Candidate surname | Other names

Centre Number | Candidate Number

Monday 13 May 2019

Morning (Time: 1 hour 40 minutes) | Paper Reference **1CP1/01**

Computer Science

Paper 1: Principles of Computer Science

You do not need any other materials. | Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- You are not allowed to use a calculator.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ⊠. If you change your mind about an answer, put a line through the box ⊠ and then mark your new answer with a cross ⊠.

1 A car park uses a number plate recognition system.

(a) Identify the reason why unsigned integers should be used to record the number of cars entering and leaving the car park, rather than signed integers.

(1)

⊠ **A** Unsigned integers are more accurate

⊠ **B** Unsigned integers cannot have overflow errors

⊠ **C** Unsigned integers store more positive values

⊠ **D** Unsigned integers do not use a parity bit

(b) The system uses a hard disc to store images of car number plates.

One kilobyte is 1024 bytes.

Construct an expression that calculates how many bytes there are in **four** terabytes of disc storage.

You do not need to carry out the calculation.

(2)

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(c) Customers pay online in advance to use the car park. Members of staff do not have to pay.

When a car arrives at the exit barrier, the system checks **three** conditions:
1) The number plate (P) has been recorded by the system.
2) Enough time (T) has been paid for.
3) The car belongs to a member of staff (S).

Construct a Boolean logic statement, using P, T and S, to represent the conditions necessary for the system to raise the exit barrier.

(2)

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P 5 6 2 3 1 A 0 2 2 0

(d) The ASCII code for the character 'R' is 82 in denary.

Derive the ASCII code for the character 'D' in 8-bit binary.

(2)

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(e) Explain why the car park system encrypts the data it stores.

(2)

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(Total for Question 1 = 9 marks)

2 A hotel chain stores guest information in a structured database.

(a) Describe how guest information would be structured in a database.

(2)

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(b) The chain has hotels in several countries.

State the type of network needed to connect these hotels to the head office.

(1)

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(c) The hotel chain is considering replacing local backup methods with 'cloud' storage.

Discuss the advantages and disadvantages of using 'cloud' storage for backup.

(6)

(d) Identify the protocol used to transfer data in networks.

(1)

☒ **A** HTML

☒ **B** TCP/IP

☒ **C** ISP

☒ **D** URL

(e) Describe a mesh network topology.

(2)

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(Total for Question 2 = 12 marks)

3 A teacher uses tablet computers with students to teach programming online.

(a) Describe how data is stored on solid state devices.

(3)

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(b) State **two** functions of utility software.

(2)

1 ....

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2 ....

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(c) Here is a uniform resource locator.

https://www.pearson.co.uk/secondary/programming/python.html

Draw a circle around the protocol and a rectangle around the domain name.

(2)

(d) Discuss the features of high-level and low-level programming languages.

(6)

(Total for Question 3 = 13 marks)

4 A baby monitor uses a microphone to record sound.

(a) An analogue to digital converter is used to change the sounds received by the microphone into a form that can be processed by a computer.

(i) Complete the diagram to show sampling frequency and label both axes.

