6. Automated and emerging technologies

6.3 Artificial intelligence

Marking scheme

Q1)

Question	Answer	Marks
(a)	**Three** from: • Rule base • Knowledge base • Interface	3
(b)	Any **two** from: • It makes decisions • … by **applying** the <u>rules/logic</u> to the <u>facts/knowledge</u> … • … to provide a result/diagnosis	2

Q2)

Question	Answer	Marks
(a)	• Interface • Knowledge base	2
(b)	Any **two** from: • **Stores** the rules for the system • … for the inference engine to use • Used to link the facts in the knowledge base	2

Q3)

Question	Answer	Marks
(a)	Any **one** from: – The ability to learn/adapt // machine learning abilities – The collection of data and the rules for using that data – The ability to reason // has problem solving abilities // makes predictions – Simulates intelligent/human behaviour – Analyses patterns	1
(b)	Any **six** from: – It has an interface … – … used to input data/view output – It has a knowledge base – It has a rule base – It has an inference engine – Applies the rule base to/and the knowledge base to provide output/diagnosis/result/solution/decision – Decides what to ask next based on the data input	6

Q4)

Question	Answer	Marks
(a)	**One** mark for each correct term, in the correct order: – Knowledge base – Inference engine – Rule base // knowledge base – Knowledge base // rule base – Interface	5

Question	Answer	Marks
(b)	Any **four** from: e.g. – It is a form of artificial intelligence – Means it can adapt/change (its own processes) // It can edit its own algorithms – It can edit its own data – It can be trained – … this can be supervised/unsupervised – … meaning it can learn with/without human interaction – Analyses patterns and stores **successful/unsuccessful** results … – … to influence future decisions – (Supervised) means a user tells the system the input and output – (Unsupervised) means the system is given the input and needs to work out the output	4

Q5)

Question	Answer	Marks
(a)	Any **two** from: • The **simulation** of intelligent behaviours by computers • A collection of data and the rules for using that data • Has the ability to reason • Has the ability to learn/adapt	2
(b)	Any **five** from: • The user will enter data into the **interface** // The user will plug the car into an **interface** // The user is given questions using the **interface** • The **inference engine** will decide which questions to ask • … by using the previous answers given • The **inference engine** will decide on a diagnosis • … by **comparing the data/answers** entered to the **knowledge base** and **rule base** • … by calculating which option is most likely if there are multiple • The **interface** will output the **diagnosis/result** • The **explanation system** shows **how** the diagnosis was reached	5

Q6)

Question	Answer	Marks
(a)	**One** mark for each correct term in the correct order. • artificial • interface • inference engine • knowledge base • rule base • inference engine • interface	7
(b)	Machine learning	1

Q7)

(b)	• Knowledge base • Rule base • Inference engine	3
(c)	Any **three** from: For example: • It could **gather data** during **vacuuming** • … and adapt its **own processes** • … such as where obstacles are placed in the room • … such as where dirtier areas are • … such as a path through a room • … such as the shape of a room • … such as the most efficient route to vacuum a room • … so, it knows areas to avoid/concentrate on/use different cleaning tools	3

Q8)

(d)	Any **four** from: For example: • It could make use of machine learning • It could **gather data** from **ploughing** • … and use this data to **adapt** its **own process** • … so that it will make fewer mistakes • … such as the dimensions of the field • … such as the landscape of the field • … such as where obstacles are in the field • … to create a map of the field • … to develop the most efficient route to take • … so, it knows what to **avoid** in future	4