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**NCC INTERNATIONAL DIPLOMA  
IN  
COMPUTER STUDIES**

**COMPUTER TECHNOLOGY**

**28<sup>th</sup> November 2004**

**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 of the following shows a correct historic sequence of the development of information systems, running from the earliest to the latest?

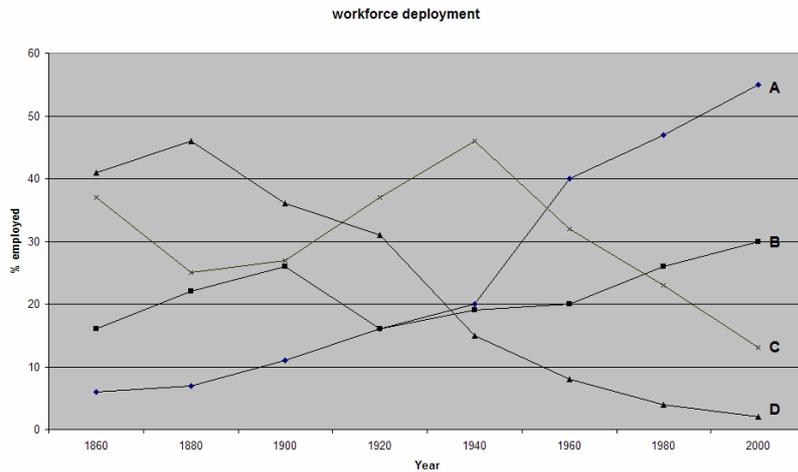
- A) technical → managerial → strategic
- B) managerial → strategic → technical
- C) technical → strategic → managerial
- D) strategic → managerial → technical

**Answer A**

**QUESTION 2**

**1**

The following graph shows the percentage of the US workforce employed in different sectors of the economy over the past 150 years. Which line represents information workers?



- A) A
- B) B
- C) C
- D) D

**Answer A**

**QUESTION 3**

**1**

Which of the following is an example of inbound logistics?

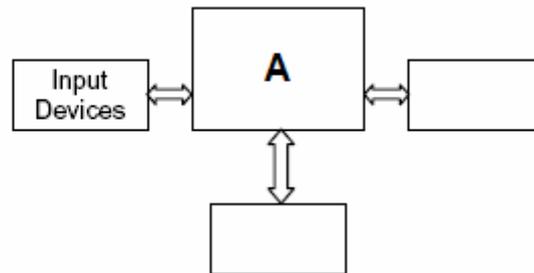
- A) warehousing finished goods
- B) inventory control
- C) promotion
- D) parts supply

**Answer B**

**QUESTION 4**

1

In the diagram of a computer system, what does the box A represent?



- A) output devices
- B) storage devices
- C) communication devices
- D) processing

**Answer D**

**QUESTION 5**

1

A certain storage medium has a capacity of 32 Gb. It is likely to be

- A) a floppy disk
- B) a CD
- C) a hard disk
- D) a flash memory drive

**Answer C**

**QUESTION 6**

1

A cathode ray display is most likely to be found on

- A) a laptop computer
- B) a desktop computer
- C) a personal digital assistant
- D) a laser printer console

**Answer B**

**QUESTION 7**

1

Which of the following operations is most suited to a transaction processing operating system?

- A) airline bookings
- B) printing electricity bills
- C) cheque processing
- D) producing exam grades from the marks obtained

**Answer A**

**QUESTION 8**

1

Which of the following is a function of a computer's operating system?

- A) calculating employees' pay
- B) operating traffic lights
- C) saving data on a disk
- D) finding a record in a file

**Answer C**

**QUESTION 9**

1

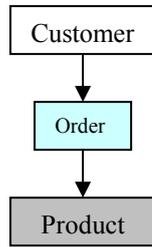
An application runs on one computer, using data stored on the same computer. Many workstations can access these services. This is an example of

- A) client-server operation
- B) peer-to-peer networking
- C) distributed processing
- D) batch processing

**Answer A**

**QUESTION 10**

A database management model is based on a customer placing orders for products. The entities are arranged as in the diagram.