(3)
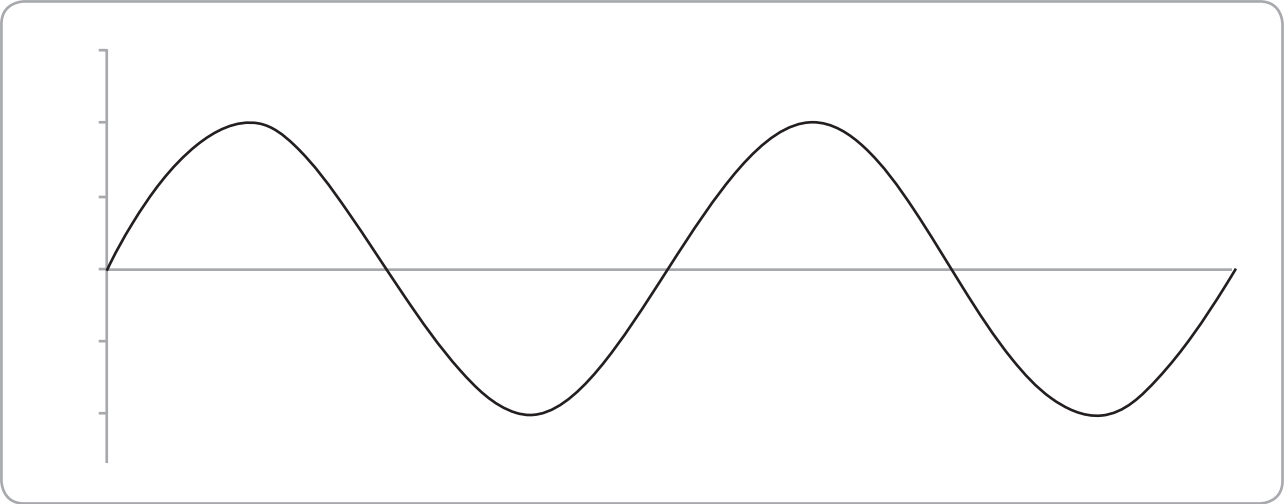
(ii) State the advantage of using a bit depth of 16 rather than a bit depth of 8.

(1)

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(b) Identify the hardware component that holds a program that is currently being executed.

(1)

☒ **A** ALU

☒ **B** RAM

☒ **C** Hard drive

☒ **D** Control unit

(c) Construct an expression to show how many seconds it will take to transmit 20 MB of data using a network transmission speed of 2 Mbps

1 KB = 1024 bytes.

You do not have to do the calculation.

(4)

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(d) Describe how an embedded system within a baby monitor can be used to alert parents about changes in room temperature.

(3)

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(e) The diagram shows two **different** types of connectivity media.

State the different types of connectivity media used at A and B.

(2)

Customer's home

Green-coloured street cabinet

Local telephone exchange

B

A
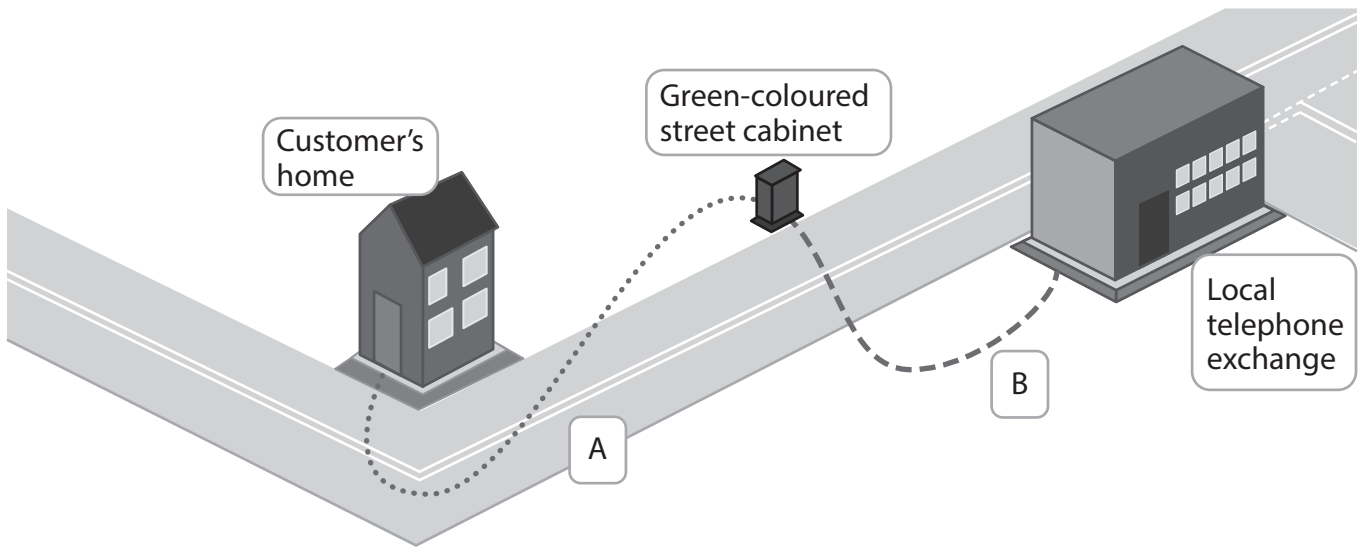
A ....

