Chhetri Academy

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GCSE COMPUTER SCIENCE

5.2

Edexcel 1CP2 | Specification point 5.2.2

Ethical and legal issues associated with the use of artificial intelligence, machine learning and...

Untiered

Past paper question booklet

3	2016-2023	Untiered
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

5 Artificial intelligence is an emerging trend in computer science.

*(a) Discuss the use of artificial intelligence by describing some of its characteristics, the ways in which it may be used and the ethical issues associated with its use.

(6)

(b) Assembly language can be used to implement artificial intelligence algorithms.

Here is a subset of an assembly language instruction set.

Operation	Assembler	Action
Multiply	MUL {condition} Rd, Rm, Rs	Multiplies the contents of Register m by the contents of Register s and stores the result in Register d
Subtract	SUB {condition} Rd, Rn, #<value>	Subtracts <value> from the contents of Register n and stores the result in Register d
Move	MOV {condition} Rd, #<value>	Moves <value> into Register d
	MOV {condition} Rd, Rm	Moves the contents of Register m into Register d
Compare	CMP {condition} Rn, #<value>	Compares <value> with the value in Register n
Branch	B {condition} label	Branch

Condition - Mnemonic	Description
EQ	Equal

Here is an assembly language program.

Line number			
245		MOV	R3,#1
246		MOV	R4,#2
247		MOV	R5,#4
248	L1:	CMP	R5,#0
249		BEQ	L10
250		MUL	R3,R3,R4
251		SUB	R5,R5,#1
252		B	L1
253	L10:		

(i) Complete the trace table showing the changes in the values of R3, R4 and R5 during execution of the program.

(5)

R3	R4	R5

(ii) State the purpose of this algorithm.

(1)

.....

.....

The assembly language instructions, like those above, are made up of two distinct parts.

(iii) Using the instruction MOV R4,#2 as an example, state the name of each part of this instruction.

(2)

MOV .....

R4,#2 .....

The assembly language program is repeated here.

Line number			
245		MOV	R3,#1
246		MOV	R4,#2
247		MOV	R5,#4
248	L1:	CMP	R5,#0
249		BEQ	L10
250		MUL	R3,R3,R4
251		SUB	R5,R5,#1
252		B	L1
253	L10:		

(iv) Use any programming language or notation that you know to complete the high-level language equivalent of the assembly language program.

(3)

(Total for Question 5 = 17 marks)

4 Issues and impact

(a) Explain **one** reason why files should be backed up regularly.

(2)

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(b) Consent must be obtained before organisations can use personal data.

Give **two** pieces of information that organisations must tell people when requesting consent to use their personal data.

(2)

1 .....

.....

2 .....

.....

(c) Police forces use algorithms to help decide how many officers to deploy and where to send them.

Discuss how algorithmic bias can affect the decisions police forces make.

Your answer should consider:

- the cause of algorithmic bias
- the impact on individuals and communities of algorithmic bias
- the methods available to reduce the risk of algorithmic bias.

(6)

(Total for Question 4 = 10 marks)

3 Issues and impact

(a) Computer worms are a type of malware.

Describe **one** way that a worm can move from machine to machine.

(2)

(b) The source code of a software application is automatically copyrighted.

State **one other** method of intellectual property protection to control who can use a software application.

(1)

(c) Computer programs control some aeroplane landings.

Explain **one** reason computers are **not** capable of safely controlling all aeroplane landings.

(2)

(d) Large amounts of water are used to manufacture computer chips.

Describe **one** way this impacts the environment.

(2)

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(e) There are ethical and legal issues with the collection and use of personal data.

Complete the table with the ethical or legal issue for each situation.

One row has been completed for you.

(2)

Situation	Ethical or legal issue
An online learning platform publishes data about how students answer questions.	Consent
A teacher uses another teacher's login to change student grades.	
A school displays closed-circuit television (CCTV) screens in a public area.	

(Total for Question 3 = 9 marks)