



5.5 Information coding systems

Name: _____

Class: _____

Date: _____

Time: **261 minutes**

Marks: **192 marks**

Comments:

Q1.

The ASCII binary code for character a is 1100001_2

- (a) Explain what is mean by a character code.

(1)

- (b) Complete the table below to show how the word `be` would be encoded in the binary form of ASCII.

Character	Binary form of ASCII
b	
e	

(2)

- (c) A program has been developed to convert a string so that all of its characters are in upper case.

The computer does this by taking each character's ASCII binary code and applying a bitwise AND operation to it, using the mask 1011111_2 .

Convert the lower case character `c`, ASCII code 1100011_2 , into the upper case character `C` using the method described above.

EXAM PAPERS PRACTICE

(1)

(Total 4 marks)

Q2.

A supermarket uses many hardware devices as part of its daily operations.

A key component at the checkout area is the bar code reader (scanner).

If a product's bar code cannot be read by the bar code reader the checkout operator will have to enter the bar code manually.

- (a) Name **two** hardware devices that could be used to manually enter a bar code.

Device 1_____

Device 2_____

- (b) Most supermarket product bar codes follow the International Article Number standard which has 13 digits: 12 of these digits are for data and the last one is a check digit.

In your answer you will also be assessed on your ability to use good English, and to organise your answer clearly **in complete sentences**, using specialist vocabulary where appropriate.

EXAM PAPERS PRACTICE

(6)
(Total 8 marks)

Q3.

Regular expressions can be used to search for strings.

- (a) For each of the following regular expressions, describe the set of strings that they would match.

(i) b^*c

(1)

(ii) $b?c$

(1)

- (b) Write a regular expression that matches the letter b , followed by zero or more occurrences of the string cd followed by either a single letter e or the string fg .

(2)

(Total 4 marks)

Q4.

One character encoding scheme is Unicode. An alternative character encoding scheme is ASCII.

- (a) State **one** difference between Unicode and ASCII.

(1)

- (b) 7-bit ASCII codes are often transmitted using 8 bits, with a single parity bit added in the most significant bit to help with error detection.

Explain how the even parity system works. Include a description of the roles of the sending device and the receiving device during transmission.

(4)

- (c) Hamming code is an alternative to the use of a single parity bit.

State **one** advantage of using Hamming code instead of the simple parity bit system.

(1)

Figure 1 shows the data bits and some of the parity bits that will be transmitted for the ASCII representation of the numeric character '3'. Even parity Hamming code is used for the transmission. One of the parity bits in the Hamming code has not been calculated.

Figure 1

Bit position	11	10	9	8	7	6	5	4	3	2	1
Bit value	0	1	1	0	0	0	1	1	1		1

- (d) What value should be given to the parity bit in bit position 2?

(1)

- (e) Four of the bit positions shown in **Figure 1** are being used as parity bits. Bit position 2 is one of these parity bits.

What are the bit positions of the other **three** parity bits?

EXAM PAPERS PRACTICE

(1)

(Total 8 marks)

Q5.

The ASCII system uses 7 bits to represent a character. The ASCII code in denary for the numeric character '0' is 48; other numeric characters follow on from this in sequence.

- (a) Using 7 bits, express the ASCII code for the character '2' in binary.

Characters are transmitted using an 8-bit code that includes a single parity bit in the most significant bit. A parity bit is added for error checking during data transmission.

(1)

- (b) Using odd parity, what 8-bit code is sent for the numeric character '0'?

(2)

Hamming code is an alternative to the use of a single parity bit.

- (c) State **one** advantage of using Hamming code instead of a single parity bit.

(1)

(Total 4 marks)

Q6.

The table below shows the values output by a 3-bit Gray Code (GC) counter.

Some of the GC values are missing.

GC	Decimal equivalent
000	0
001	1
(a)	2
(b)	3
(c)	4
111	5
101	6
100	7

- (a) What value should be in position **(a)** in the table?

(1)

- (b) What value should be in position **(b)** in the table?

(1)

- (c) What value should be in position **(c)** in the table?

(1)

- (d) State **one** advantage of GC counters compared with pure binary counters.

(1)
(Total 4 marks)

Q7.

The ASCII system uses 7 bits to represent a character. The ASCII code for the character 'A' is 65; other alphabetic characters follow on from this in sequence.

- (a) How many different characters can be represented using ASCII?

(1)

- (b) How would the character 'B' be represented in ASCII using 7 bits?

Use the space below for rough working.

Answer

(1)

- (c) Characters are transmitted using an 8-bit code that includes a parity bit in the most significant bit.

Using even parity, what bit pattern is sent for the character 'A'?

Use the space below for rough working.

Answer

(2)

- (d) Explain how the even parity system works. Include a description of the roles of the sender and receiver during transmission.

(4)
(Total 8 marks)

Q8.

