7.4 External hardware devices part 2

Name: _____

Class: _____

Date: _____

Time: **289 minutes**

Marks: **195 marks**

Comments:

Q1.

(a) For **each** of the following situations in a small business, give **one** appropriate storage medium from the list below. Justify your choice.

Flash memory, CD-R, hard disk, DAT tape, floppy disk

(i) Storage of applications and data used on a daily basis.

Medium _____

_____

Justification _____

(2)

(ii) Regular overnight backup of data.

Medium _____

_____

Justification _____

(2)

(iii) Archiving several megabytes of data.

Medium _____

_____

Justification _____

(2)

(b) What would you expect of a printer that was to be used to print photographs as well as routine documents? Give **three** features.

1. _____

2. _____

3. _____

(3)

(Total 9 marks)

Q2.

A college wants to improve the physical security of its open access computers located in several unsupervised rooms. The network security is also causing concern.

When a student joins the college, the student is issued with an ID card, which includes a photograph and his/her student ID barcode.

The college is proposing to set up a computerised system which will monitor who is in the room at any one time and which computers they are using. The system should prevent any unauthorised person from entering the room. It may be necessary to modify the way

in which students' ID cards are made.

The following hardware devices are being considered for use with this system. Justify **one** different possible use for each hardware device in the proposed system.

(a) barcode scanner _____

_____

_____

(1)

(b) fingerprint scanner _____

_____

_____

(1)

(c) digital still camera _____

_____

_____

(1)

(d) digital video camera _____

_____

_____

(1)

(e) programmable doorlock/turnstile _____

_____

_____

(1)

(f) RFID (Radio Frequency Identification) tag reader _____

_____

_____

(1)

(Total 6 marks)

Q3.

DVD-R and DVD-RW, floppy disk, hard disk, magnetic tape and flash memory are all examples of secondary storage media. For each of the following tasks, select from this list one suitable medium.

(a) Distributing software with a computer magazine.

_____

(1)

(b) Storing application programs for everyday use on a PC.

_____

(1)

(c) Transporting files between computers.

_____

(1)

(Total 3 marks)

Q4.

The figure below shows a label from an item sold in a shop. The data from this label is captured by a computer system at the checkout.

(a) What input device would have been used in the shop to read this label?

_____

(1)

(b) (i) Give **one** advantage of having the label read by the input device given in (a) rather than having the numbers keyed in by the shop assistant.

_____

_____

(1)

(ii) This type of code is used to identify items in many different situations. State **one** advantage that it has over a character code that makes it suitable for this task.

_____

_____

(1)

(Total 3 marks)

Q5.

(a) Describe what is meant by **secondary storage**.

_____

_____

(2)

(b) Which of the following is **not** a secondary storage medium?

floppy disc, flash memory, cache memory, CD-Rom

_____

(1)

(Total 3 marks)

Q6.

A school plans for the school's canteen to eliminate the need for

- canteen staff to handle cash transactions;
- pupils to pay with cash when purchasing meals.

Instead all payments in the canteen will be made electronically from an "electronic wallet" provided by the school to each pupil.

Pupils will be able to top up their "electronic wallet" at any time at machines located around the school which accept payment by cash, debit card and credit card.

A system designer is employed to design a system for the canteen which supports the

- payment for meals by "electronic wallet";
- production of menus and price lists for display.

The designer has the following hardware in addition to computers with hard disk storage, keyboard, mouse and VDU to choose from:

Smart card reader/writer
Fingerprint scanner
Touch sensitive screen
Laser printer
Impact printer with paper roll.

(a) For each of the above give **one** purpose of its use in this canteen system.

(i) Smart card reader _____

_____

_____

(1)

(ii) Fingerprint scanner _____

_____

_____

(1)

(iii) Laser printer _____

_____

_____

(1)

(iv) Impact printer _____

_____

_____

(1)

(v) Touch sensitive screen _____

_____

_____

(1)

(b) Describe the principle of operation of a touch sensitive screen.

_____

_____

_____

_____

(2)

(Total 7 marks)

Q7.

Name the most suitable input device for the following tasks:

(a) transferring data from multiple choice examination scripts into a computer system;

_____

(1)

(b) selecting information from a computer-based information system in a busy Tourist Information Centre;

_____

(1)

(c) creating a cartoon character which will be used for computer animation.

_____

(1)

(Total 3 marks)

Q8.

(a) Write the names of the following removable secondary storage media in the appropriate cell in the table below.

Floppy disk
Read only DVD
Recordable CD-R
Zip disk

Typical Capacity	Storage Medium
< 2 MB	
250 MB	
600 – 700 MB	
4 – 10 GB	

(3)

(b) Write the names of the following removable secondary storage media in their appropriate cell in the table below.

Flash memory
CD-R
Floppy disk
DAT magnetic tape

Used for	Storage Device
Distributing commercial software	
Storage in digital cameras	
Regular system backups	
Exchanging small files	

(3)

(Total 6 marks)

Q9.

A football club invests in a computerised ticketing system for home matches. In addition to networked computers with hard disk storage, keyboard, mouse and VDU, the system designer of the football ticketing system has the following hardware to choose from:

Magnetic Stripe reader
Ink-jet printer
Barcode scanner
Iris scanner
Digital still camera
Smart card reader

Spectators who have pre-paid by credit card before the day of a match will only have to

insert their credit card into a machine situated outside the football stadium to obtain their entrance ticket.

Other spectators will pay on the day of the match for their entrance ticket at ticket booths situated outside the football stadium or use a season ticket which is pre-purchased at the beginning of the season and used for every home match.

A season ticket holder's ticket may be pre-loaded with electronic cash which can be spent inside the stadium on refreshments.

