Final Exam

Choose the Correct Answer (Note: Do not choose more than one answer)
For any calculation, approximate the result to 2 decimal places

Questions 1 – 6 are based on the following information:

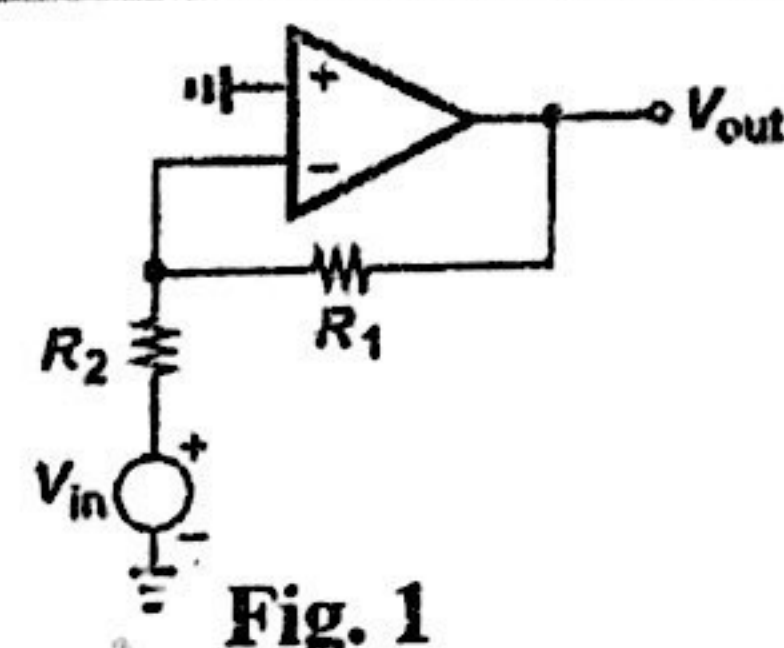For the circuit shown in Fig.1, if $R_1=10K\Omega$, $R_2=1K\Omega$, and $V_{CC}=\pm12V$

Fig. 1

1) What is the circuit Name?

A. *Inverting Amplifier* B. *Noninverting amplifier* C. *Voltage Follower* D. *None of them*

2) What is the Voltage Gain A_v?

A. $1+\frac{R_1}{R_2}$ B. $\frac{R_2}{R_1}$ C. $1+\frac{R_2}{R_1}$ D. $-\frac{R_1}{R_2}$

3) Calculate A_v?

A. 11 B. -10 C. 1.1 D. -0.1

4) The circuit shown is an equivalent to:

A. *Noninverting Integrator* B. *Inverting Differentator* C. *Difference Amp.* D. *Inverting Integrator*

5) The expression of the Differentiator

A. $V_o = -CR\frac{dV_i}{dt}$ B. $V_o = -\frac{1}{RC}\int_0^t V_i\, dt$ C. $V_o = -CR\int_0^t V_i\, dt$ D. $V_o = -\frac{1}{RC}\frac{dV_i}{dt}$
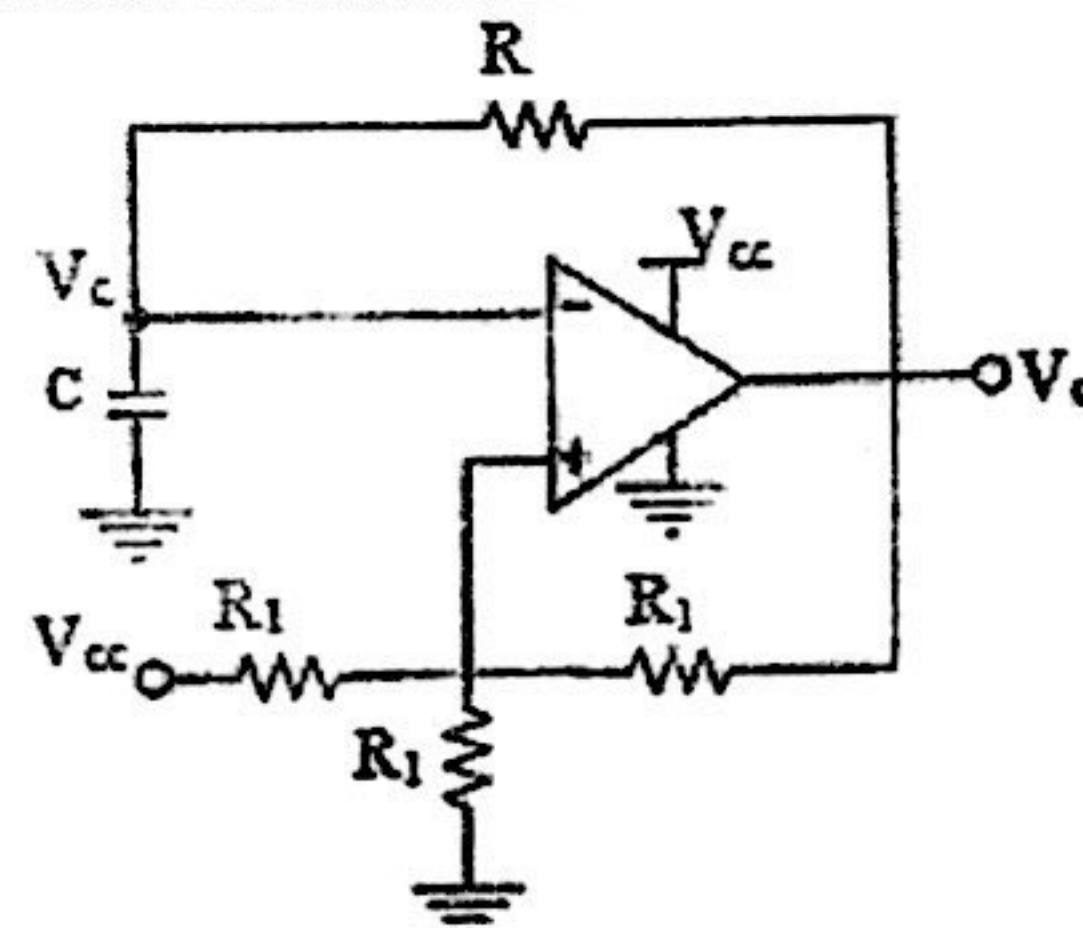
6) The expression of the Integrator