A supermarket uses a computerised stock control system. Each product is identified by a unique product code which is printed on the product as a bar code. The bar codes are input into the stock control system at the till using a bar code reader. One of the digits in the bar code is a check digit.



- (a) Describe the principles of operation of a bar code reader, **excluding** the use of the check digit.



EXAM PAPERS PRACTICE

(4)

- (b) Explain the purpose of the check digit.

(1)

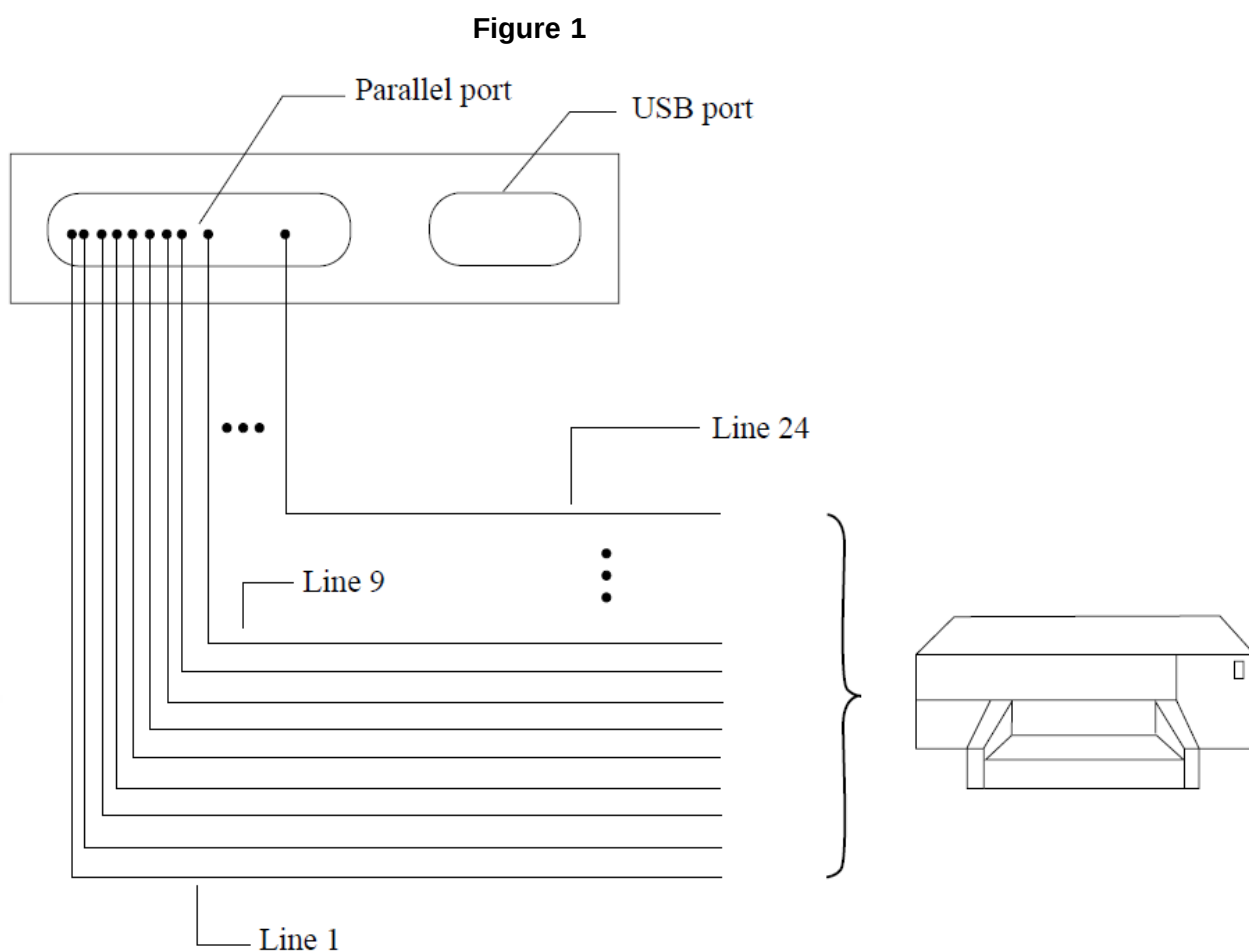
- (c) Some unpackaged items such as loose fruit and vegetables do not have a product code printed on them.

Name an input device that the till operator could use to enter details of these items.

(1)
(Total 6 marks)

Q9.

Figure 1 shows two of the ports on the back of a student's home computer. The parallel port is connected to a laser printer.



The parallel port has 24 lines.

- Lines 1 to 7 are used for transfer of the data bits, with the byte's most significant bit transferred on line 1.
 - Line 8 is used to transfer the parity bit when used.
- (a) Give **one** use for any of the other lines (9 to 24) for the parallel port connection.

