

M1.(a) High input resistance ✓

low / no energy consumption when in the ON and OFF states ✓

OR

No input current / control by pd only.

2

(b) Prevents static charge building up on gate (-source capacitor) ✓
Makes gate voltage 0 V when no water / nothing between probes ✓

2

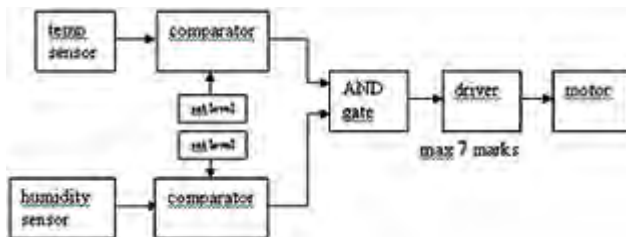
(c) Identifies or attempts to use potential divider equation ✓

$$2.4 = 12 \times 1 / (R_{\text{probes}} + 1) \text{ leading to } R_{\text{probes}} = 9.6 / 2.4 = 4 \text{ M}\Omega \checkmark$$

2

[6]

M2.(a)



7

(b) (i) driver ✓

1

(ii) comparator ✓

1

(iii) temperature sensor ✓

1

(c) (i) $25 + 450 = 475\text{mA} \checkmark$

1

(ii) $12\text{V} \times 475\text{mA} \checkmark$
 $= 5.7\text{W} \checkmark$

2

[13]