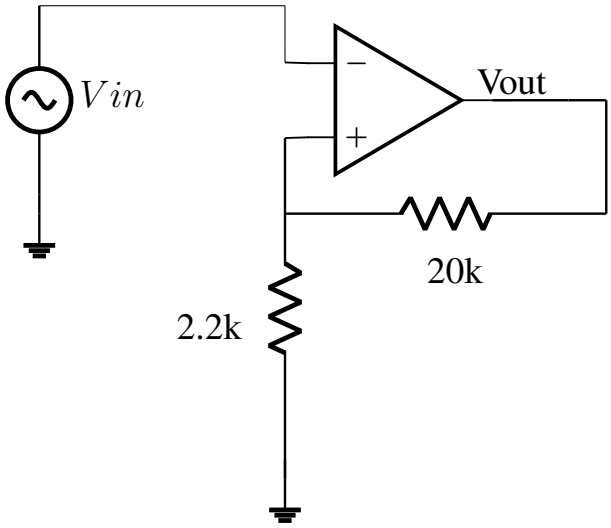
GATE 2022-PH

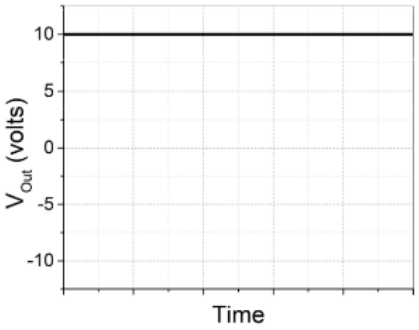
EE23BTECH1205 - Avani Chouhan*

Question : 11

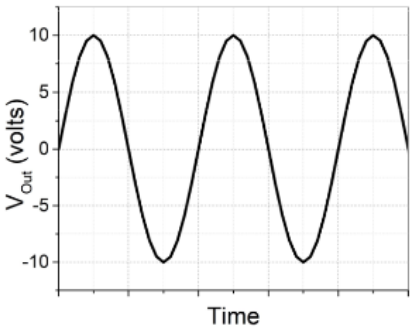
For the Op-Amp circuit shown below, choose the correct output waveform corresponding to the input $V_{\text{in}} = 1.5\sin(20\pi t)$ (in Volts). The saturation voltage for this circuit is $V_{\text{sat}} = \pm 10$ V.



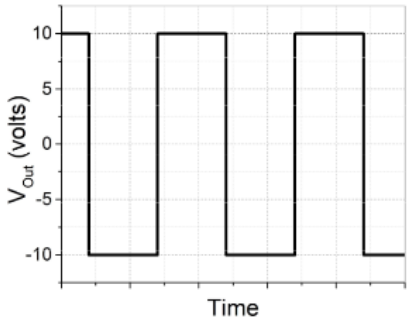
(A)



(B)



(C)



(D)

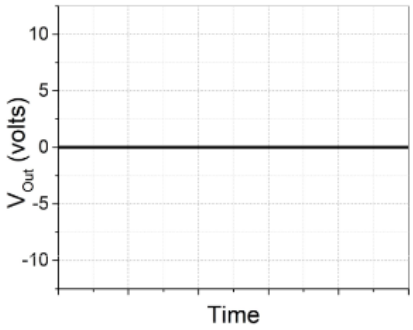
(GATE PH 2022)

Solution:

Given circuit is a Schmitt Trigger circuit. In this output will be always saturated, i.e., limited between $+V_{\text{sat}}$ to $-V_{\text{sat}}$.

Let's assume initially the output is at its negative saturation voltage ($-V_{\text{sat}}$). As the input voltage (V_{in}) increases, it eventually exceeds V_{TH}, causing the output of the op-amp to switch to its positive saturation voltage ($+V_{\text{sat}}$). As V_{in} decreases, it eventually falls below V_{TL}, causing the output of the op-amp to switch back to its negative saturation voltage ($-V_{\text{sat}}$). This process repeats as the input voltage oscillates sinusoidally. Each time V_{in} crosses one of the threshold levels, the output switches between $+V_{\text{sat}}$ and $-V_{\text{sat}}$.

So, the correct answer is (A).


10
5
0
-5
-10
V_{Out} (volts)
Time