(1)

- (b) (i) Use the ASCII code table shown in the table below to write the **7-bit ASCII binary** code for character 'j'.

ASCII Code Table (part only)

Character	Decimal	Character	Decimal	Character	Decimal	Character	Decimal
-----------	---------	-----------	---------	-----------	---------	-----------	---------

<Space>	32	9	57	j	106	t	116
0	48	a	97	k	107	u	117
1	49	b	98	l	108	v	118
2	50	c	99	m	109	w	119
3	51	d	100	n	110	x	120
4	52	e	101	o	111	y	121
5	53	f	102	p	112	z	122
6	54	g	103	q	113	(	40
7	55	h	104	r	114	)	41
8	56	i	105	s	115	:	58

(1)

- (ii) Characters are transmitted as an 8-bit code which includes a **parity bit** (in the most significant bit position of the byte) using **even parity**.

Give the 8-bit binary code for the character 'j'.

(1)

- (iii) The character 'j' is sent to the laser printer.

Write on **Figure 1** the pattern of bits when this character is transmitted using even parity.

(3)

- (c) The parallel port uses a protocol called handshaking for the transfer of data.

- (i) What is meant by the term *protocol*?

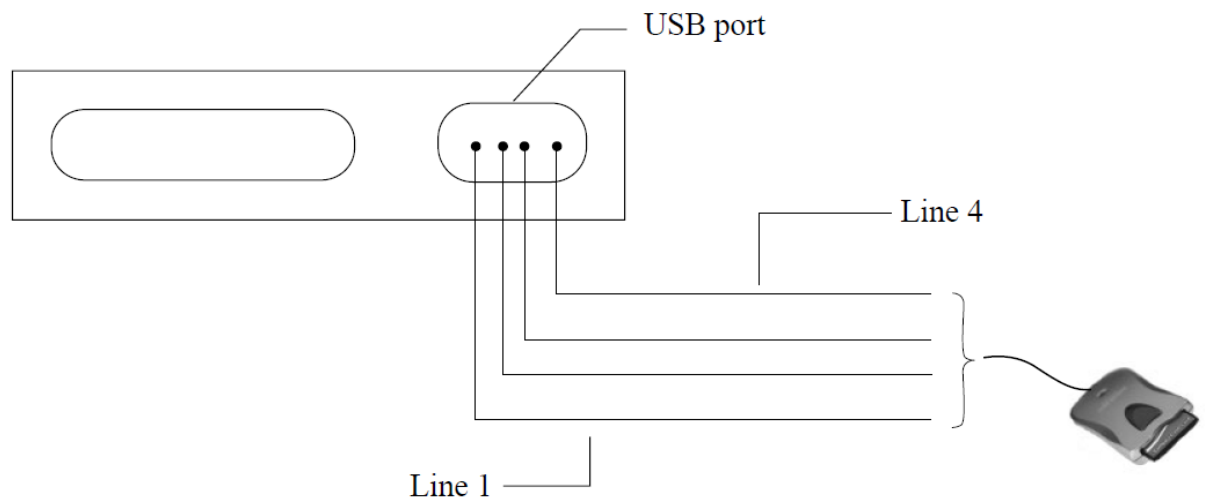
(1)

- (ii) What is meant by the term *handshaking*?

(2)

- (d) The USB port is connected to a card reader for a flash memory card which the student regularly uses to transfer files from the school's computer system to the student's home computer.

Figure 2



The **USB connection** uses 4 lines (wires).

- Line 1 is used to transfer data from the card reader to the home computer.
- Line 2 is used to transfer data from the home computer to the card reader.
- The most significant data bit is always transferred first.

(i) What does USB stand for? _____

(1)

(ii) The USB port is currently in use transferring a spreadsheet file from the memory card to the PC.

Write on **Figure 2** the pattern of bits showing the transfer of the character 'j'.

(2)

(iii) Define the term bit rate.

(1)

(Total 13 marks)

Q10.

A programming language has two different data types for storing positive integers.

Data type `Integer1` uses a single byte to store data.

Data type `Integer2` uses two consecutive bytes to store data.

(a) The program statement below defines a variable `NoOfAccidents`.

```
Var NoOfAccidents : Integer1 ;
```

What is the largest value which can be assigned to `NoOfAccidents`?

(1)

- (b) Two more program statements are:

```
Var JourneyMileageA : Integer1 ;
```

```
Var JourneyMileageB : Integer1 ;
```

Interpreter software uses address 600 for storing a value for JourneyMileageA. See **Figure 1**.

Figure 1

Address	Contents
600	0101 0001
601	1010 1010
602	1111 1100
603	
604	
~	~
~	~
700	0000 0010
701	0000 1010
702	
703	

- (i) State the **denary value** for the stored binary value.

JourneyMileageA = _____

(1)

- (ii) The program statement:

```
JourneyMileageB := 138 ;
```

stores the data value for JourneyMileageB at address 603.

