

PRIFYSGOL BANGOR BANGOR UNIVERSITY



PRIFYSGOL
BANGOR
UNIVERSITY

ARHOLIADAU YSGOLORIAETHAU MYNEDIAD 2025 SCHOLARSHIP ENTRANCE EXAMINATIONS 2025

PWNC / SUBJECT: ELECTRONIC ENGINEERING

Amser a ganiateir: 2 awr

Time allowed: 2 hours

Cyfarwyddiadau / Instructions: Answer all questions

1. A local pizzeria is testing their new wood-fired oven. They measure the temperature (in °C) at the center of the oven every hour for 5 hours during their busiest period:
485, 492, 485, 478, 489

- a) Calculate the median temperature. [5]
- b) Calculate the mode temperature. [5]
- c) Calculate the mean temperature. [7]
- d) Calculate the standard deviation of the temperatures. [8]

2. Imagine you're working with a quantum computer that uses "qubits" instead of regular bits. Unlike a bit, which is either 0 or 1, a qubit can be in a superposition of both states. 1 When you measure a qubit, it collapses into either 0 or 1 with certain probabilities.

Assuming you have two qubits. The first qubit (Q1) has a 70% chance of collapsing to 0 and a 30% chance of collapsing to 1. The second qubit (Q2) has a 40% chance of collapsing to 0 and a 60% chance of collapsing to 1. These qubits are independent, meaning the measurement of one doesn't affect the other.

- a) What is the probability that both qubits collapse to 0 when measured? [7]
- b) What is the probability that at least one of the qubits collapses to 1 when measured? [9]
- c) You perform a special operation that "entangles" the two qubits. After entanglement, the only possible measurement outcomes are: both qubits are 0, or both qubits are 1. The probability of both being 0 is now 55%. What is the probability of both being 1 after entanglement? [9]

3. A Explain how the circuit in Figure 1 works.

[8]

If V_{in} = steps rapidly from 0 to 20V at $t=0s$, what voltage appear across C at steady state?

[8]

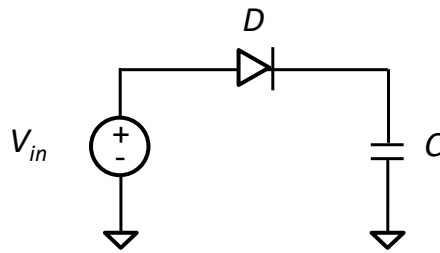


Figure 1

4. Calculate the voltage and current through the R_3 resistor in the circuit shown in Figure 2.

[34]

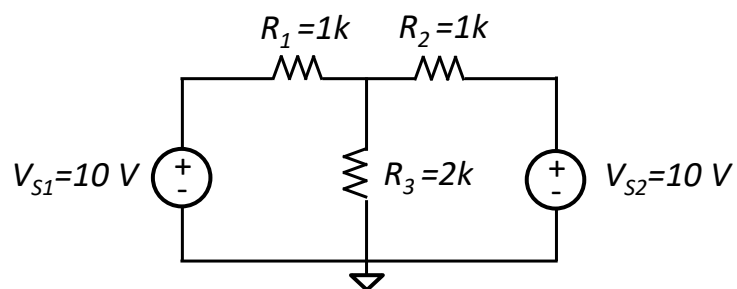


Figure 2