This type of data model is

- A) hierarchical
- B) network
- C) relational
- D) flat file

Answer A

**SECTION A - 2**

**ANSWER ALL QUESTIONS FROM THIS SECTION**

**EACH QUESTION REQUIRES MORE THAN ONE RESPONSE**

**General marking principle: If the candidate gives more than the required number of responses, take the first *n* given up to the number required.**

**QUESTION 11**

The following are QBE grids used in a database of weather data:

(A)

Field:	Date	Wind Speed (kph)	Wind Direction	Relative Humidity
Table:	weather	weather	weather	weather
Sort:		Ascending		
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:		>80		

(B)

Field:	Date	Wind Speed (kph)	Wind Direction	Relative Humidity
Table:	weather	weather	weather	weather
Sort:				Ascending
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:		>80		

(C)

Field:	Date	Wind Speed (kph)	Wind Direction	Relative Humidity
Table:	weather	weather	weather	weather
Sort:				Ascending
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:		>70		>"87"

Match these QBE grids to the following query outputs:

i)

Date	Wind Speed (kph)	Wind Direction	Relative Humidity
13/12/2000	85	SE	82
28/10/2002	86	SW	85
30/10/2000	82	SSE	87

ii)

Date	Wind Speed (kph)	Wind Direction	Relative Humidity
30/10/2000	82	SSE	87
13/12/2000	85	SE	82
28/10/2002	86	SW	85

iii)

Date	Wind Speed (kph)	Wind Direction	Relative Humidity
06/12/2000	76	SE	88
04/04/2000	72	NE	88
03/04/2000	75	NE	89

iv)

Date	Wind Speed (kph)	Wind Direction	Relative Humidity
30/03/2000	53	NW	85
12/04/2000	74	NW	86
18/04/2000	51	NW	87
17/03/2001	51	NW	86
23/10/2001	51	NW	86

v)

Date	Wind Speed (kph)	Wind Direction	Relative Humidity
30/03/2000	53	NW	85
12/04/2000	74	NW	86

vi)

Date	Wind Speed (kph)	Wind Direction	Relative Humidity
20/02/2002	48	SSE	63
29/04/2002	63	SSE	66
28/06/2002	42	SSE	69
04/07/2002	41	SSE	61

**Answer** A) ii, B) i, C) iii  
1 mark each – max 3

**QUESTION 12**

3

The following are examples of where business communications are needed:

- A) working on a document with a colleague in the same building
- B) discussions with colleagues across the world
- C) discussing an order with a customer

Choose the most appropriate means of communication for each of these situations.

- i) video conferencing
- ii) standard PSTN telephone service
- iii) dial-up Internet access
- iv) sending a fax
- v) file sharing across a LAN
- vi) voice mail message

**Answer** A)v, B) i, C) ii  
1 mark each – max 3

**QUESTION 13**

3

Components of a computer based system must be able to communicate. Examples of such communication include:

- A) connecting many work-stations via a hub or switch to a server in the same building
- B) connecting networks in different buildings on a university campus
- C) connecting a laptop to the Internet from inside a car

Match these communication requirements with the most suitable means of communication taken from the following list:

- i) copper wire
- ii) radio
- iii) infra red
- iv) co-axial cable
- v) optical fibre
- vi) parallel cable

*Answer A) i, B)v, C)ii*

*1 mark each – max 3*

**QUESTION 14**

3

The following are activities that are associated with the Internet:

- A) converting URL addresses to IP address numbers
- B) determining how a text file is to be displayed in a browser
- C) transmission of files from one connected computer to another

Choose the service or protocol that is appropriate to each of these activities.

- i) XML
- ii) HTML
- iii) FTP
- iv) DNS
- v) UDP
- vi) POP

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

*1 mark each – max 3*

**QUESTION 15**

4

The following are registers in a computer's CPU:

- A) program counter
- B) flags register
- C) current instruction register
- D) general purpose register

Match these registers with the appropriate activities (i) to (vi).