What **binary value** will be stored at location 603?

(1)

- (c) Another program statement is:

Var TotalMileage : Integer2 ;

The interpreter software uses locations 700 and 701 to store a value for TotalMileage with the most significant byte stored at location 700. See **Figure 1**.

What is the **denary value** assigned to TotalMileage?

(1)

- (d) Programs also work with character data.

ASCII Code Table

Character	Decimal	Character	Decimal	Character	Decimal
<space>	32	I	73	R	82
A	65	J	74	S	83
B	66	K	75	T	84
C	67	L	76	U	85
D	68	M	77	V	86
E	69	N	78	W	87
F	70	O	79	X	88
G	71	P	80	Y	89
H	72	Q	81	Z	90

- (i) Using the ASCII code table shown above, what is the **7-bit binary ASCII** code for character 'B'?

(1)

- (ii) When a parity bit is included, character codes are stored as 8-bit binary numbers where the most significant bit is a parity bit. This system will use **even parity**.

Describe how the parity bit is used during data transmission of a single character.

(2)

(Total 7 marks)

Q11.

Figure 1 below shows an area of main memory storing a text file which is about to be sent to a printer.

Address	Contents
0	
1	
...	
...	
150	0100 0101
151	0101 1000
152	0100 0001
153	0100 1101

Table 1
ASCII Code Table

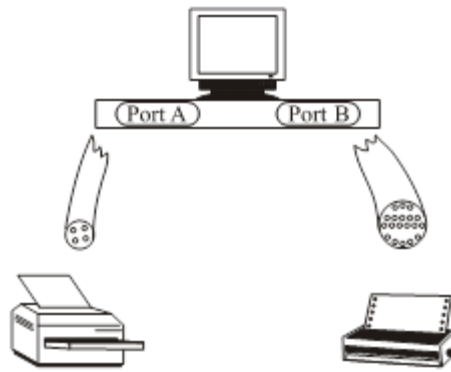
Character	Decimal	Character	Decimal	Character	Decimal
<Space>	32	I	73	R	82
A	65	J	74	S	83
B	66	K	75	T	84
C	67	L	76	U	85
D	68	M	77	V	86
E	69	N	78	W	87
F	70	O	79	X	88
G	71	P	80	Y	89
H	72	Q	81	Z	90

- (a) Assuming the first character to be printed is held at address 150, show the **first four** characters to be printed on the page. Use **Table 1**.

(3)

- (b) **Figure 2** shows there are two printers available on the PC and they are connected to the computer. One is connected to port A, the other to port B.

Figure 2



The cable which connects to port A has 4 wires and connects to a USB printer.

The cable which connects to port B has 25 wires of which eight are used for sending data bits.

- (i) What does USB stand for?

_____ (1)

- (ii) What type of data transmission occurs using Port B?

_____ (1)

- (iii) The computer communicates with the printer connected to port B using a **handshaking protocol**. Explain this term.

_____ (2)

- (iv) The port B cable uses 8 wires for data bits. Using a handshaking protocol, the other wires are used to send various signals. Name **one** signal.

_____ (1)

- (v) **Figure 1** shows the first four bytes of the text file to be printed. Name **two** necessary items of software resident in main memory at the time the printout is produced.

1. _____
2. _____

(2)

(Total 10 marks)

Q12.

- (a) In a text file, most bytes represent printable characters, for example upper case characters. Give **two** further examples.

1. _____
2. _____

(1)

- (b) A text file may also include some control characters. Give **two** examples of control characters.

1. _____
2. _____

(1)**(Total 2 marks)****Q13.**

Table 1
ASCII Code Table

Character	Decimal	Character	Decimal	Character	Decimal
<Space>	32	I	73	R	82
A	65	J	74	S	83
B	66	K	75	T	84
C	67	L	76	U	85
D	68	M	77	V	86
E	69	N	78	W	87
F	70	O	79	X	88
G	71	P	80	Y	89
H	72	Q	81	Z	90

- (a) Use the ASCII code table given in **Table 1** to look up the ASCII code for character 'V'

- (i) What is its representation when written in 7-bit binary?

--	--	--	--	--	--	--

(1)

- (ii) What is its value when expressed in 8 bits with the 8th bit an odd parity bit?

--	--	--	--	--	--	--	--

(1)

- (b) A programming language help file describes the Chr() function as follows.

Chr() takes a single integer value as its parameter.

The function returns the ASCII character represented by the parameter.

Example: Chr(65) will return value 'A'.

- (i) What is returned by Chr(68)?

(1)

- (ii) What value is assigned to variable MyChar when the following **two** statements are executed?

Value ← 9

MyChar ← Chr (65 + Value)

MyChar = _____

(1)

- (c) The algorithm which follows uses a function ConCat.

