MODULE J HARDWARE AND EMERGING TECH · J7

Expert systems

Original practice questions · 21 marks · ~25 minutes · Cambridge 0478 syllabus 6.3.2, 6.3.3

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. Use the full name of each component of an expert system. Do not give brand names. The total for this worksheet is **21 marks**.

1

Total: 4 marks

Draw **one** line from each component of an expert system to its description. Not all of the descriptions will be used. **[4]**

inference engine	Lets the user enter data and shows the user questions and results
knowledge base	Automatically changes its own processes and data as it is given more data
interface	Stores the facts about the specialist area
rule base	Applies the rules to the facts and to the user's answers to reach a conclusion
	Stores the rules that are used to reason with the facts

2 **Total: 4 marks**

A water company has pumping stations across a large region. Its engineers use an expert system to help them find the cause of a fault in a pump. When a new type of pump is installed, the company's senior engineers add new facts and rules to the expert system.

Tick (✓) **one** box in each row to show which component of the expert system each item belongs to. **[4]**

Item	Knowledge base	Rule base	Inference engine	Interface
The screen where the engineer taps Yes or No to answer "Is the pump making a grinding noise?"				
"Pump type K normally runs at a motor temperature between 40 °C and 60 °C."				
The part that uses the engineer's answers so far to decide which question to ask next				
"IF the pump is vibrating AND the motor is above 60 °C THEN the bearings may be worn."				

3 **Total: 4 marks**

The water company's expert system in Question 2 is an example of artificial intelligence (AI).

Describe **two** characteristics of AI that this expert system shows. **[4]**

Characteristic 1

Characteristic 2

4 Total: 5 marks

A mining company uses an expert system to help its geologists decide whether a site might contain copper. The expert system asks a geologist a series of questions about rock samples taken from the site. The geologist answers "Yes" to the question "Does the rock contain green-coloured minerals?".

Explain how the expert system uses this answer to decide what to output next. **[5]**

5 Total: 4 marks

A company that repairs kitchen appliances gives each of its repair technicians a tablet computer with an expert system. The expert system helps a technician work out why an appliance has stopped working.

(a) Give **two** tasks that the interface of this expert system carries out. **[2]**

1

2

(b) A technician has answered three questions, but the expert system has not yet given a result. It asks another question.

Explain why the expert system may need to ask the technician more questions before it gives a result. **[2]**

Total for this worksheet: 21 marks