus at one time*
- any 2 points, 1 mark each*
- ii)** State the THREE components of a system bus. **3**
- *control*
 - *data*
 - *address*
- 1 mark each, max 3*

Total 20 Marks

Specification Grid IDCS CT Sep 2005

Section A1	Obj A	Obj B	Obj C	Obj D	Obj E	Obj F	Obj G	Obj H	Obj I	Page reference "Computer technology" (NCC Education Ltd, 2001)
Q1	1									9
Q2	1									13
Q3	1									13
Q4		1								50
Q5			1							61
Q6					1					114
Q7					1					117
Q8						1				153
Q9						1				178
Q10							1			197
total A1	3	1	1	0	2	2	1	0	0	10 marks
Section A2	Obj A	Obj B	Obj C	Obj D	Obj E	Obj F	Obj G	Obj H	Obj I	page reference
Q11								3		222
Q12									3	244
Q13				3						96
Q14				3						98
Q15						4				152 et seq
Q16							3			210
Q17					3					124 et seq
Q18	2									19 et seq
Q19		3								38 et seq
Q20			3							58 et seq
total A2	2	3	3	6	3	4	3	3	3	30 marks
total section A	5	4	4	6	5	6	4	3	3	40 marks
Section B	Obj A	Obj B	Obj C	Obj D	Obj E	Obj F	Obj G	Obj H	Obj I	page reference
Q21a)i, ii)					4					114
Q21b)i)					4					116
Q21b)ii,iii)					4					117
Q21c) i), ii)					4					122
Q21c)iii)					2					122
Q21c)iv)					2					123
Q22a)i,ii)						5				160
Q22b)i,ii), iii,iv,v,vi)						15				162 et seq
Q23a)i)							3			191
Q23a)i)							3			206
Q23b)							4			209
Q23c) i),ii)							5			199
Q23c)iii)							5			200
Q24a)i)		2								42
Q24a)ii)		4								42
Q24a)iii)		5								43
Q24a)iv)		2								44
Q24a)v)		2								46
Q24b)i)		2								47
Q24b)ii)		3								47
total B	0	20	0	0	20	20	20	0	0	