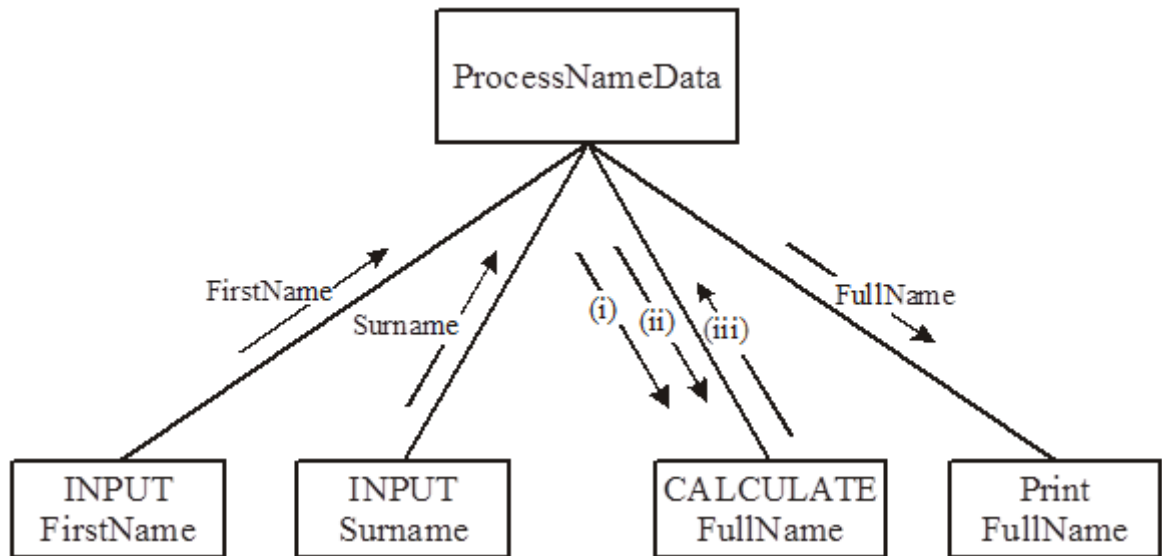
The ConCat function takes **two** strings as its parameters, and returns the concatenated string.

Example: ConCat('Fred', 'Smith') would return 'FredSmith'.

```
Procedure
  ProcessNameData
    INPUT  FirstName
    INPUT  Surname

    FullName ← ConCat (FirstName, Surname)
    PRINT  FullName
End Proc
```

The stages of this procedure ProcessNameData are shown as a structure chart below.



What are the missing labels?

(i) _____ (1)

(ii) _____ (1)

(iii) _____ (1)

- (d) **Table 2** shows an array of integers with identifier Index, to which values have been assigned.

Table 2

Index

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
0	13	-33	4	17	17	14	17

Study the following algorithm and trace its execution by completing the trace table **Table 3**, using the ASCII code table given in **Table 1**.

Final String ← ' '

For Position ← 1 To 8 Do

 NextNumber ← 65 + Index[Position]

 NextChar ← Chr (NextNumber)

 FinalString ← ConCat (FinalString, NextChar)

End For

Print FinalString

Table 3

Position	NextNumber	NextChar	FinalString
----------	------------	----------	-------------

1	65	'A'	'A'
2			

(6)

(Total 13 marks)

Q14.

The figure below shows the main memory and processor of a computer system. Data moves between these **two** components along the data bus which uses parallel data transmission.



- (a) (i) Show the binary representation for the denary value 59.

(1)

- (ii) Add to the diagram in the figure an 8-bit data bus connecting the components showing the value 59 in its binary form being transferred from the main memory to the processor.

(2)

- (b) Give **three** possible interpretations of the byte being read in part (a) (ii).

1. _____

2. _____

3. _____

(3)

(Total 6 marks)

Q15.

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.

EXAM PAPERS PRACTICE

_____ (1)

(Total 3 marks)

Q16.

- (a) The ASCII code for the character '0' (zero) is 00110000. By completing the boxes show how 27 would be represented in a 16 bit word:

- (i) as ASCII characters;

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(1)

- (ii) in pure binary (unsigned binary).

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(1)

- (b) Unicode is another coding system for characters. Why is it **not** possible to code 27 into the 16 bit word using Unicode?

(1)

- (c) What is the largest value that can be stored in a 16 bit word when the following coding systems are used?

Pure binary (unsigned binary)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(1)

(Total 4 marks)

Q17.

Bit patterns can be interpreted in a number of different ways. A computer word contains the bit pattern 0011 0100.

