

QUESTION 1.



6 A computer system is used to manage some of the functions in a vehicle. The vehicle has a number of sensors and actuators. One sensor is used to monitor the moisture on the screen. If the moisture exceeds a pre-set value, the windscreen wiper motor turns on automatically.

The software used in the computer system is dedicated to the sensor management functions. When the system starts, the software runs some initial tasks. It then loops continuously until the system is switched off.

(a) (i) State the name given to the type of system described.
.....[1]

(ii) Explain your answer to **part (i)**.
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.....[1]

(b) Within the software loop, the value of each sensor is read in turn. The value read from the sensor is then processed.

State **two** drawbacks with this method of reading and processing sensor data.

Drawback 1

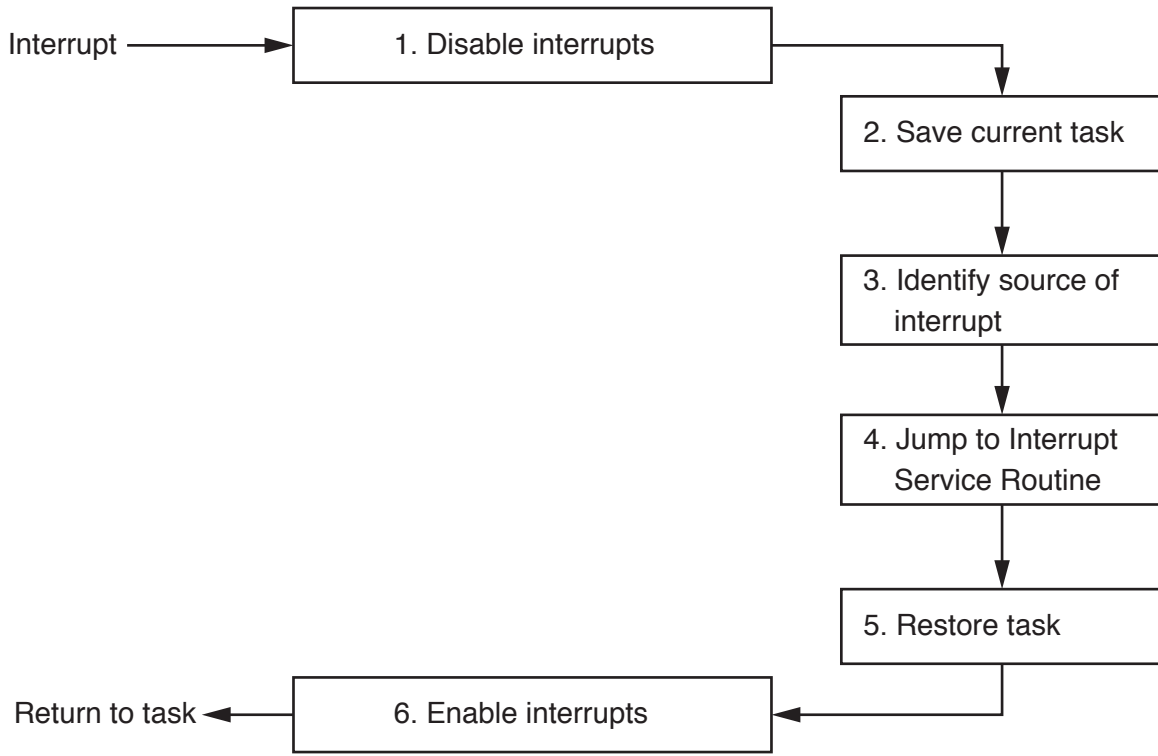
Drawback 2

[2]



(c) An alternative method of reading and processing sensor data is to use interrupts. A sensor is connected so that it can send an interrupt signal to the processor if its value changes.

On receipt of an interrupt signal, the processor carries out a number of steps as shown in the following diagram.



(i) State the purpose of step 1.

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.....[1]

(ii) State the purpose of step 6.

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.....[1]

(iii) Explain how the current task is saved in step 2.

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QUESTION 2.



6 Monitoring and control systems have many different applications.

(a) Explain the importance of feedback in a control system.

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(b) An indoor swimming pool is to be kept at a constant temperature of 28 degrees.

Describe the use of feedback in this control system.

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(c) Give **one** example of a monitoring system. Explain why this is a monitoring system.

Monitoring system

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Explanation

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..... [3]



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QUESTION 3.



5 A weather station uses monitoring and control systems.

(a) Describe the difference between a monitoring system and a control system.

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..... [2]

(b) (i) The weather station records how the outside temperature changes over a period of time. The system will read the temperature once every hour, over a period of 100 days.

The temperature readings are automatically stored in a file. No other data are stored.

Explain why the weather station has decided to use serial organisation for the file.

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(ii) Serial files can be accessed using sequential access.

Explain how sequential access could be used for the temperature readings file.

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(iii) Name **and** describe a method of file organisation other than serial or sequential.

Method

Description

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[4]