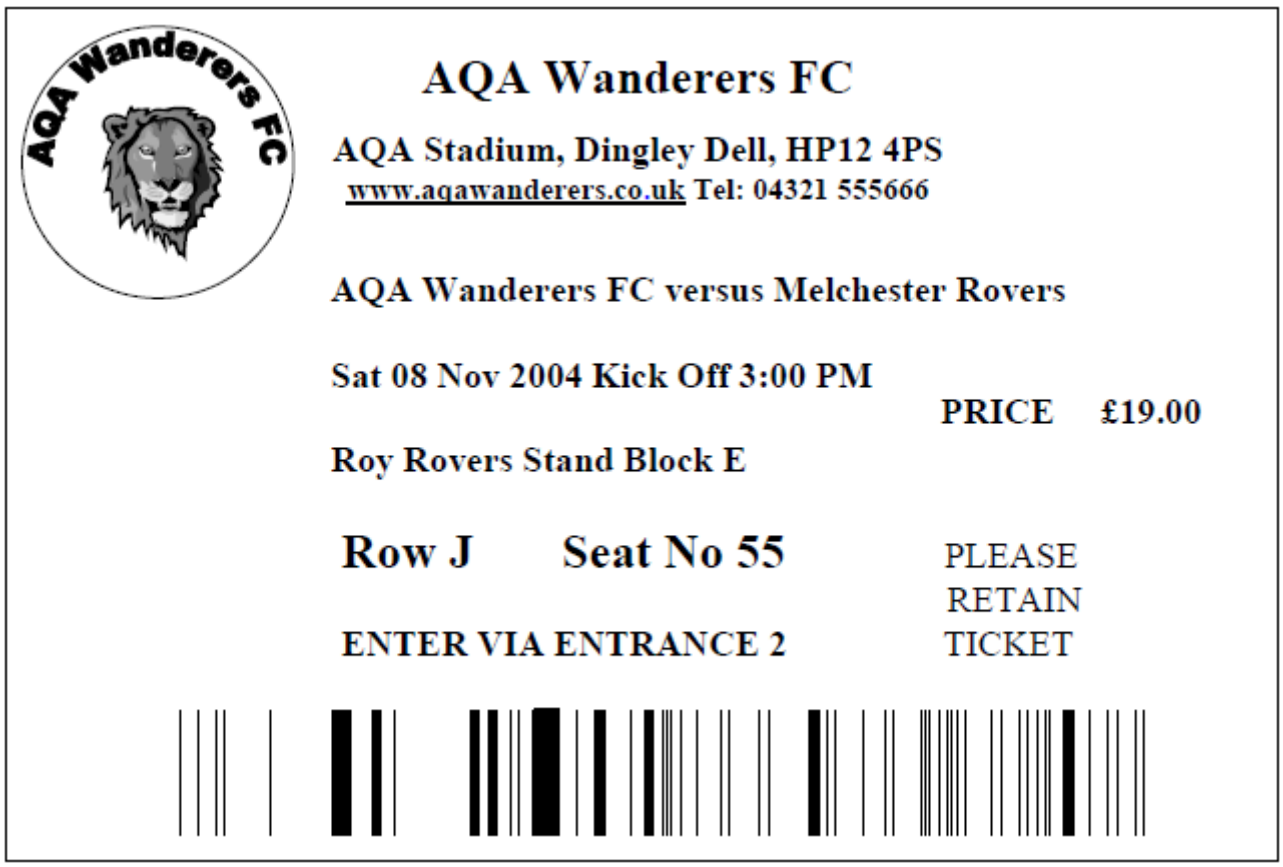
Spectators must present a valid ticket before being allowed into the club's stadium.

Each spectator is allocated a numbered seat in the stadium.

The system must prevent a spectator from gaining admittance to the stadium if the spectator has been banned from the stadium.

The system must record the number of spectators inside the stadium.

The figure below shows an example of a ticket purchased on the day of a match.



Give **one** possible **use** of each hardware device in this computerised ticketing system.

(a) Magnetic Stripe reader _____

_____

_____

(1)

(b) Ink-jet printer _____

_____

_____

(1)

(c) Barcode scanner _____

_____

_____

(1)

(d) Iris scanner _____

_____

_____

(1)

(e) Digital still camera _____

_____

_____

(1)

(f) Smart card reader _____

_____

_____

(1)

(Total 6 marks)

Q10.

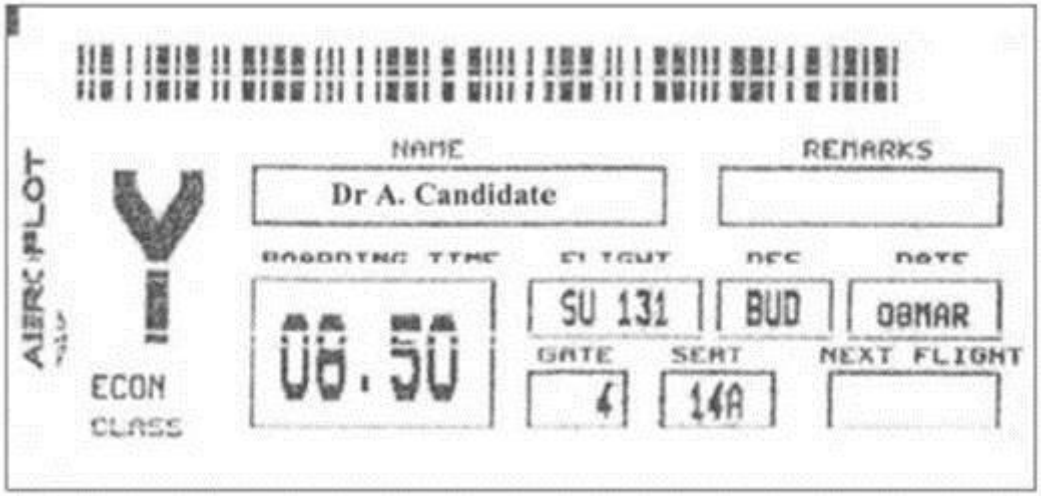
In addition to networked computers with hard disk storage, keyboard, mouse and VDU, the system designer of an airport ticketing and security system has the following hardware to choose from:

Magnetic Stripe reader
Ink-jet printer
Barcode scanner
Iris scanner
Digital still camera
Smart card reader
Optical Character Recognition system

Passengers with hand baggage only and who have pre-paid by credit card insert their credit card into a machine which issues each passenger with a boarding pass.