- (a) What is its decimal value if it represents:

a pure binary integer; _____

(1)

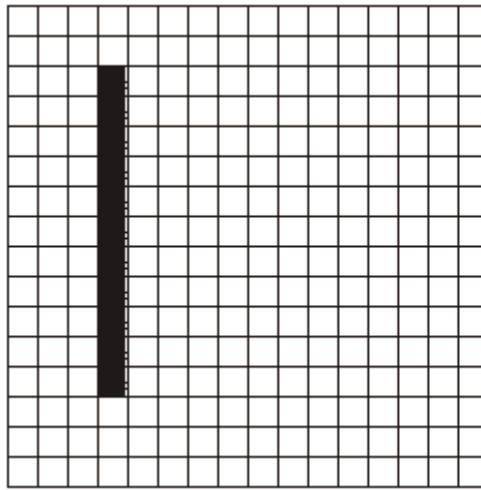
- (b) (i) The ASCII value for the character '0' (zero) is 48. What character is represented by 0011 0100?

(1)

- (ii) Name one other standard coding system for coding information expressed in character or text-based form.

(1)

- (c) One method of representing graphics in a computer system is as bit mapped graphics.



The black line on the left might be represented as

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- (i) Describe how a coloured line might be represented.

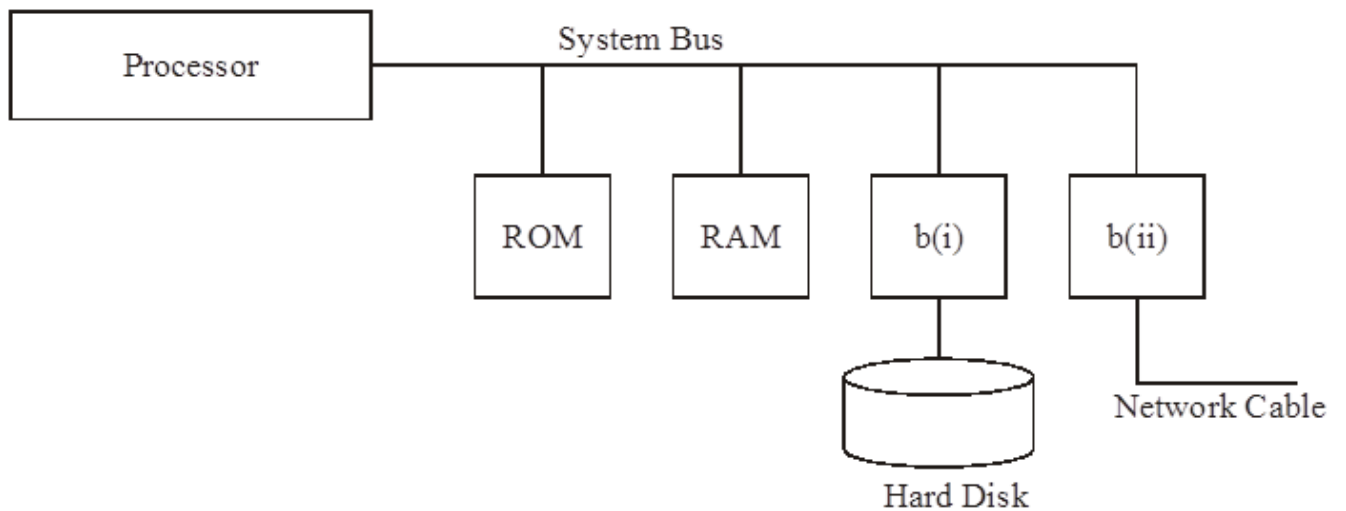
(2)

- (ii) Describe how a line would be stored using vector graphics.

(3)

EXAM PAPERS PRACTICE (Total 8 marks)

Q18.



- (a) The diagram above represents part of a computer system. Give the full name of **each** of the following:
- (i) ROM _____ (1)
- (ii) RAM _____ (1)
- (b) In the diagram above, what are the parts labelled (b)(i) and (b)(ii)?
- (i) _____ (1)
- (ii) _____ (1)
- (c) The system bus normally consists of three buses. Give the names of each of these **three** buses.
1. _____
2. _____
3. _____ (3)
- (d) What is meant by the stored program concept?
- _____
- _____
- _____ (2)
- (e) Parity bits are used to ensure the accuracy of stored data.
- (i) What is meant by even parity?
- _____
- _____ (1)
- (ii) Briefly describe how parity bits are used.
- _____
- _____
- _____ (2)

(Total 12 marks)

Q19.

- (a) Name **two** different coding systems used to represent characters in a computer system.

1. _____
2. _____

(2)

- (b) In one coding system the character digits are assigned the decimal number codes 48 to 57.

The operators DIV and MOD perform integer arithmetic.
 x DIV y calculates how many times y divides into x,
 for example 7 DIV 3 = 2.
 x MOD y calculates the remainder that results after the division,
 for example 7 MOD 3 = 1.

- (i) The following algorithm uses an array Result. Dry run this algorithm by completing the trace table below.

```

x ← 835
Index ← 0
Repeat
  Index ← Index + 1
  Result[Index] ← x MOD 10 + 48
  x ← x DIV 10
UNTIL x = 0
  
```

x	Index	Result		
		[3]	[2]	[1]
835	0	–	–	–
83	1	–	–	53

(6)

- (ii) Explain the purpose of the algorithm.