B ....

(Total for Question 4 = 14 marks)

5 Computers carry out mathematical operations.

(a) Give the result of applying a logical shift left by 2 to the 8-bit binary pattern 00110110.

(1)

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(b) Describe the function of the component labelled A.

(2)

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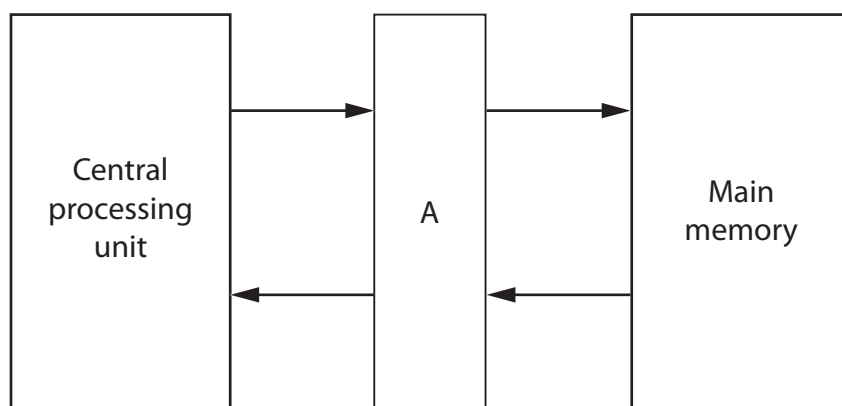
(c) (i) Convert the binary number 00111101 to hexadecimal.

(2)

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(ii) Explain why hexadecimal notation is used.

(2)

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(d) Describe the role of the control unit, the data bus and the address bus when fetching an instruction from memory.

(4)

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(e) State why a binary search algorithm will not be appropriate for use with this sequence of numbers.

| 55 | 33 | 2 | 47 | 90 | 105 | 44 | 3 |

(1)

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(Total for Question 5 = 12 marks)

6 A computer stores images online.

(a) An image uses 8-bit colour and is 64 pixels wide.

It uses 1MB of storage.

Construct an expression to calculate the height of the image in pixels.

1 KB = 1024 bytes

You do not have to do the calculation.

(2)

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(b) The computer runs seven applications, at the same time.

The sum of their memory usage exceeds that of physical memory.

However, all seven applications run.

Describe how the operating system uses virtual memory to manage the situation.

(4)

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(c) A code review is an important stage in software development.

State the purpose of a code review.

(1)

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(d) This notification appears on a computer screen.

Thank you for clicking our link.
Your important files are no longer accessible.

Can I get access to my files?
Yes, you can. Simply send your payment as described below.

How long do I have?
14 days.

How do I pay?
Send £500 in Bitcoin to abc123def456ghi789.

Describe how this cyber attack operates.

(3)

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(Total for Question 6 = 10 marks)

7 The internet is the world's largest network.

(a) One function of a router is to forward data packets from one network to another across the internet.

Describe how a router carries out this function.

(2)

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(b) Explain why it is important to review network and user policies.

(2)

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(c) The transport layer of network protocols splits data into packets before sending it.

Describe the process that ensures the data received matches the original.

(2)

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(d) Inclusion is an ethical concern.

A school has decided to allow students to bring their own digital device to use in class.

Assess the impact of the school's decision on its ability to be inclusive.

(4)

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(Total for Question 7 = 10 marks)

TOTAL FOR PAPER = 80 MARKS

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