Passengers must present a valid boarding pass and a valid passport at security control before being allowed into the aircraft's boarding lounge.

The diagram below shows an example of a boarding pass.



Give **one** possible **use** of each hardware device in this airport ticketing and security system.

(a) Magnetic Stripe reader _____

_____

_____

(1)

(b) Ink-jet printer _____

_____

_____

(1)

(c) Barcode scanner _____

_____

_____

(1)

(d) Iris scanner _____

_____

_____

(1)

(e) Digital still camera _____

_____

_____

(1)

(f) Smart card reader _____

_____

_____

(1)

(g) Optical Character Recognition system _____

_____

_____

(1)

(Total 7 marks)

Q11.

(a) Two of the components of a computer system are a processor and main memory which are connected together by three buses. Name **each** of these buses and explain their purpose.

1. Name _____

   Purpose _____

   _____

2. Name _____

   Purpose _____

   _____

3. Name _____

   Purpose _____

   _____

(6)

(b) In order to connect the computer system to a local area network (LAN) an additional piece of hardware is required. Name this piece of hardware and explain its purpose.

Name _____

Purpose _____

_____

(2)

(c) A printer is connected to the computer system using parallel transmission. Give **one** reason why parallel transmission may be more appropriate than serial transmission.

_____

_____

(1)

(d) Give **one** reason why serial transmission is more appropriate for the local area network.

_____

_____

(1)

(Total 10 marks)

Q12.

A multi-storey car park is controlled by a computer system as follows.

For a vehicle arriving at the barrier-controlled *entrance*:

- the computer system generates an integer number at random from a set of unused numbers which identifies the vehicle to the system
- the vehicle's driver collects a ticket containing this number from a machine at the barrier
- after a short interval a barrier is raised to enable the car to enter the car park
- the computer system remembers the current date, the arrival time and the randomly generated number.

If the car park is full a sign is lit to indicate the situation and no vehicle is allowed to enter the car park.

For a vehicle arriving at the barrier-controlled *exit*:

- the ticket is presented to a machine which reads the number on the ticket
- the computer system determines the length of time the vehicle has been parked in the car park and calculates the amount to pay
- the amount to pay is displayed on the machine
- the driver inserts the correct money into the machine
- the computer system records the length of time in minutes and the amount to pay in pence
- after a short interval the barrier is raised to enable the vehicle to exit.

(a) Taking account of the technology that could be used for ticket production at the entrance barrier, describe **two** different ways for the number assigned to the ticket to be submitted to the computer system at the exit barrier. Your answer should include a reference to the relevant input/output hardware used.

1. _____

_____

_____

2. _____

_____

_____

_____

(4)

(b) Using the table below, construct an appropriate record structure for the computer system to use to record the relevant car parking details for one vehicle. Data types should be given that would be available in a third generation programming

language.

Field Name	Data Type

(5)

(Total 9 marks)

Q13.

An insurance company wishes to enter data from hundreds of proposal forms filled in by customers each day. Describe a suitable method of data input. Justify your choice.

Method: _____

_____

Justification: _____

_____

(Total 2 marks)

Q14.

A recent government white paper proposes a national identity (ID) card scheme backed by a central national database for all citizens who are legally resident in the UK.

(a) Describe **two** different ways that basic information such as *name*, *address* and *unique personal number* could be recorded on an identity card in machine-readable form.

1. _____

_____

2. _____

_____

(2)

(b) If an identity card containing just the basic information mentioned in part (a) was stolen, it would be easy for someone to use another person's identity. Describe **one** way that the proposed scheme – ID card, card reader and central database - could be improved to make it much harder for someone to pass as someone else.

_____

_____

_____

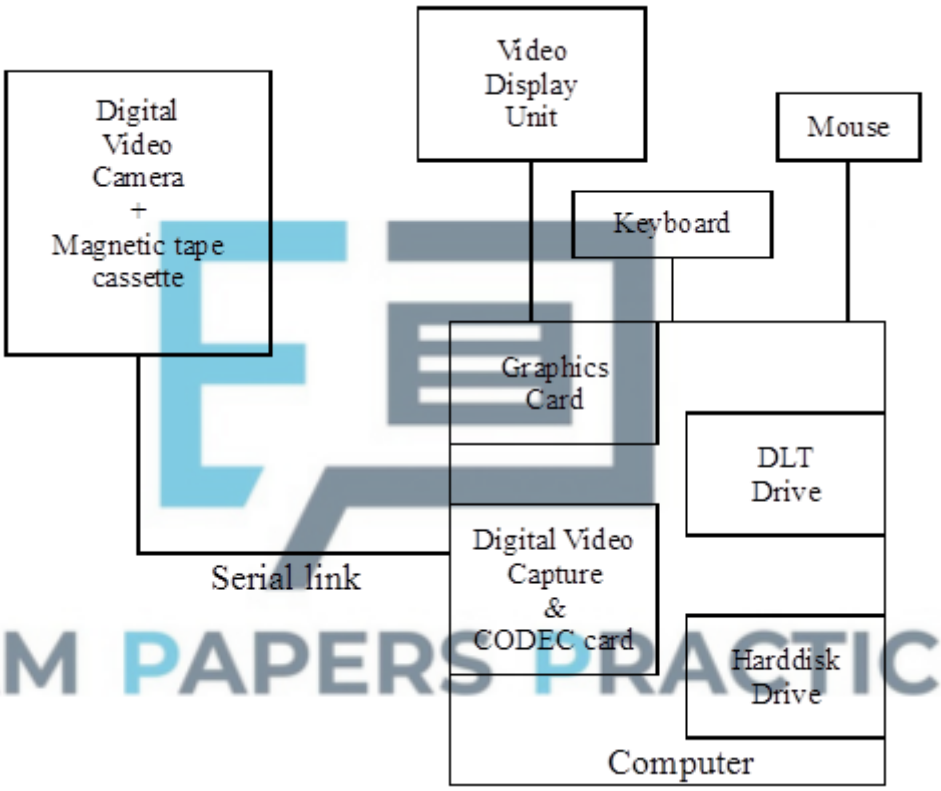
_____

(2)

(Total 4 marks)

Q15.

