

## **Questions**

Q1.

### **Issues and impact**

Students are asked to sign an acceptable use policy.

Explain **one** way that an acceptable use policy helps to protect student data.

(2)

.....

.....

.....

.....

**(Total for question = 2 marks)**

Q2.

### **Issues and impact**

Identify the ethical issue associated with the use of artificial intelligence.

(1)

- A** Acceptable use policies
- B** Algorithmic bias
- C** Logic errors
- D** Unpatched software

**(Total for question = 1 mark)**

Q3.

Here is an algorithm.

```
1 myNumber = 0
2
3 myNumber = int (input ("Enter a whole number between 1 and 100:"))
4
5 if (myNumber < 1):
6     print ("Too low")
7 elif (myNumber > 100):
8     print ("Too high")
9 elif (myNumber % 10 == 0):
10    print ("Nice round number")
11 elif (myNumber == 100):
12    print ("That's the biggest number")
13 else:
14    print ("Good choice")
```

Complete the table to show the output for the given input.

(4)

Input	Output
200	
33	
100	
0	

**(Total for question = 4 marks)**

Q4.

### **Private Postal People (P-Cubed)**

Private Postal People (P-Cubed) is a national delivery service specialising in small letters, large letters, small packages, and medium packages. The company has regional depots across the

country. The company runs a fleet of delivery vans. It uses technology to help run the business. It does not deliver internationally.

P-Cubed has 2000 employees, some based in the head office, some working in the regional sorting offices and some driving the delivery vans.

During the period leading up to the Christmas holidays, P-Cubed hires temporary staff. Staff are hired for each of the six weeks prior to Christmas week.

Here is the pseudo-code for an algorithm that calculates the number of additional staff needed for each week.

```

2 # Percentage of staff needed in 6 weeks prior to Christmas
3 SET weekNumber TO ["-6", "-5", "-4", "-3", "-2", "-1"]
4 SET staffRates TO [105, 110, 115, 120, 125, 130]
5 SET goodInput TO False
6
7 # Validate the input
8 WHILE (goodInput = False) DO
9     SEND "Please enter the number of staff on week -7" TO DISPLAY
10    RECEIVE currentCount FROM (INTEGER) KEYBOARD
11
12    IF (currentCount >= 200) THEN
13        SET goodInput TO True
14        SEND "Staff on week -7 is " & currentCount TO DISPLAY
15    ELSE
16        SEND "Invalid input" TO DISPLAY
17    END IF
18 END WHILE
19
20 # Print requirements
21 FOR i FROM 0 TO (LENGTH(weekNumber)-1)
22     SET percentage TO staffRates[i] / 100
23     SET neededStaff TO currentCount * percentage
24     SEND "Week " & i & "needs " & neededStaff & "staff" TO DISPLAY
25 END FOR

```

Complete the trace table to show execution of lines 21 to 25 of the pseudo-code for the fourth week before Christmas when the user enters the value 300.

(6)

currentCount	i	LENGTH(weekNumber)	percentage	staffRates[i]	neededStaff

**(Total for question = 6 marks)**



Q6.

### Margaret's Ice Cream Kiosk

Margaret runs an ice cream kiosk in a seaside town. She makes and sells ice cream. She also sells sweets, hot and cold drinks, and cookies.

A pseudocode algorithm that manipulates sales figures is shown.

```
2 SET num TO 0
3 SET x TO 999
4 SET y TO 0
5
6 FOR EACH num FROM "SalesFile.txt" DO
7     IF (num < x) THEN
8         SET x TO num
9     IF (num > y) THEN
10        SET y TO num
11 END FOREACH
12
13 SEND x & " " & y TO DISPLAY
```

(i) The first four inputs from the file to the algorithm are 355, 554, 199, and 409.

Complete the trace table showing the execution of the pseudocode with these four inputs. You may not need to fill in all the rows in the table.

(6)



```
2
3 SET change TO payment - cost
4 SET pence TO change * 100
5 SET tens TO pence DIV 1000
6 SET pence TO pence MOD 1000
7 SET fives TO pence DIV 500
8 SET pence TO pence MOD 500
9 SET ones TO pence DIV 100
10 SET ones TO pence MOD 100
11 SET fiftyP TO pence DIV 50
12 SET pence TO pence MOD 50
13 SET twentyP TO pence DIV 20
14 SET pence TO pence MOD 20
15 SET tenP TO pence DIV 10
16 SET pence TO pence MOD 10
17 SET fiveP TO pence DIV 5
18 SET pence TO pence MOD 5
19
```

(i) Explain why integer division (DIV) and modulus (MOD) rather than division (/) are used in this algorithm.