- i) storage of an intermediate value in a calculation
- ii) decoding an instruction
- iii) ensuring that the instructions are executed in the correct order
- iv) storing the outcome of an operation such as when overflow has occurred
- v) holding return addresses when a procedure has been called
- vi) holding the address where the data segment starts

*Answer A) iii, B) iv, C) ii, D) i*

*1 mark each – max 4*

**QUESTION 16**

4

The system bus connects the processor, main memory and the i/o (input/output) controllers. It contains three lines: (i) the control bus, (ii) the data bus and (iii) the address bus.

Identify which bus from the above list is associated with each of the following activities:

- A) signalling that an interrupt has occurred
- B) carrying an instruction from main memory to the processor
- C) causing data to be written to memory
- D) indicating the location where data from the processor is to be stored

**Answer** (A) i, (B)ii, (C) i, (D) iii

*1 mark each – max 4*

**QUESTION 17**

3

Which THREE of the following statements about hard disks are true?

- A) all the data on a track can be read without moving the read-write heads
- B) a track contains the smallest amount of data that can be read in one operation
- C) a cylinder refers to all the tracks on one disk surface
- D) the read-write head can read data from the same track of each disk without moving
- E) all sectors on a disk store the same amount of data
- F) the disks are made to rotate only when a data transfer is taking place

**Answer** (A), (D), (E)

*1 mark each – max 3*

**QUESTION 18**

3

An airline uses IT systems for many purposes. The following are some examples of the IT related tasks that the airline's systems must perform:

- A) provide a list of unprofitable flights
- B) make an online flight booking for a customer
- C) provide a list of available flights to a travel agent
- D) the autopilot of a plane makes an in-flight navigation correction.

List these tasks in order of the required response time, starting with the least urgent and ending with the most urgent.

**Answer**

—————→  
least urgent: A, C, B, D :most urgent

*all 4 in order = 3 marks*

*any 3 in order = 2 marks*

*any 2 in order (credit once only) = 1 mark*

**QUESTION 19**

2

Which TWO of the following activities are most likely to require a multiprogramming computer system?

- A) processing cheques
- B) data backup
- C) sales order processing
- D) software development
- E) processing a payroll

**Answer** C, D

*1 mark each – max 2*

**QUESTION 20**

Which TWO of these statements correctly describe transaction files?

- A) they are in key field order
- B) they are in chronological order
- C) they are indexed
- D) specific records can be located directly without the need for a search process
- E) they are used to update master files

*Answer B, E*

*1 mark each – max 2*

**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.**

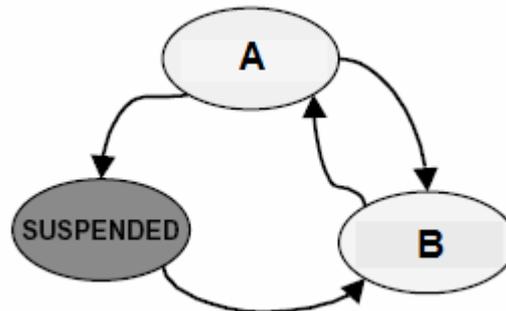
- a) List THREE components that can make up a multimedia production. 3
- *text, graphics / still images*
  - *moving images*
  - *sound*
  - *animations*
- Any 3, 1 mark each*
- b) i) Give THREE reasons why multimedia presentations need to be compressed when provided on web sites. 3
- *multimedia presentations are large files*
  - *compression reduces file size*
  - *reduced file size reduces download times*
- ii) Describe TWO problems that can be caused as a result of compressing multimedia files. 4
- *information may be lost, leading to a poor quality reconstruction*
  - *reconstruction may take time, leading to unusable product*
  - *compression may be insufficient, leading to no significant reduction in file size*
- 1 mark each for defining the problem (max 2) plus 1 mark each for explaining the consequence (max 2)*
- iii) Explain what is meant by *lossy file compression* and what is the effect of using such a method. 2
- not all the data is retained, leading to a reconstruction of lower quality*
- c) i) State FOUR reasons why multimedia can be a good choice for training employees in new job skills. 4
- *has more impact than many other methods*
  - *interactivity is good reinforcement*
  - *can be repeated when required*
  - *cheaper than human trainer*
  - *can be used whenever convenient*
  - *consistent each time it is used*
- any 4 points – 1 mark each*
- ii) Explain how a multimedia system can be of use to help passengers at a railway station. 2
- *provides train times*
  - *as a result of enquiry*
  - *saves queuing*
  - *up to date*
- any 2 points – 1 mark each*