(1)**(Total 9 marks)****Q20.**

- (a) How many bytes are 1 Kilobyte? _____

(1)

- (b) A computer system uses 2 bytes to store a number.

(i) What is the largest pure binary integer it can store? _____ (1)

What is the bit pattern if the number 37 is to be stored as

(ii) a pure binary integer?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(1)

- (c) The ASCII coding system uses seven bits to code a character. The character digits 0 to 9 are assigned the decimal number codes 48 to 57. An extra bit is used as a parity bit. A computer system uses the most significant bit (MSB) as a parity bit for each byte and works with **even** parity.

(i) What is the bit pattern if the digits 37 are to be stored as characters?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(3)

(ii) Explain how the parity bit is used by this computer system.

(2)

(Total 8 marks)

EXAM PAPERS PRACTICE

Q21.

Bit patterns can be interpreted in a number of different ways.

- (a) A computer word contains the bit pattern 0001 0111.

What is its decimal value if it represents a pure binary integer

(1)

- (b) A computer system uses **odd** parity. The most significant bit (MSB) is used as a parity bit. The ASCII value for the character '!' is decimal number 33.

(i) What would be the 8-bit binary pattern to represent the character '!'?

MSB							
-----	--	--	--	--	--	--	--

(2)

- (ii) Asynchronous data transmission is used if one character is sent at a time. One start bit marks the beginning of a character and one stop bit marks the end of a character.

What would be the bit pattern if the character '!' above is sent using asynchronous data transmission?

--	--	--	--	--	--	--	--	--	--

(1)
(Total 4 marks)

Q22.

Bit patterns can be interpreted in a number of different ways. A computer word contains the bit pattern 0011 0110.

- (a) What is its decimal value if it represents a pure binary integer

(1)

- (b) (i) The ASCII value for the character '2' is 50. What is the character stored in the computer word 0011 0100?

(2)

- (ii) Name **one** other standard coding system for coding information expressed in character or text-based form.

(1)

- (c) One method of storing graphics in a computer system is as vector graphics.

- (i) Name **one** other method.

(1)

- (ii) Describe how a black-and-white image would be stored using your method.

(2)
(Total 7 marks)

Q23.

- (a) The ASCII coding system uses 7 bits to code a character. The eighth bit is used as

a parity bit. Explain how a parity bit is used when transmitting ASCII codes using even parity.

(3)

- (b) What is the relationship between bit rate and bandwidth?

(1)

(Total 4 marks)

Q24.

- (a) Data can be stored inside a computer system in several different representations. The number 25 is to be stored in a 16-bit word.

What is the bit pattern if the number 25 is to be stored as a pure binary integer

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(1)

- (b) The ASCII code for the character '3' is the decimal number 51.

- (i) What is the ASCII code for the character '5'? _____

(1)

- (ii) If eight bits are used to store one character, what is the bit pattern when the string '25' is stored in a 16-bit word?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(2)

(Total 4 marks)

Q25.

- (a) Data communication involves sending and receiving data. This can be either serial or parallel transmission. What is meant by:

- (i) serial transmission of data; _____

(1)

- (ii) parallel transmission of data? _____

(1)

- (b) Explain the term *baud rate* in the context of data transmission.

(1)

- (c) A computer system uses even parity. The most significant bit is used as a parity bit. The ASCII code of the character '&' is decimal number 38.

- (i) What would be the 8-bit binary pattern transmitted if the character '&' is sent?

(2)

- (ii) Asynchronous data transmission is used if one character is sent at a time. One start bit marks the beginning of a character and two stop bits mark the end of a character. What would be the bit pattern if the character '&' is sent using asynchronous data transmission?

(1)

(Total 6 marks)

Q26.

- (a) A unique numerical code, occupying a single byte, is generated for each key pressed on a computer's keyboard. What is meant by a byte?

(1)

- (b) In one coding system, the character digits 0 to 9 are assigned the decimal number codes 48 to 57 and the letters A to Z the decimal number codes 65 to 90. Which keys produce the following codes?

- (i) 0100 0001_____

(1)

- (ii) 0011 1001_____

(1)

- (c) A number is entered at the keyboard as a sequence of character digits. This sequence is processed to convert the code representation into its decimal integer value using the following algorithm:

```
Number ← 0
While more character digits Do
    get next character digit
    and store its ASCII code in the variable Code
    Number ← Number * 10 + Code - 48
EndWhile
```

Complete the trace table for the sequence 7321.

Code	Number
–	0
55	7

(6)
(Total 9 marks)

Q27.

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.



