BERGVLIET HIGH SCHOOL

Grade 9 Technology Electronics and Calculations

Informal Test 1 | 30 marks | Suggested working time 40 minutes

Name: _____ Class: _____ Date: _____

Answer all questions in the spaces provided. Use a pencil and ruler for drawings. Show working and units in calculations. This is preparation for the November examination.

Question 1 Multiple Choice

1.1 A diode is forward-biased and within its ratings. What does it mainly allow? **(1)**

- **A.** Current in its conducting direction
- **B.** Unlimited current both ways
- **C.** Mechanical movement
- **D.** Storage of chemical energy

Answer: _____

1.2 One lamp is removed from two parallel branches. The supply works. What happens to the other lamp? **(1)**

- **A.** It must go off
- **B.** It can remain lit
- **C.** It becomes a short circuit
- **D.** The supply polarity reverses

Answer: _____

1.3 What do the outward arrows in an LED symbol indicate? **(1)**

- **A.** Heat entering
- **B.** Light emitted
- **C.** Current reversing
- **D.** A moving switch

Answer: _____

1.4 Which switch selects between two alternative connections? **(1)**

- **A.** Normally open push switch
- **B.** SPST only
- **C.** SPDT changeover
- **D.** A fixed resistor

Answer: _____

1.5 Two switches must both close before a lamp works. Which arrangement gives this control? **(1)**

- **A.** Switches in parallel
- **B.** Both across the supply
- **C.** Switches in series
- **D.** A wire bypass around the lamp

Answer: _____

Question 2 Electronic Components

Match the component to a description. Use each letter once. Two descriptions are not used.

No.	Component	Description
2.1	NTC thermistor	A Stores energy in an electric field.
2.2	Capacitor	B Sounds with a suitable DC supply.
2.3	Fixed resistor	C Resistance can be adjusted by the user.
2.4	Variable resistor	D Emits light.
2.5	Active buzzer	E Resistance decreases as temperature rises.
		F Opens a circuit mechanically.
		G Opposes current with a selected fixed resistance.

2 Write your five matching letters in order. **(5)**

Question 3 Resistor Colour Codes and Ohm's Law

Use V = I × R, I = V ÷ R or R = V ÷ I. 1 A = 1 000 mA. Show working and units.

Colour	Digit	Multiplier	Tolerance
Black	0	×1	-
Brown	1	×10	-
Red	2	×100	-
Gold	-	×0.1	±5%

The bands of a four-band resistor, from left to right, are BROWN, RED, RED and GOLD.

3.1 Calculate the nominal resistance. Show how the bands are used. **(3)**

3.2 State the tolerance indicated by the gold band. **(1)**

3.3 A 600 Ω ohmic resistor has 12 V across it. Calculate the current in amperes. **(3)**

A separate circuit has a 9 V supply, one conducting LED with 3 V across it, and a series resistor. The required current is 20 mA.

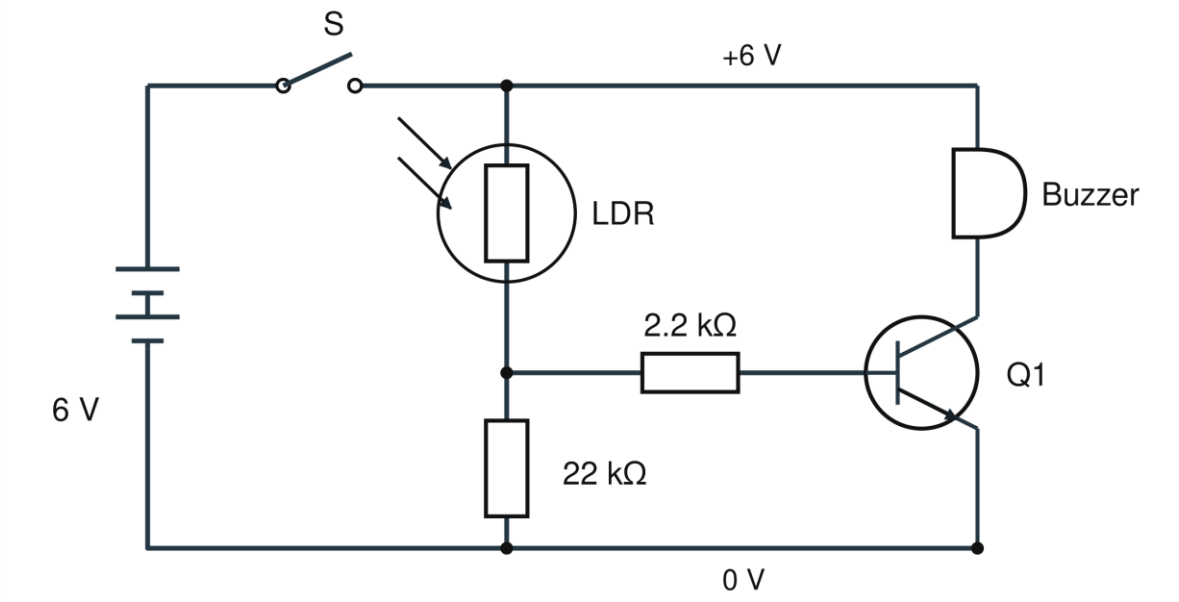
3.4 Calculate the voltage across the resistor. **(1)**

3.5 Calculate the resistance needed for 20 mA. **(2)**

3.6 The voltage across the 600 Ω resistor is halved at constant temperature. Explain how the current changes. **(2)**

Question 4 Light Sensor Circuit

A model cupboard buzzer must sound in darkness. The circuit shown activates in sufficiently bright light. S must be closed during operation. Q1 is an NPN transistor and all parts have suitable ratings.



4.1 State the function of S. **(1)**

4.2 State the function of Q1. **(1)**

4.3 An opaque cover encloses the LDR. Why will a change in room light not give the intended input? **(1)**

4.4 Suggest ONE suitable enclosure change. **(1)**

Question 4 Light Sensor Circuit Continued

4.5 Adapt the sensor branch to activate in darkness. Draw the LDR, 22 kΩ resistor, supply rails and connection through the 2.2 kΩ resistor to the base. Do not redraw the whole circuit. **(2)**

4.6 Explain how darkness activates the buzzer in your adapted circuit. **(2)**

LDR resistance

Q1 and the buzzer

TOTAL **30 MARKS**