1 Fig. 10.1 shows a circuit based on a transistor and a thermistor.

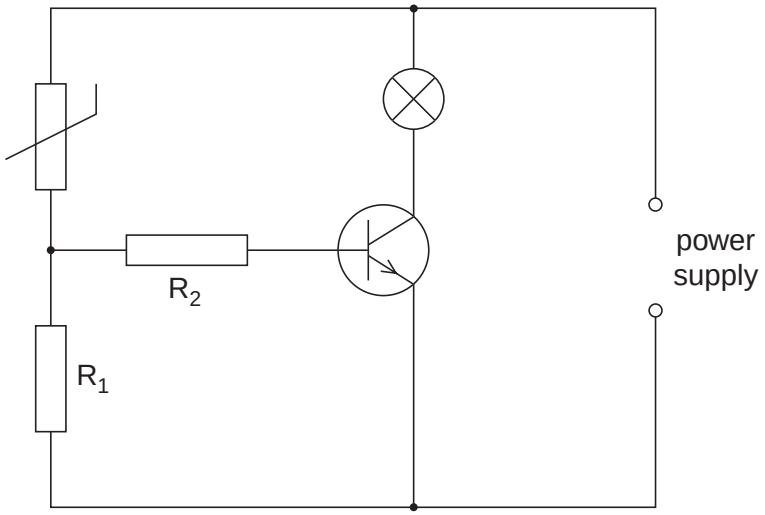

Fig. 10.1

(a) Describe the action of the thermistor in this circuit.

.....

.....

.....

..... [3]

(b) State and explain how the circuit may be modified so that the lamp switches on at a different temperature.

.....

.....

..... [2]

(c) State one practical use of this circuit.

..... [1]

[Total :6]

2 **(a)** Fig. 10.1 shows an AND gate with two inputs A and B and one output.

Fig. 10.1

State the output when

(i) A is high and B is low,

..... [1]

(ii) both A and B are low.

..... [1]

(b) An electrical thermometer in a greenhouse gives a low output if the temperature is too low.

A humidity sensor in the same greenhouse gives a high output if the humidity in the greenhouse is too high.

An alarm sounds when both the temperature is too low and the humidity is too high.

(i) Complete the diagram below to show how a NOT gate and an AND gate may be used to provide the required output to the alarm. [2]

(ii) On your diagram, use either 'high' or 'low' to indicate the level of the inputs and outputs of both gates when the alarm sounds. [2]

[Total: 6]

3 Fig. 10.1 shows a circuit that is used to switch on a lamp automatically when it starts to go dark.

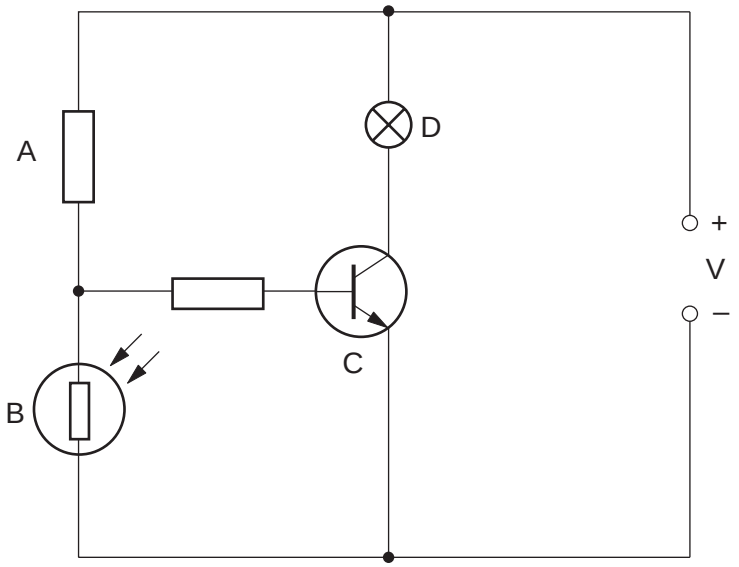

Fig. 10.1

(a) Write down the names of the components labelled A, B, C and D.

A ..... B .....

C ..... D ..... [2]

(b) Which of the four components A, B, C or D acts as a switch?

.....[1]

(c) Explain why the lamp comes on as it goes dark.

.....

.....

.....

.....[3]

[Total : 6]

4 **(a)** Fig. 9.1 shows an a.c. supply connected to a resistor and a diode.

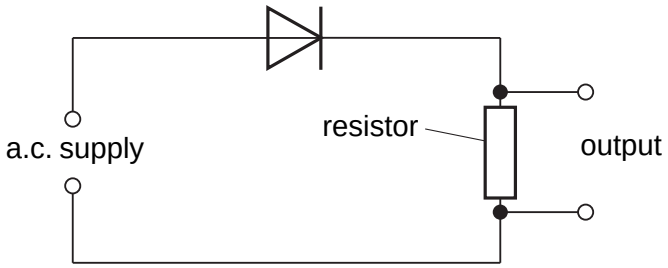

Fig. 9.1

(i) State the effect of fitting the diode in the circuit.