EXAM PAPERS PRACTICE

National Lottery Entry Form					
Which draw?	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -
Wed ---	- 6 -	- 7 -	- 8 -	- 9 -	-10-
	-11-	-12-	-13-	-14-	-15-
Sat ---	-16-	-17-	-18-	-19-	-20-
	-21-	-22-	-23-	-24-	-25-
Both ---	-26-	-27-	-28-	-29-	-30-
	-31-	-32-	-33-	-34-	-35-
	-36-	-37-	-38-	-39-	-40-
	-41-	-42-	-43-	-44-	-45-
	-46-	-47-	-48-	-49-	

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**.

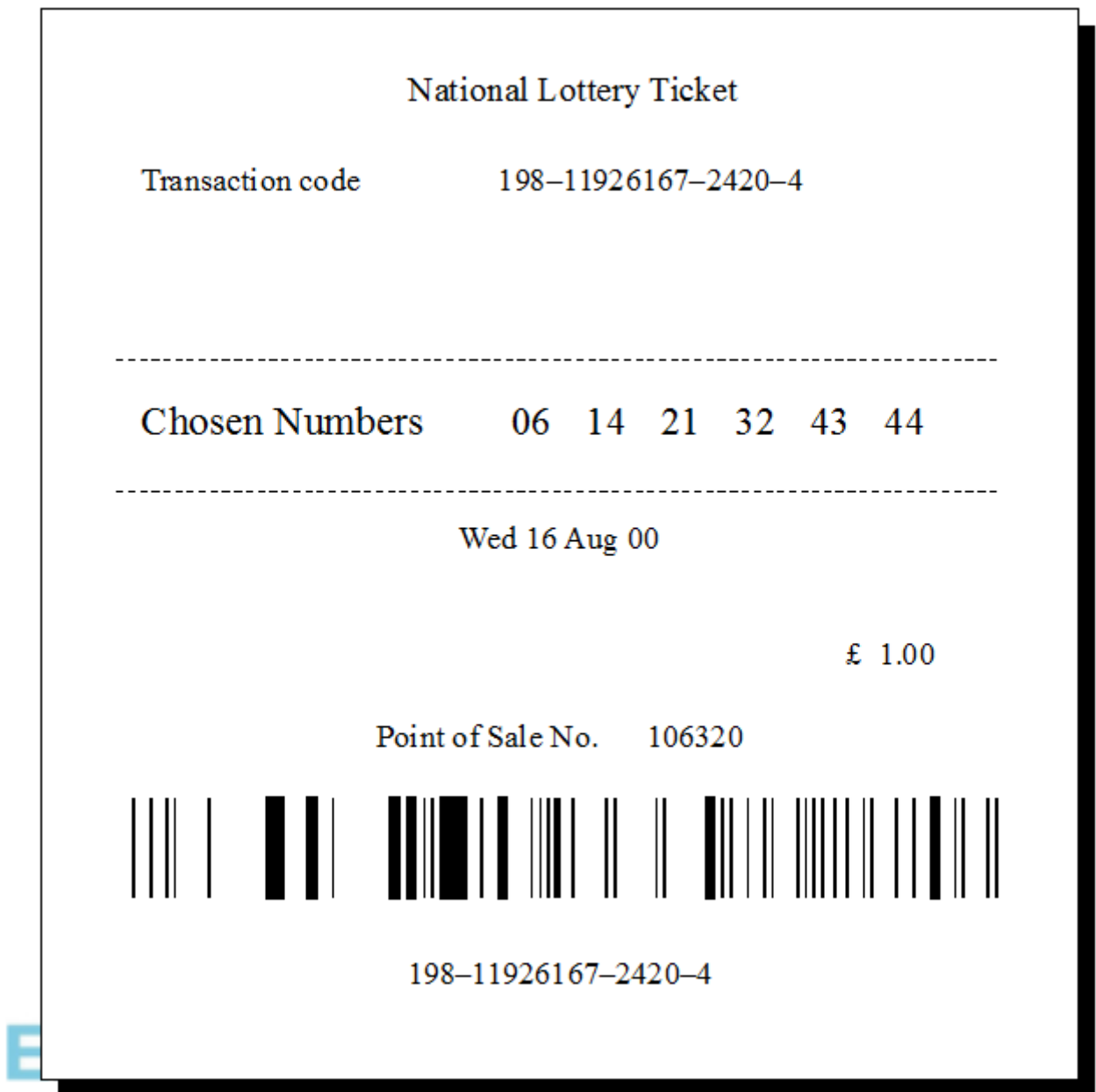


Figure 2

- (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.

EXAM PAPERS PRACTICE

(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)

Q28.

A particular location in computer memory holds 32 bits.

- (a) Give **three** different interpretations that may be associated with this pattern of bits.

1. _____

2. _____

3. _____

(3)

- (b) How does the computer “decide” which interpretation to use?

(1)

(Total 4 marks)



EXAM PAPERS PRACTICE