

11. (continued)

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MARGIN

Marks

The sensing circuit used to detect if a sheet of metal is in place is shown in Figure Q11(b).

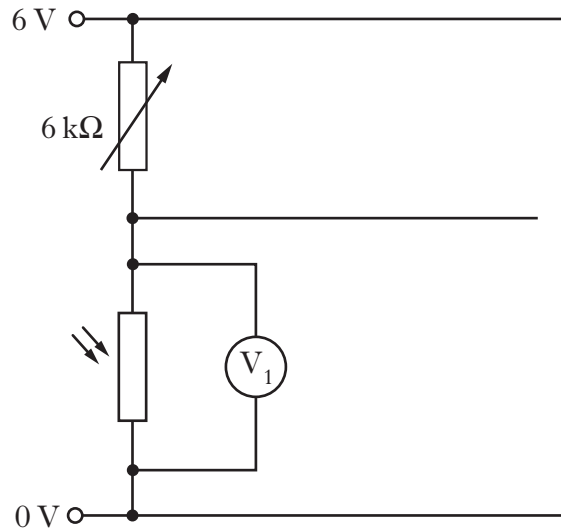


Figure Q11(b)

- (d) (i) State, with reference to the Data Booklet, the resistance of the LDR at a light level of 20 lux.

_____ 1

- (ii) Calculate the voltage V_1 for this light level.

2



11. (continued)

Marks

The circuit used to actuate the pneumatic valve (2) is shown in Figure Q11(c).

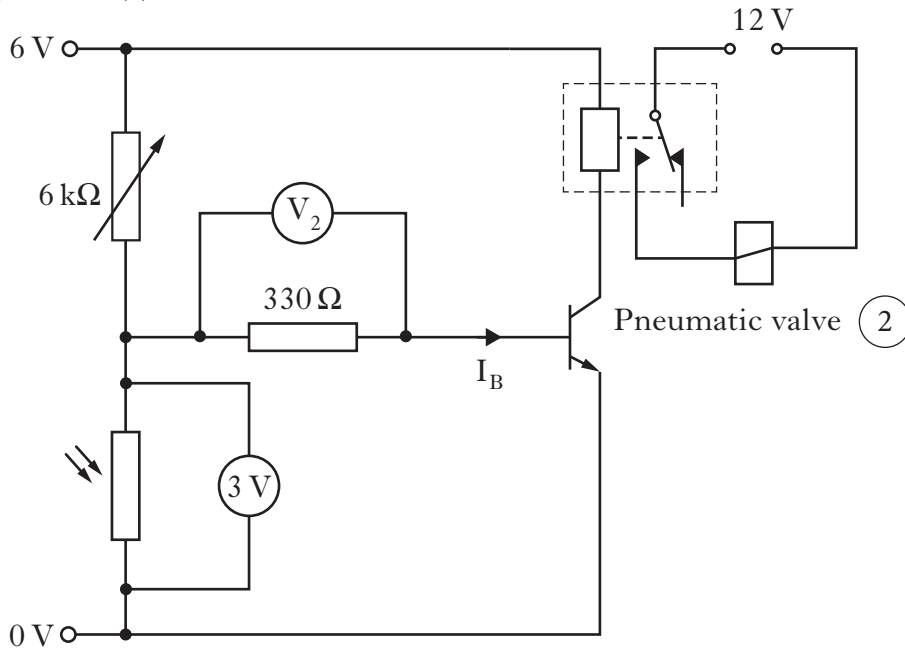


Figure Q11(c)

- (e) (i) Complete the circuit shown in Figure Q11(c) to include the symbol for a diode to protect the transistor. 2
- (ii) State the **function** of the variable resistor in the circuit. 1

As the light level dropped, V_1 across the LDR is 3 V and the transistor is saturated.

- (f) Calculate:
- (i) the voltage shown on V_2 . 2

[Turn over



SECTION B

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Attempt any TWO questions (Total 40 marks)

9. Figure Q9(a) shows the circuit diagram used to control an electric motor for a wood saw.

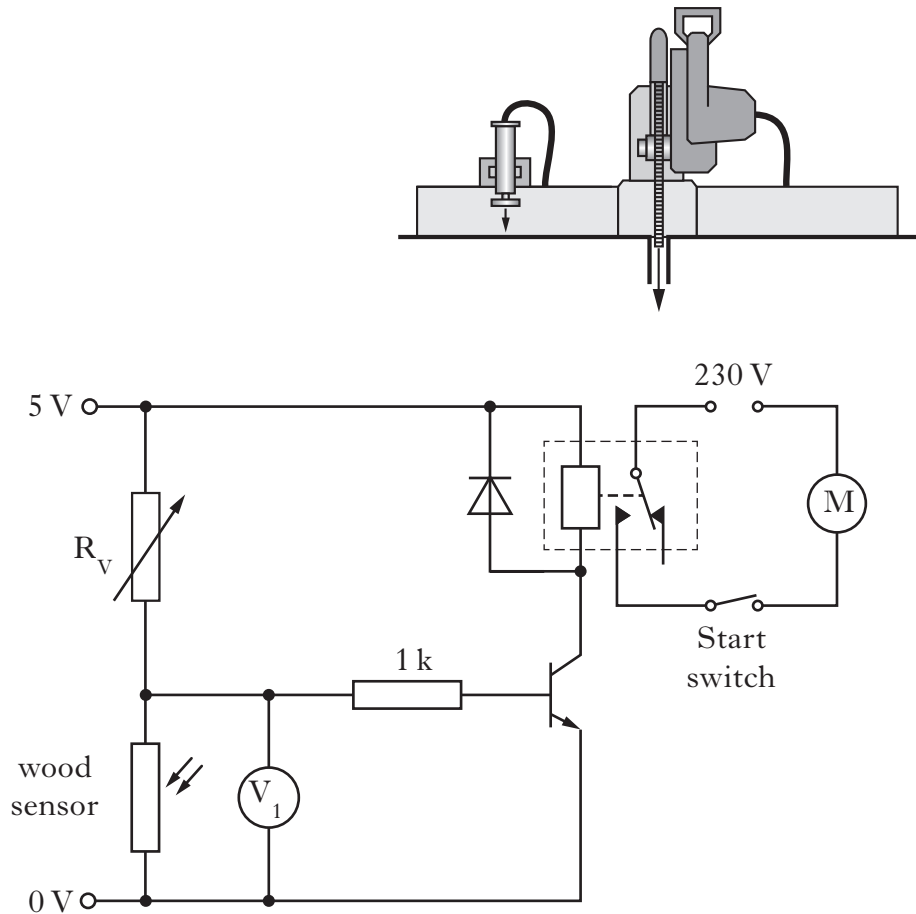


Figure Q9(a)

- (a) Describe, using appropriate terminology, the operation of the circuit.

When wood covers the sensor . . .



Marks

9. (continued)

- (b) (i) Determine the resistance of the LDR for a light level of 300 lux, with reference to the Data Booklet.

_____ 1

- (ii) State the full name for the LDR.

_____ 1

Calculate:

- (c) (i) the base current, I_B , when the current in the relay is 48 mA and the current gain, h_{FE} , is 80;

2

- (ii) the voltage V_1 , when the transistor is saturated.

2

A SPDT relay is used in the circuit.

- (d) (i) State the **full** name of this relay.

_____ 1

- (ii) Explain why a relay is required in the circuit.

_____ 1

[Turn over