A. $V_o = -CR\frac{dV_i}{dt}$ B. $V_o = -\frac{1}{RC}\int_0^t V_i\, dt$ C. $V_o = -CR\int_0^t V_i\, dt$ D. $V_o = -\frac{1}{RC}\frac{dV_i}{dt}$

Questions 7 – 16 are based on the following information:

For the multivibrator circuit shown in Figure:
Given that: $V_{CC} = 12V$, $R_1 = 6.8K\Omega$, $R = 6.2K\Omega$, $C = 33nF$.

7) What is the equivalent circuit representing the charging mode?

A. B. C. D. *None of them*

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8) What is the voltage V_C during the charging mode?

A. $V_c = 6$ B. $V_c = 4$ C. $V_c = 8$ D. $V_c = 5$

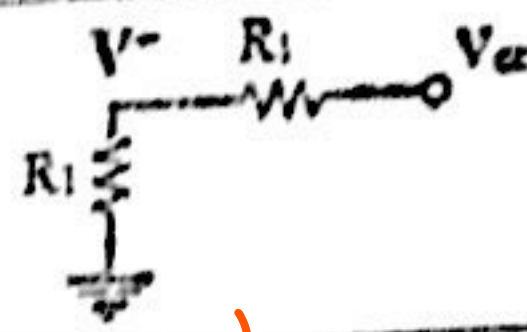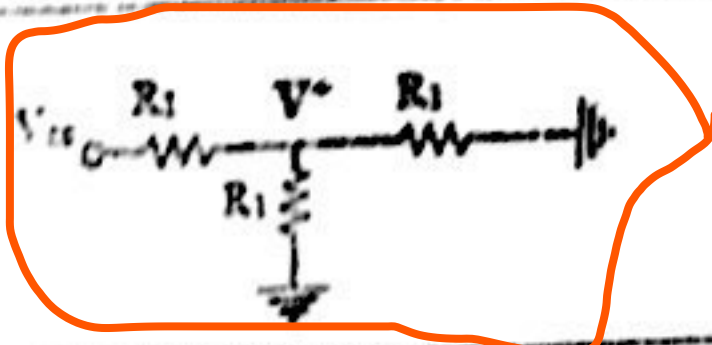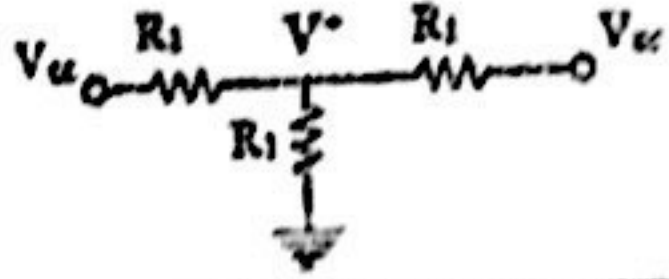**9) What is the time T_1 during the charging mode?**

A. $T_1 = 2\tau \ln 2$ B. $T_1 = \tau \ln 2$ C. $T_1 = \frac{\tau}{2}\ln 2$ D. $T_1 = \tau \ln 3$

10) What is the equivalent circuit representing the discharging mode?