The diagram below shows part of a video editing computer system. The digital video camera records video and audio onto magnetic tape cassette using a digital format called **DV.** When the video camera is set to play mode the video and audio data are retrieved from the magnetic tape cassette at a rate of 3.6 Megabytes per second (MB/s). The storage capacity of a DV tape is 13 Gigabytes (GB).



The table below shows typical characteristics of four storage media, DLT magnetic tape, magnetic hard disk, Compact Disk-Recordable, Digital Versatile Disk-Recordable.

Medium	Data Transfer Rate Megabytes per second	Storage Capacity Gigabytes
Digital Linear Tape (DLT)	6	40
Magnetic Hard Disk	100	30
CD-R	0.176	0.635
DVD-R	1.25	4.37

(a) Which of the four media shown in the table is most suitable for storing the video and

audio data stream obtained by the computer from the video camera in real time, without compression, so that the data can be accessed for editing purposes using random access? Justify your answer.

Medium:_____

Justification:_____

_____

_____

(2)

(b) A CODEC (Coder-Decoder) is often used to compress (and decompress) video and audio data.

(i) On some video-capture and editing systems the CODEC is entirely software-based whereas in others the CODEC is implemented in hardware and software on a plug-in board. Why is the hardware and software CODEC preferred to the software only CODEC?

_____

_____

(1)

(ii) Why must a CODEC be used if a movie from the video camera is to be stored on DVD-R?

_____

_____

(1)

(c) What purpose might the DLT drive be used for?

_____

_____

(1)

(Total 5 marks)

Q16.

(a) Some of the basic components of a computer system are processor, main memory, and secondary storage.

(i) What connects the processor and main memory?

_____

(1)

(ii) What is the purpose of secondary storage?

_____

_____

(1)

(iii) Describe what happens during the fetch-execute cycle.

_____

_____

_____

_____

(2)

(b) (i) Machine code is the first generation programming language. What is the second generation?

_____

(1)

(ii) A programmer writes a program in a second generation programming language.
What has to be done to this program before it can be executed?

_____

_____

_____

_____

(2)

(iii) Some high level languages are classified as *imperative*. What is meant by imperative?

_____

_____

(1)

(iv) Give an example of an imperative high level language.

_____

(1)

(v) What is the relationship between an imperative high level language statement and its machine code equivalent?

_____

_____

(1)

(vi) Give **two** disadvantages of programming in first and second generation programming languages compared with imperative high level languages.

1. _____

_____

2. _____

_____

(2)

(Total 12 marks)

Q17.

Suggest the most appropriate storage medium for distributing the electronic form of a mail-order catalogue through the post. The catalogue occupies 500 Mb of storage space.

_____

(Total 1 mark)

Q18.

A book lending library lends books to borrowers. Each borrower is assigned a unique borrower code. This code is encoded magnetically on to an identity card issued to each borrower when they join the library. The code is read from the identity card by swiping it through a machine connected to the library's computer system. The code is also printed on the card in human-readable form.

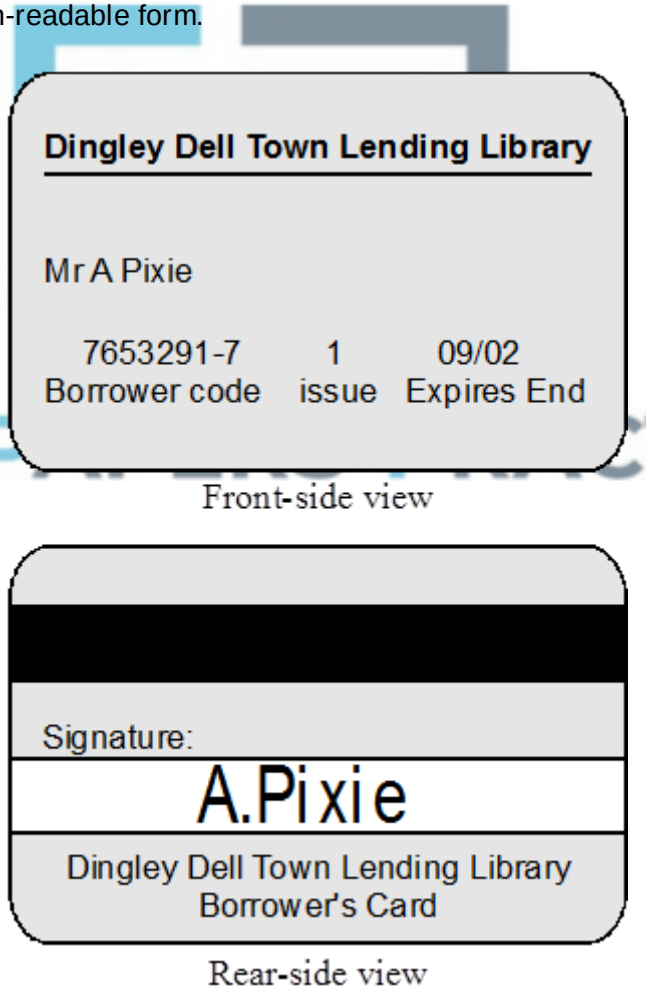


Figure 1

(a) Name the type of machine used to read the borrower code from the card.

_____

(1)

(b) Each borrower code includes a check digit. What is a check digit and why is it used?