- iii) State; with reason the likely hardware that would be used to interact with the passengers in a railway multimedia system. **2**
- *touch screen*
  - *unlikely to suffer dirt / damage*
  - *situated in public place*
  - *easy for non-experts to use*
- any 2 points – 1 mark each*

**Total 20 Marks**

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

- a) i) In terms of *computer operating systems*, explain the meaning of a process. **1**  
*a program currently in execution*
- ii) Operating systems sometimes have to provide process scheduling. Explain the meaning of *process scheduling*. **2**
- *giving each process access to the processor*
  - *by dividing the time available into slices*
- iii) State THREE objectives of a multiprogramming operating system **3**
- *minimise unused CPU time*
  - *reduce incidence of peripheral bound operations*
  - *minimise total time taken by all operations*
  - *prevent single programs occupying processor / share processor resources fairly*
- Any three points, 1 mark each*
- iv) The following diagram shows the possible states of a process in a multiprogramming operating environment. Name the states A and B. **2**



- *A=running*
  - *B=runnable*
- b) i) Operating systems can be used to produce user accounts. Explain why this may be necessary. **2**
- *users may be charged for their use of resources*
  - *need to keep a record of which users have used which resources*
- ii) State TWO items that might be logged for operating system accounts. **2**
- Examples:*
- *processor time*
  - *printer paper*
  - *disk space*
  - *software*
- Any 2 points, 1 mark each – reward any other reasonable examples*
- iii) Describe how the logging of a computer network’s activity can be of use to the systems administrator. **2**
- *tracking failures*
  - *predicting future use*

- c) i) Most operating systems provide a set of utilities. Describe what is meant by an operating system utility. **2**
- *small program*
  - *specific (limited) purpose*
  - *aimed at helping system maintenance*
- Any 2 points – 1 mark each*
- ii) Describe FOUR utilities that may be provided with an operating system. **4**
- Examples (reward other correct answers)*
- *formatting disks*
  - *mail*
  - *text editor*
  - *searching utilities*
  - *file copying/renaming/deletion*
  - *scan disk – check disk for errors*
  - *virus scanning*
  - *check disk space*
- Any 4 – 1 mark each*

**Total 20 Marks**

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

- a) i) State TWO functions of the arithmetic logic unit (ALU). 2
- *perform calculations*
  - *make comparisons*
- ii) State TWO functions of a computer's primary storage. 2
- *store programs currently in execution*
  - *temporary store for calculation intermediate results*
  - *store data currently being processed*
  - *store data temporarily as it is being read from or written to a peripheral*
- any 2 points, 1 mark each*
- iii) State TWO factors that can affect the speed at which a computer processes data. 2
- *clock speed*
  - *bus width*
  - *word length (register size)*
  - *RAM size*
  - *disk speed*
  - *nature of instructions*
  - *number of processors (e.g. parallel processing)*
- any 2 points - 1 mark each*
- b) i) A storage location consists of eight bits. What is the largest positive integer that it can store? 1
- 255*
- ii) Apart from integers, give two examples of other types of data that might be represented in the storage location. 2
- *character*
  - *floating point numbers*
  - *boolean values*
  - *part of an image / pixel*
  - *part of a sound*
  - *part of an instruction*
- Any 2 points, 1 mark each*
- iii) Explain the purpose of ASCII code. 1
- to store characters*
- iv) Explain how Unicode is an improvement on ASCII. 3
- *Unicode is 16 bit / bigger structure than ASCII / ASCII only 7 bit or reverse argument*
  - *this allows more characters to be encoded*
  - *useful so that more languages can be encoded*