(2)

.....  
.....  
.....  
.....

(ii) Complete the trace table showing the execution of the code when change = 17.55

You may not need to fill in all the rows in the table.

(5)

pence	tens	fives	ones	fiftyP	twentyP	tenP	fiveP
1755							

**(Total for question = 7 marks)**

Q8.

A computer programmer uses a programming language to write a stock control program for The HappyPetBox Company.

Here is a pseudo-code algorithm that identifies which product has the fewest sales in the month.



```

1
2 # HappyPetBox Stock Control
3 # Sales in one month for each product
4 # Cat, Small dog, Medium dog, Large dog
5
6
7 SET sales TO [55,65, 40, 45]
8
9 SET lowest TO 100
10 SET count TO 0
11 SET boxID TO 0
12
13 FOR count FROM 0 TO 3 DO
14     IF sales[count] < lowest THEN
15         SET lowest TO sales[count]
16         SET boxID TO count
17     END IF
18 END FOR
19
20

```

(i) Complete the table to identify line numbers for each feature of the program.

(4)

Program feature	Line number(s)
Indentation	
Iteration	
Comments	
Data structure	

(ii) Complete the trace table to show the execution of the pseudo-code. You may not need to fill in all the rows in the table.

(5)

count	sales[count]	lowest	boxID

**(Total for question = 9 marks)**

## Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
	<p>Award <b>1</b> mark for the identification of a way (1) with a linked justification/exemplification (1), up to a maximum of <b>2</b> marks.</p> <ul style="list-style-type: none"><li>• Students are deterred from unsafe practices (1) because consequences are clarified (1).</li><li>• People follow safe/good practices (1) because permitted activities are defined/set out (1).</li></ul> <p>Accept any other appropriate response.</p>		<b>(2)</b>

Q2.

Question Number	Answer	Additional Guidance	Mark
	<p>B Algorithmic bias</p> <p><i>A is not correct because AUPs are not an ethical issue associated with the use of artificial intelligence</i></p> <p><i>C is not correct because logic errors are not an ethical issue associated with the use of artificial intelligence</i></p> <p><i>D is not correct because unpatched software is not an ethical issue associated with the use of artificial intelligence</i></p>		<b>1</b>

Q3.

Question Number	Answer	Additional Guidance	Mark										
	One for each correct cell.	<ul style="list-style-type: none"> <li>Ignore spelling</li> </ul>											
	<table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>200</td> <td>Too high (1)</td> </tr> <tr> <td>33</td> <td>Good choice (1)</td> </tr> <tr> <td>100</td> <td>Nice round number (1)</td> </tr> <tr> <td>0</td> <td>Too low (1)</td> </tr> </tbody> </table>	Input	Output	200	Too high (1)	33	Good choice (1)	100	Nice round number (1)	0	Too low (1)		
Input	Output												
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			<b>4</b>										

Q4.

Question Number	Answer	Additional Guidance	Mark												
	One mark for each correct cell.	<ul style="list-style-type: none"> <li>If the calculation is wrong on line 22 (percentage), award a follow through to line 23 (neededStaff = 300 * percentage)</li> <li>Award equivalent expressions</li> </ul>													
	<table border="1"> <thead> <tr> <th>currentCount</th> <th>i</th> <th>LENGTH(weekNumber)</th> </tr> </thead> <tbody> <tr> <td>300</td> <td>2</td> <td>6</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>percentage</th> <th>staffRates[i]</th> <th>neededStaff</th> </tr> </thead> <tbody> <tr> <td>1.15</td> <td>115</td> <td>345</td> </tr> </tbody> </table>	currentCount	i	LENGTH(weekNumber)	300	2	6	percentage	staffRates[i]	neededStaff	1.15	115	345		
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Q5.

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	<p><b>1</b> mark for initialising all variables and <b>1</b> mark for each correct pass through the loop.</p> <table border="1"> <thead> <tr> <th>num</th> <th>x</th> <th>y</th> <th>Display</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>999</td> <td>0</td> <td></td> <td>(1)</td> </tr> <tr> <td>355</td> <td>355</td> <td>355</td> <td></td> <td>(1)</td> </tr> <tr> <td>554</td> <td></td> <td>554</td> <td></td> <td>(1)</td> </tr> <tr> <td>199</td> <td>199</td> <td></td> <td></td> <td>(1)</td> </tr> <tr> <td>409</td> <td></td> <td></td> <td></td> <td>(1)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>199 554</td> <td>(1)</td> </tr> </tbody> </table>	num	x	y	Display	Marks	0	999	0		(1)	355	355	355		(1)	554		554		(1)	199	199			(1)	409				(1)				199 554	(1)	<ul style="list-style-type: none"> <li>• Award alternative versions of the trace table if correct. For example, copying of values that do not change.</li> <li>• Passes are incorrect if display is indicated.</li> <li>• Display must be after the final pass (on a separate line in the table).</li> </ul>	<b>(6)</b>
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Q6.