_____

_____

_____

_____

(2)

(c) State **one** reason for having the human-readable form of the borrower code printed on the card.

Reason: _____

_____

_____

(1)

Each book is allocated a unique book code. The book code together with other details as shown in **Figure 2** are pasted on to the inside cover of the book. When a borrower borrows a book the book code is scanned into the computer system so that the loan can be recorded.

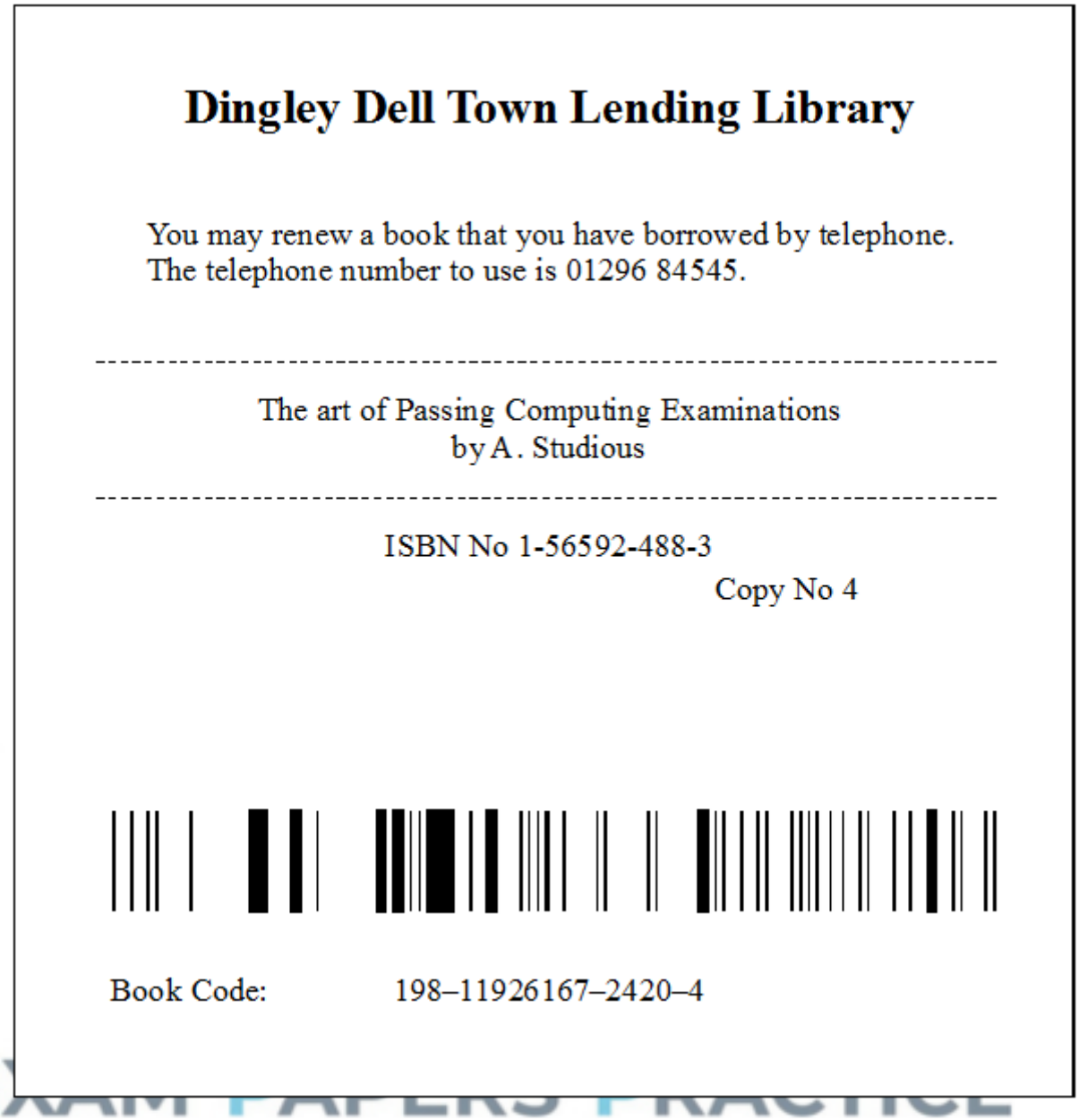


Figure 2

(d) Name the device used to scan the book code into the computer system.

_____

(1)

(e) Each loan is recorded in a separate record. All loan records are stored in a Loans file.

The loan record includes the following fields:

BookCode
BorrowerCode
DateBookToBeReturnedBy

(i) What is meant by primary key?

_____

(1)

(ii) Which of the above fields should be chosen as the primary key?

_____

(1)

(iii) Each new loan can only be recorded at the end of the Loans file. What type of file organisation does the Loans file use?

_____

(1)

(f) At the end of each day the information stored in the Loans file is transferred to the Books file using sequential file access. The Books file contains a separate record for each copy of a book that the library stocks.

The book record includes the following fields:

BookCode
BorrowerCode
LoanStatus
DateBookToBeReturnedBy

The Books file is organised sequentially. The field LoanStatus is used to record whether or not a book is currently on loan.

(i) Suggest a suitable field on which the Books file would be sorted.

_____

(1)

(ii) Why should the Loans file be sorted and in what order, before the Books file is updated?

Reason: _____

_____

_____

Order: _____

(2)

(g) At the end of each day overdue books are identified. State the processing steps that need to be executed in the library's computer system to extract the loan details of books that have not been returned by the date recorded in the Books file and to record these details in a separate OverDueBooks file. State clearly the data that will be extracted.

Steps: _____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

Data: _____

_____

_____

(3)

(Total 18 marks)

Q19.