- c) i) The data belonging to an organisation is usually stored in a database rather than keeping it in separate files. One reason for this is it leads to non-redundancy. Explain what is meant by non-redundancy in this context. **2**
- *data is not repeated*
  - *needlessly*
- ii) How does a relational database promote non-redundancy? **2**
- *data kept in separate tables*
  - *linked by key fields*
  - *each table relates to one entity*
- any 2 points 1 mark each*
- iii) Describe how a database management system promotes flexibility in a large database system. **3**
- *data is independent from software*
  - *software can be updated without changing the data*
  - *new processes can be added on without rewriting all the software*
  - *new tables can be added without rewriting all the software*
- any 3 points, 1 mark each*

**Total 20 Marks**

**QUESTION 24**

Marks

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

- a) i) The following standards are associated with the Internet: 6
- jpeg
  - Java
  - pdf
- Briefly explain the purpose of each of these standards.
- jpeg**
- *a standard for storage of graphic images*
  - *in compressed form*
- 2 marks**
- Java**
- *a programming language*
  - *produces code that can be run by web browser*
- 2 marks**
- pdf**
- *a standard for storing documents*
  - *original format preserved*
  - *need Acrobat reader to view*
  - *usually intention is that the document cannot be changed*
- any 2 points – 1 mark each**  
**total = 6 marks**
- ii) A resource is available on the Internet at <http://www.nccedu.com/information.html>. 3  
Identify
- the protocol used
  - the file name
  - the domain name
  - *protocol=http*
  - *file name=information.html*
  - *domain name=nccedu.com*
- 1 mark per point to a maximum of 3 marks**
- iii) List TWO ways that the Internet can be used to promote business. 2
- *advertising*
  - *supply product information*
  - *take / service orders*
- any 2 points – 1 mark each**
- b) i) A bank provides an on-line service so that customers can maintain their accounts. State TWO database tables that the customers would need to access on-line. 2  
**examples:**
- *customer personal details*
  - *past transactions*
  - *standing orders / direct debits*
  - *bill payments*
- 1 mark each point to a maximum of 2 marks**

- ii) Describe ONE 1-to-many relationship that would exist between tables in the database. 1  
*examples:*
- *customer --< transactions*
  - *customer --< payments*
  - *customer --< standing orders etc*
- 1 mark for any one correct relationship*
- iii) Describe TWO problems in the implementation of on-line database access that are additional to the normal operation of the database. For each of these two problems, suggest a means of solution. 6  
*examples:*
- *ease of use problems*
  - *users are likely to be unfamiliar with database handling techniques*
  - *therefore special attention must be given to interface design*
  - *security problems*
  - *greater possibility of unauthorised access*
  - *measures need to be taken to encrypt / passwords / only ask for random part of passwords*
  - *apply access restrictions to data sets*
- 1 mark each problem identified plus 2 additional marks for correct solution to problem to a maximum of 6 marks*

**Total 20 Marks**

## Specification Grid IDCS CT December 2004

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									5
Q2	1									6
Q3	1									8
Q4		1								36
Q5			1							44, 58 et seq
Q6			1							78
Q7				1						108
Q8					1					112 et seq
Q9					1					122
Q10						1				176
total A1	3	1	2	1	2	1	0	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				183
Q12							3			191
Q13							3			199
Q14								3		222
Q15		4								42
Q16		4								48-49
Q17			3							59
Q18				3						105 et seq
Q19					2					120
Q20						2				159
total A2	0	8	3	3	2	5	6	3	0	30 marks
Section C	Obj A	Obj B	Obj C	Obj D	Obj E	Obj F	Obj G	Obj H	Obj I	page reference
Q21a)									3	241
Q21b)i, ii)									7	246
Q21b)iii)									2	248
Q21c) i, ii, iii)									8	251
Q22a)i, ii, iii, iv)					8					117 et seq
Q22b) i, ii, iii)					6					125
Q22c) i, ii)					6					124
Q23 a) i, ii, iii)		6								38 et seq - 43 et seq
Q23b) i, ii)		3								44 - 45
Q23b)iii, iv)				4						155
Q23c) i, ii, iii)				7						170 et seq
Q24a) i)								6		224
Q24a, ii)								2		227 et seq
Q24a, iii)								3		230
Q24b, i)						2				174 et seq
Q24b, ii)						2				175
Q24b) iii)								6		234