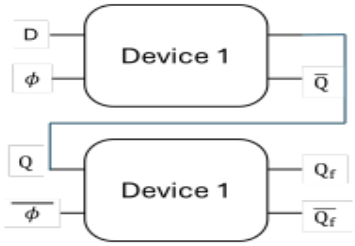
CMOS, Digital Electronics, DC response

Q1.

Scenario 1:

A classroom has **three** temperature sensors to control the temperature of the room by controlling the air conditioner installed in that room. The temperature sensors produce a high output if the temperature crosses a certain threshold. The air conditioner turns **on** if the outputs of all three sensors are **high**, otherwise it remains **off**.

Scenario 2:



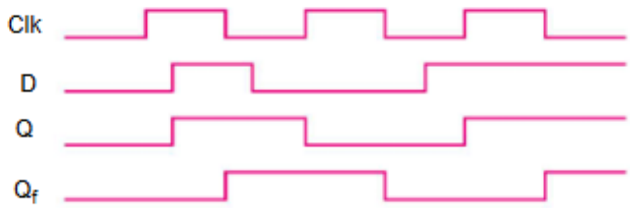


Figure: 1 **Figure: 2**

Figure 2 shows the output waveshape of the device implemented in **Figure 1**.

(a)	**Identify** the logic circuit required to implement the system mentioned in scenario 1 and implement the circuit using **2:1 mux**.	[5]
(b)	**Identify** the circuit implemented in **Figure 1** from the timing diagram of **Figure 2**. Also identify **Device 1** shown in **Figure 1**.	[3]
(c)	**Draw** the circuit of **Device 1** using transmission gates.	[3]
(d)	**Explain** why **n-MOS** pass transistors produce good 0 and bad 1, and **p-MOS** pass transistors produce bad 0 and good 1 with proper mathematical justification.	[4]