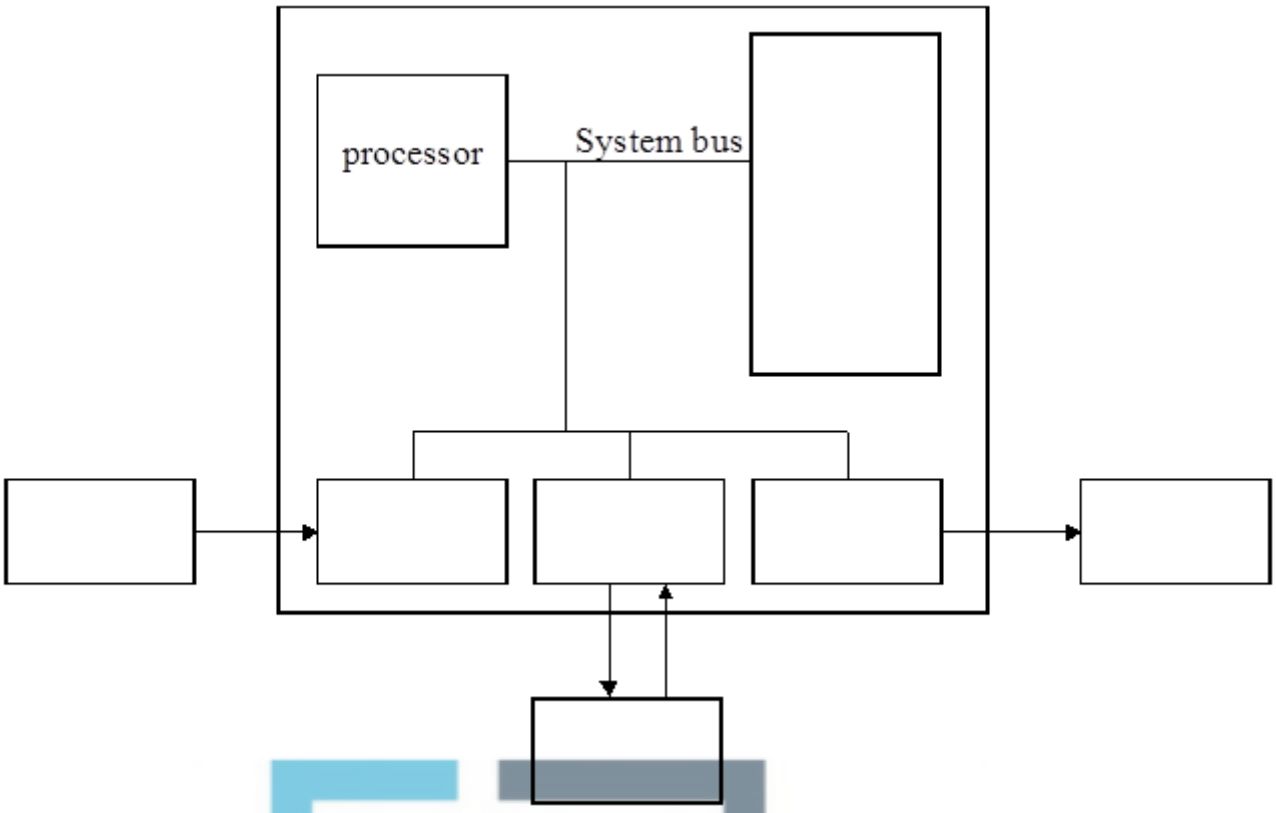
(a) Some of the components of a computer system are:

Memory:
- main memory 1

Peripherals:
- keyboard 2
- monitor 3
- hard disk drive 4

I/O Ports:
- keyboard controller 5
- disk controller 6
- VDU controller 7

In the diagram, name the components by writing the number into the appropriate box.



(4)

(b) The above computer system uses the *stored program concept.* Explain this term.

_____

_____

_____

_____

(2)

(c) Many computer systems and printers have both serial and parallel ports. Data can be sent to a printer from either port. What is meant by:

(i) serial transmission of data; _____

_____

(1)

(ii) parallel transmission of data. _____

_____

(1)

(d) (i) When could parallel data transmission be used?

_____

(1)

(ii) Justify the answer you have given in (d) (i). _____

_____

(1)

(e) Asynchronous data transmission is a method of data transmission in which a character is sent as soon as it becomes available, for example when a key is pressed on the keyboard. In this situation, what is the reason in having the start and stop bits?

_____

_____

_____

_____

(2)

(Total 12 marks)

Q20.

Players, in a national lottery, show their selection of different numbers by placing marks on an entry form similar to the one shown in **Figure 1.** The entry form is then inserted into a machine at the point of sale and the numbers are read.