Question Number	Answer	Additional Guidance	Mark																																			
(i)	<p>One mark for initialising all variables and one mark for each correct pass through the loop.</p> <table border="1"> <thead> <tr> <th>num</th> <th>x</th> <th>y</th> <th>Display</th> <th></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>999</td> <td>0</td> <td></td> <td>(1)</td> </tr> <tr> <td>355</td> <td>355</td> <td>355</td> <td></td> <td>(1)</td> </tr> <tr> <td>554</td> <td></td> <td>554</td> <td></td> <td>(1)</td> </tr> <tr> <td>199</td> <td>199</td> <td></td> <td></td> <td>(1)</td> </tr> <tr> <td>409</td> <td></td> <td></td> <td></td> <td>(1)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>199 554</td> <td>(1)</td> </tr> </tbody> </table>	num	x	y	Display		0	999	0		(1)	355	355	355		(1)	554		554		(1)	199	199			(1)	409				(1)				199 554	(1)	<ul style="list-style-type: none"> <li>• Award alternative versions of the trace table if correct, for example, copying of values that do not change.</li> <li>• Passes are incorrect if display is indicated.</li> <li>• Display must be after the final pass (on a separate line in the table)</li> </ul>	<b>6</b>
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Question Number	Answer	Additional Guidance	Mark
(ii)	To identify the minimum/lowest number and the maximum/highest number (1)		1

Q7.

Question Number	Answer	Mark
(i)	<p>An explanation such as:</p> <ul style="list-style-type: none"> <li>Using normal division results in real numbers (1) which when rounded to two decimal places could result in errors / pence that don't add up to 100 / the machine might give incorrect amount of change (1)</li> <li>Amount has been converted into whole numbers of pence therefore the calculations need to produce a remainder in whole numbers of pence (1) and the correct number of notes and coins (1)</li> </ul>	2

Question Number	Answer	Mark
(ii)	One mark for each part of the logic illustrated in the overall flow	5

pence	tens	fives	ones	fiftyP	twentyP	tenP	fiveP	
1755	1							(1)
755		1						(1)
255			2					
55				1				(1)
5					0			
5						0		(1)
5							1	
0								(1)

Q8.

Question Number	Answer	Additional Guidance	Mark										
(i)	<table border="1"> <thead> <tr> <th>Program feature</th> <th>Line number(s)</th> </tr> </thead> <tbody> <tr> <td>Indentation</td> <td>14 - 17 / 14 (1)</td> </tr> <tr> <td>Iteration</td> <td>13 - 18 / 13 (1)</td> </tr> <tr> <td>Comments</td> <td>2 / 3 / 4 (1)</td> </tr> <tr> <td>Data structure</td> <td>7 / 14 / 15 (1)</td> </tr> </tbody> </table>	Program feature	Line number(s)	Indentation	14 - 17 / 14 (1)	Iteration	13 - 18 / 13 (1)	Comments	2 / 3 / 4 (1)	Data structure	7 / 14 / 15 (1)		4
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Question Number	Answer	Additional Guidance	Mark																								
(ii)	<p>One mark for each correct row showing variable change.</p> <table border="1"> <thead> <tr> <th>count</th> <th>sales[count]</th> <th>lowest</th> <th>boxID</th> </tr> </thead> <tbody> <tr> <td>0</td> <td></td> <td>100</td> <td>0</td> </tr> <tr> <td></td> <td>55</td> <td>55</td> <td></td> </tr> <tr> <td>1</td> <td>65</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>40</td> <td>40</td> <td>2</td> </tr> <tr> <td>3</td> <td><b>45</b></td> <td></td> <td></td> </tr> </tbody> </table>	count	sales[count]	lowest	boxID	0		100	0		55	55		1	65			2	40	40	2	3	<b>45</b>			<ul style="list-style-type: none"> <li>Layout utilising additional rows accepted.</li> </ul>	5
count	sales[count]	lowest	boxID																								
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