

**10.** An oil and gas company has a networked computer system for use of their employees in the Head Office.

- (a) (i) Identify **one** hardware security measure that will ensure that confidential data from the Head Office cannot be accessed. [1]
- (ii) Identify **one** software security measure that will ensure that confidential data from the Head Office cannot be accessed. [1]

The company also uses the internet to enable communication with employees working on exploration and production in many remote geographical areas.

- (b) Identify **one** network security measure. [1]

The sub-sea oil and gas exploration and production unit of the company relies on thousands of kilometres of pipeline which are monitored by a computer control system which can detect leaks.

- (c) Explain the environmental benefit of using a computer control system to monitor the pipeline. [3]

The process of detecting leaks is carried out by sensors which are continuously monitoring changes in the flow and pressure of the liquids in the pipes.

This data is processed on a computer in the office.

If any of sensor values are outside of the acceptable parameters stored on a disk in the office, the following error routines are performed:

- an alarm is sounded on the computer at the office
- an email message is sent to managers in the Head Office.

A member of staff can also configure the system.

- (d) Explain the relationship between sensors, output transducers and processor in this situation. [4]
- (e) Construct a system flowchart to represent the process described above. [5]