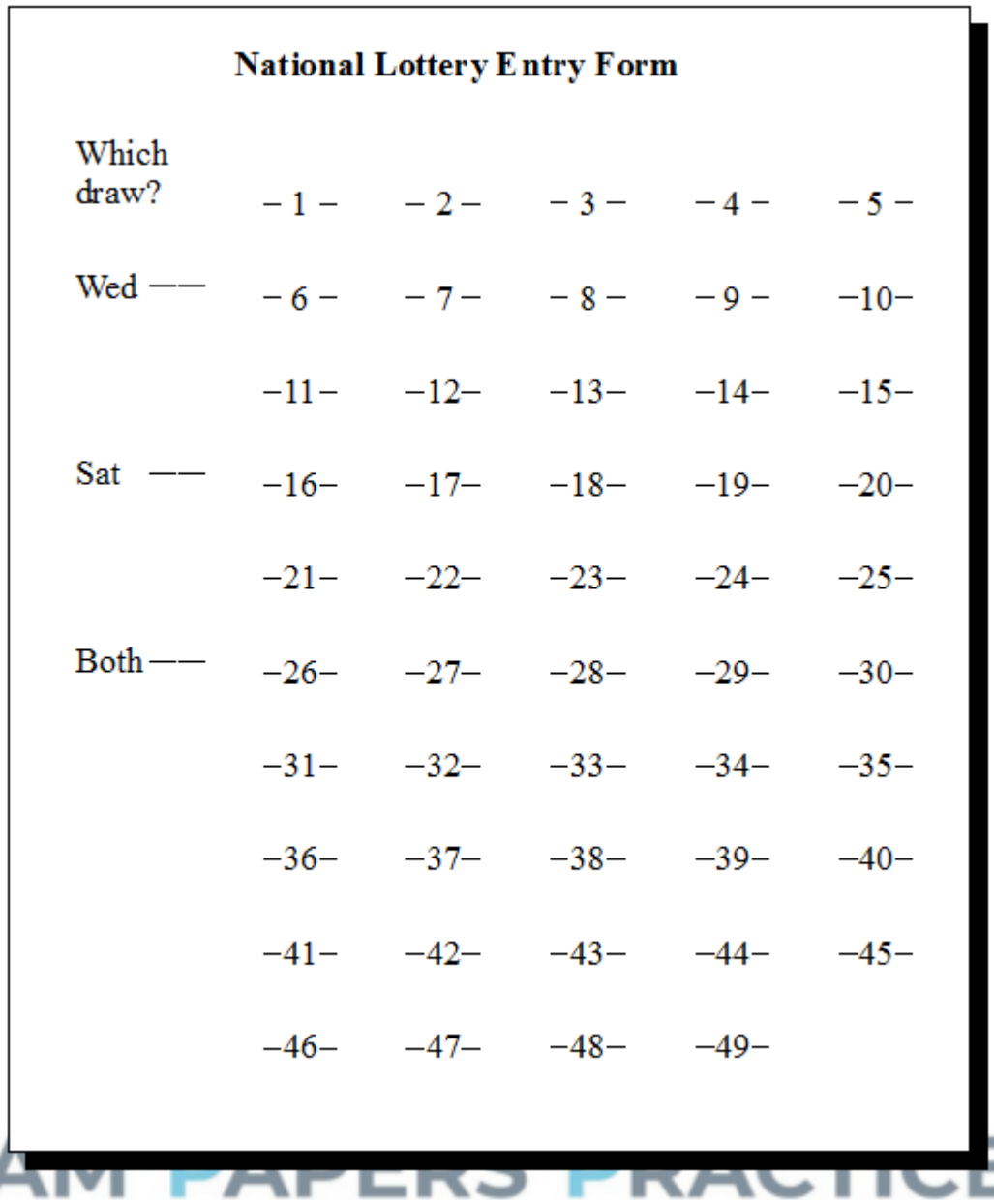


Figure 1

(a) Name the method being used to read the data.

_____

(1)

The data are transmitted to a central computer which allocates a unique transaction code. This code is relayed back to the point of sale where a machine prints the chosen numbers and a transaction code onto the ticket similar to the one shown in **Figure 2.**

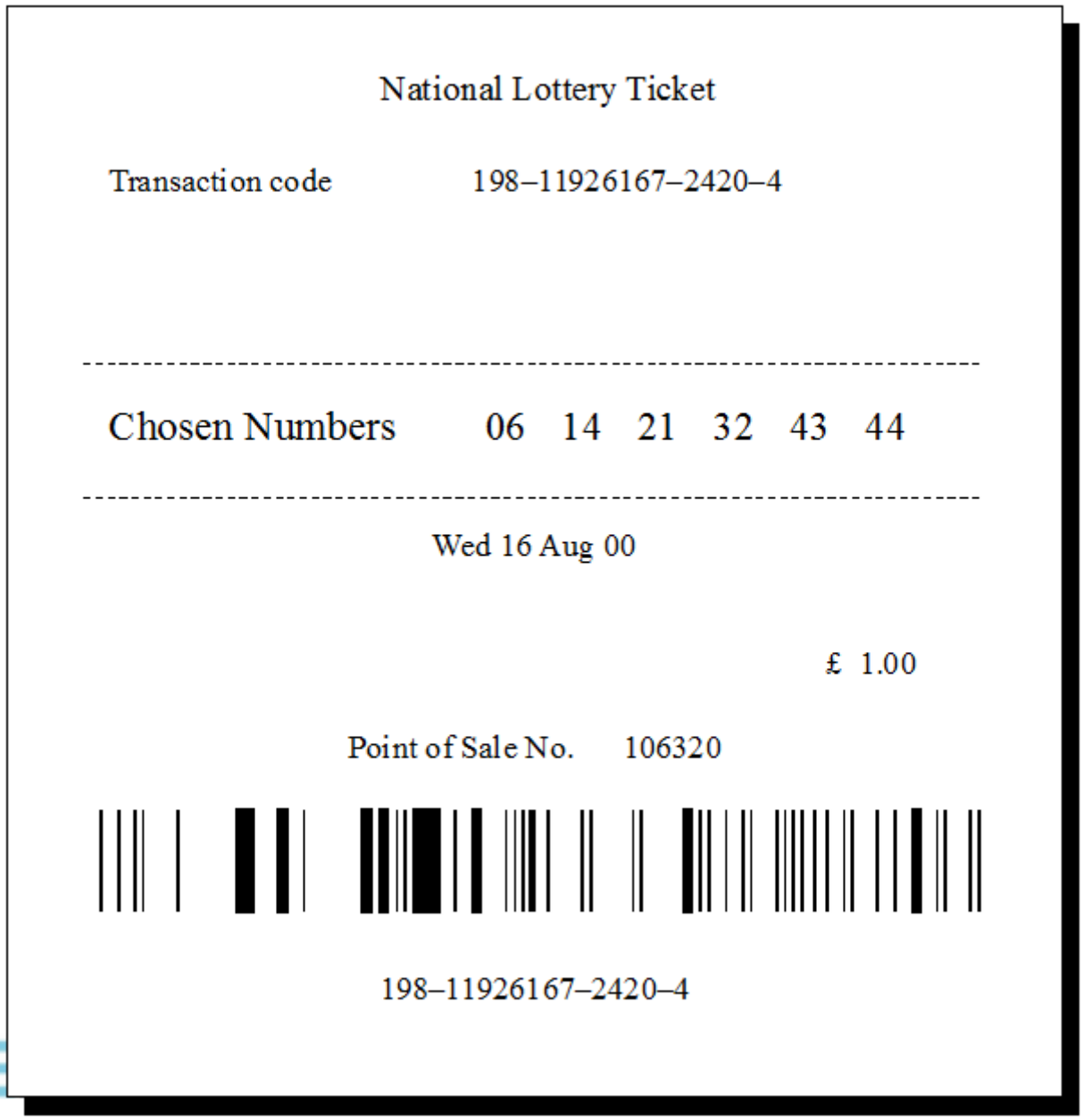


Figure 2

(b) Each transaction code includes a check digit. What is a check digit and why is it used?