A.   B.   C.   D. None of them

11) What is the voltage V_C during the discharging mode?

A. $V_c = 6$ B. $V_c = 4$ C. $V_c = 8$ D. None of them

12) What is the time T_2 during the discharging mode?

A. $T_1 = 2\tau \ln 2$ B. $T_1 = \tau \ln 2$ C. $T_1 = \frac{\tau}{2}\ln 2$ D. None of them

13) What is the frequency f of the output waveform?

A. $f = \frac{1}{2\tau \ln 2}$ B. $f = \frac{1}{\tau \ln 2}$ C. $f = \frac{2}{\tau \ln 2}$ D. None of them
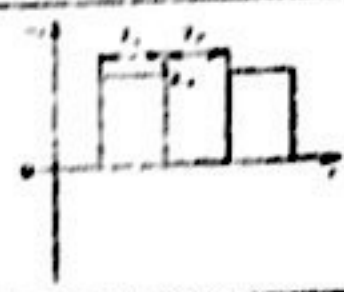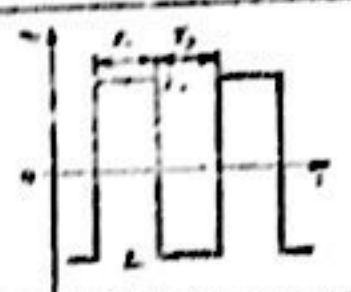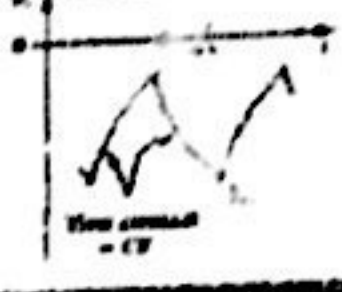
14) Calculate f (in Hz)

A. $7\,K$ B. $3.5\,K$ C. $1.75\,K$ D. None of them

15) What is the output waveform?