.....

..... [1]

(ii) On Fig. 9.2, sketch graphs to show the variation of the a.c. supply voltage and the output voltage with time.

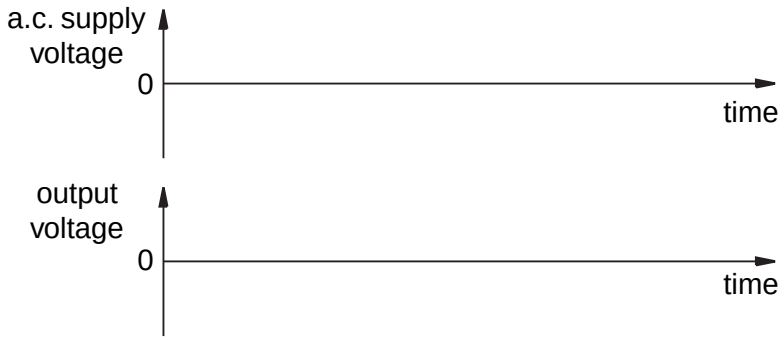

Fig. 9.2

[2]

(b) **(i)** In the space below, draw the symbol for a NOT gate.

[1]

(ii) State the action of a NOT gate.

.....

.....

..... [2]

[Total : 6]

5 **(a)** In the space provided, draw the symbol for a NOR gate. Label the inputs and the output.

[2]

(b) State whether the output of a NOR gate will be high (ON) or low (OFF) when

(i) one input is high and one input is low,

.....

(ii) both inputs are high.

.....
[1]

(c) Fig. 9.1 shows a digital circuit made from three NOT gates and one NAND gate.

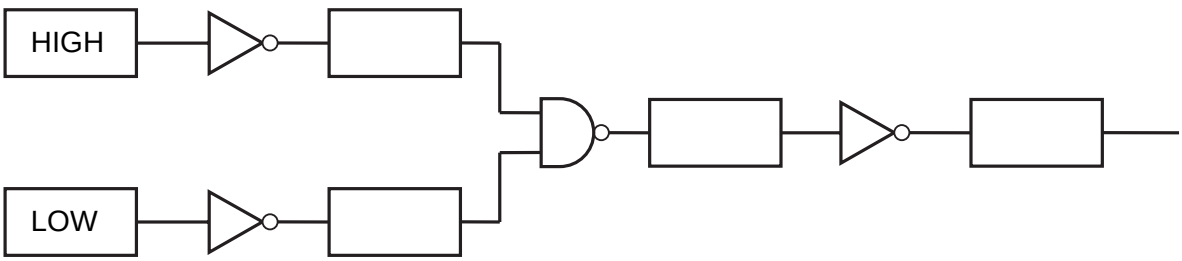

Fig. 9.1

(i) Write HIGH or LOW in each of the boxes on Fig. 9.1. [2]

(ii) State the effect on the output of changing both of the inputs.

.....

..... [1]

[Total : 6]

6 **(a)** Fig. 10.1 shows the faces of two ammeters. One has an analogue display and the other a digital display.

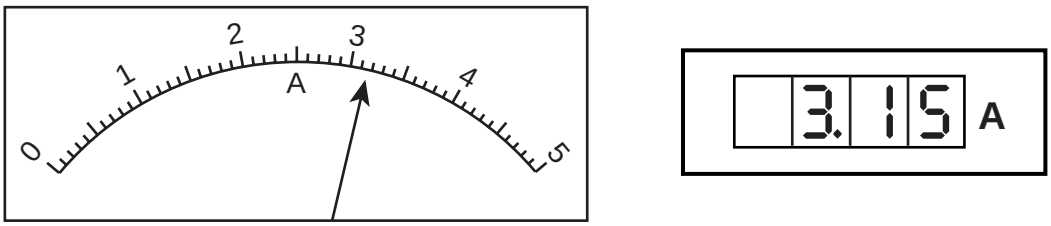

Fig. 10.1

State what is meant by the terms *analogue* and *digital*.

.....

.....

.....[2]

(b) **(i)** Name the components from which logic gates are made.

.....[1]

(ii) In the space below, draw the symbol for an AND gate.
Label the inputs and the output. [1]

(iii) Describe the action of an AND gate with two inputs. [2]

[Total : 6]

7 **(a)** **(i)** What is the function of a transistor when placed in an electrical circuit?

.....

(ii) Describe the action of a transistor.

.....

.....

.....
[3]

(b) **(i)** In the space below, draw the symbol for an OR gate. Label the inputs and the output.
[1]

(ii) Describe the action of an OR gate that has two inputs.

.....

.....

.....[2]

[Total : 6]