_____

_____

_____

_____

_____

(2)

(c) Each transaction is recorded in a separate record. All transaction records for a particular lottery draw are stored in a single transaction file.

The transaction record includes the following fields:

Date of Purchase
Date of Draw
Point of Sale Identification Code
Transaction Code
Chosen Numbers

(i) What is meant by primary key?

_____

_____

(1)

(ii) Which of the above fields should be chosen as the primary key?

_____

(1)

(iii) What would be a suitable file organisation for the transaction file if it is required that the ticket(s) with the winning numbers is to be found? Justify your choice.

_____

_____

_____

_____

(2)

(iv) If individual records need to be accessed quickly what file organisation should be used? Justify your choice.

_____

_____

_____

(2)

(d) After a draw, some lottery prize-winners can check their tickets at any lottery point of sale machine. State the processing steps required by the lottery's computer system to check if the ticket is a winning ticket.

_____

_____

_____

_____

_____

(4)

(Total 13 marks)

Q21.

A method of increasing the flow of large amounts of data from a disk drive is to use a disk cache. What is a disk cache and how does its use speed up the flow of data?

_____

_____

_____

_____

_____

_____

(Total 3 marks)

Q22.

For **each** of the following, give a suitable application that might make use of:

(a) Optical Mark Recognition,

_____

_____

(1)

(b) Magnetic Stripe,

_____

_____

(1)

(c) Bar Code,

_____

_____

(1)

(d) Optical Character Recognition.

_____

_____

(1)

(Total 4 marks)

Q23.

For each of the following forms of secondary storage, give reasons why a systems analyst might recommend its use in a particular situation.

(a) Hard Disk,

(3)

(b) Tape Streamer,

(3)

(c) CD-ROM.

(3)

(Total 9 marks)

Q24.

A security system uses the control port shown below.

7	6	5	4	3	2	1	0
0	0	0	1	1	0	0	1
Alarm	Security light	not used	Window contact	Door contact	Internal movement sensor	External movement sensor	System activated

The purpose of each bit is shown in the diagram.
Bits 0 to 4 are inputs, bit 5 is not used and should always be zero, bits 6 and 7 are output bits.
The bit pattern shown occurs when the system is first activated.

Detection of movement results in the corresponding bit being set to 1.
Breaking of a contact results in the corresponding bit being set to 0.
Bits 6 and 7 will turn on the security light and alarm respectively when set to 1.

The system, if activated, must turn on the security light if external movement is detected.
The alarm must be turned on if either or both contacts are broken or if internal movement is detected.

(a) Give the masks and the logical operations needed for **each** of the following. In each case all other bits must remain unchanged.

(i) Testing the state of the external movement sensor.

_____

_____

_____

_____

(ii) Turning on the alarm.

_____

_____

_____

_____

(4)

(b) Write an algorithm for the procedure required to check the sensors and contacts and to activate the alarm or security light when necessary.

(7)

(Total 11 marks)

Q25.

Describe, with the aid of a diagram, the layout of data on one surface of a magnetic disk pack.

(Total 3 marks)

Q26.

"Firemen will be able to respond faster to emergency calls thanks to a system which relays data from the control room computer to the fire engine."

Data that could be transmitted include maps or directions to give the best route to a fire and information on the hazardous chemicals that might be stored at the site of the fire.

Suggest and justify an appropriate device that could be used effectively in a fire engine cab for this system for:

input; _____

_____

(2)

output; _____

_____

(2)

(Total 4 marks)

Q27.

A typical, large UK supermarket uses a computer system for a variety of different purposes. These include stock control and re-ordering; customer purchasing, which today is linked with loyalty cards; and there may be a link to the National Lottery.

The bar code is crucial to the computerisation of stock control.

(a) (i) Describe in detail how a bar code is scanned into the computer system.

_____

_____

_____

_____

_____

(3)

(ii) Why is price not usually recorded in a bar code on grocery items?

_____

_____

(1)

(iii) Explain how the bar code data may be used once it has been entered into the system.

_____

_____

_____

_____

_____

_____

(3)

(b) A supermarket stock control system would be a *real time,* or pseudo-real-time, *interactive* system. Explain the terms:

real time; _____

_____

_____

_____

(2)

interactive _____

_____

_____

_____

(2)

(c) Many large supermarkets have a direct computer link to the National Lottery main computer system for immediate transmission of the data. At peak periods, these links are heavily used.

(i) To fill in a lottery ticket, customers identify their chosen numbers by putting short lines in pre-determined places on a lottery ticket. What device is used to read this form of input?

_____

(1)

(ii) Different types of transmission link can be used to connect lottery retailers with the main computer systems. Explain why no one type is suitable to cover the whole of the UK. Suggest **two** suitable types which between them could cover the whole of the UK.

_____

_____

_____

1. _____

_____

2. _____

_____

(3)

(d) A supermarket chain, which has been using a computerised system for some years, decides to upgrade its systems. There are a number of different techniques that the systems analysts could use to investigate the old system before preparing their design of the new. Choosing **two** of these techniques, explain briefly to whom or what it is directed and what useful information could be gained.

1. _____

_____

_____

(2)

2. _____

_____

_____

(2)

(Quality of language 3)

(Total 22 marks)