A.   B.   C.   D. None of them

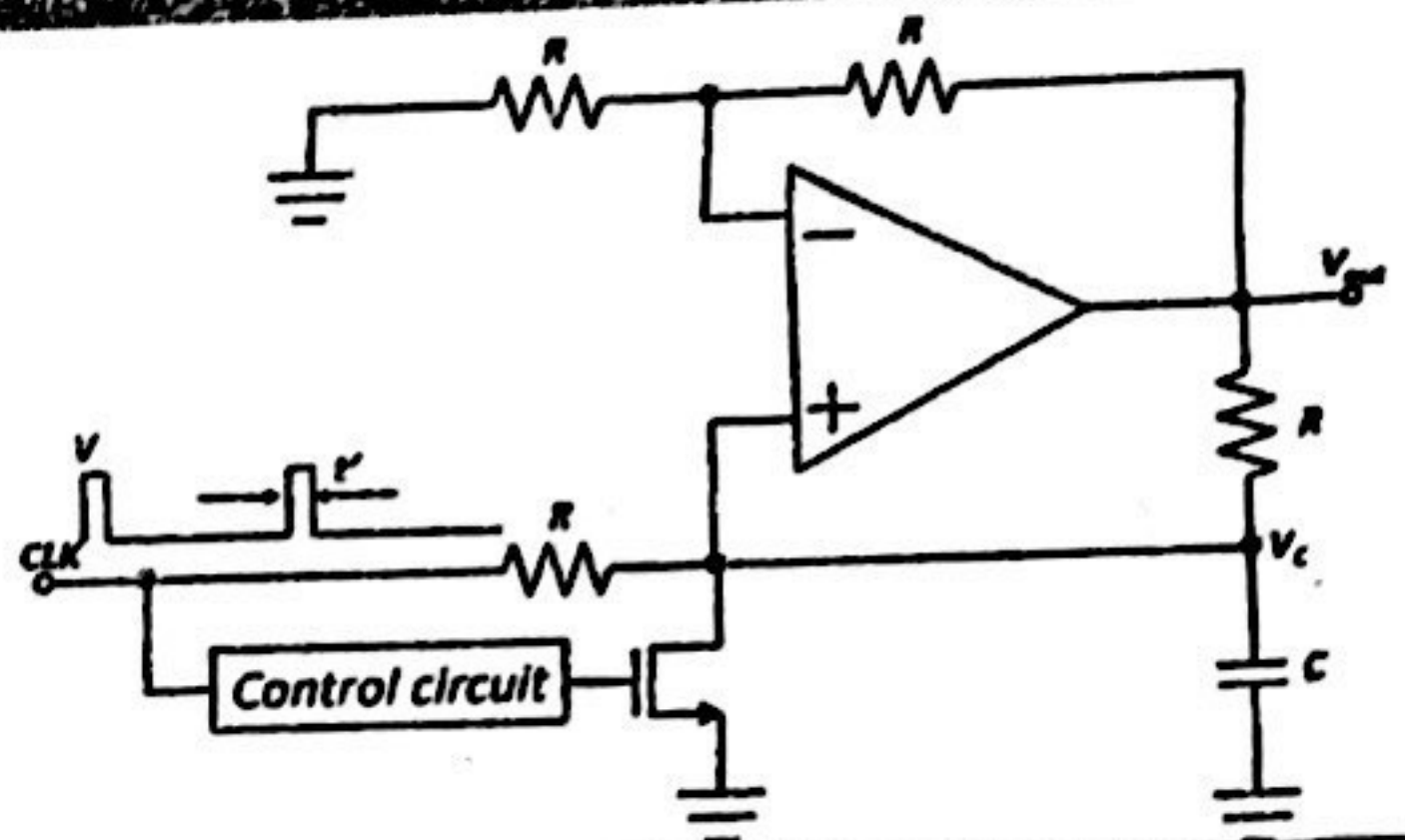**16) What is the waveform on the capacitor?**
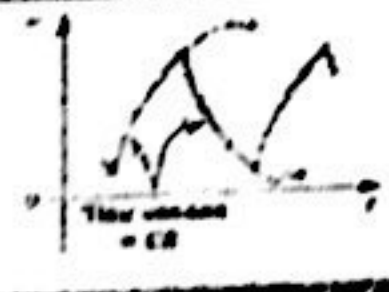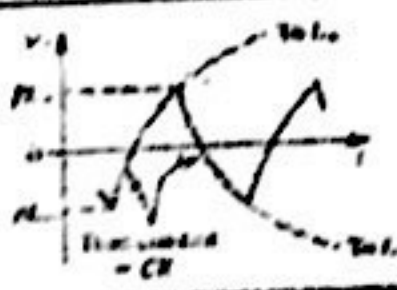
A.   B.   C.   D. None of them

Questions 17 – 22 are based on the following information:

For the circuit shown in Figure:

Given that: $V_{DD} = \pm 10V$, $R = 1K\Omega$, $V = 5V$, and $C = 1\mu F$.
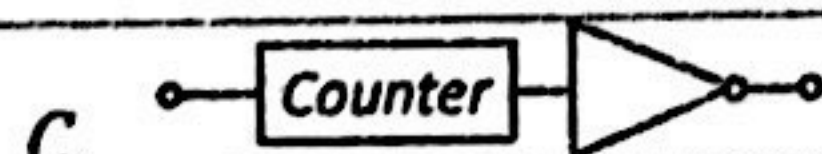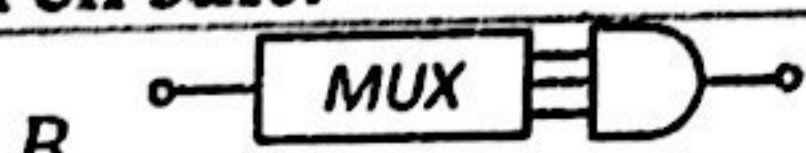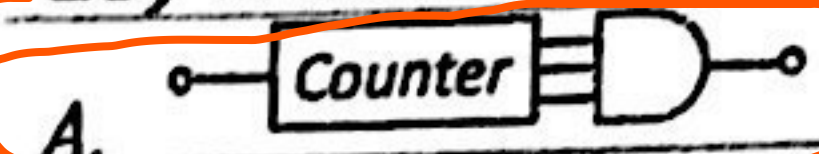
17) What is the circuit name?

A. Ramp Generator   B. Staircase Generator   C. Bootstrap Sawtooth Generator   D. Integrator

18) What is the control circuit?

A. Counter   B. MUX   C. Counter   D. None of them

19) What is the step size of V_{out}?

A. $V_{out} = \frac{2V}{CR}t'$ B. $V_{out} = \frac{2V}{CR}T$ C. $V_{out} = \frac{V-0.7}{CR}T$ D. None of them

20) What is the step size if $f_{clk} = 1KHz$ and $D = 5\%$?

A. $1V$ B. $0.5V$ C. $2V$ D. $0.25V$
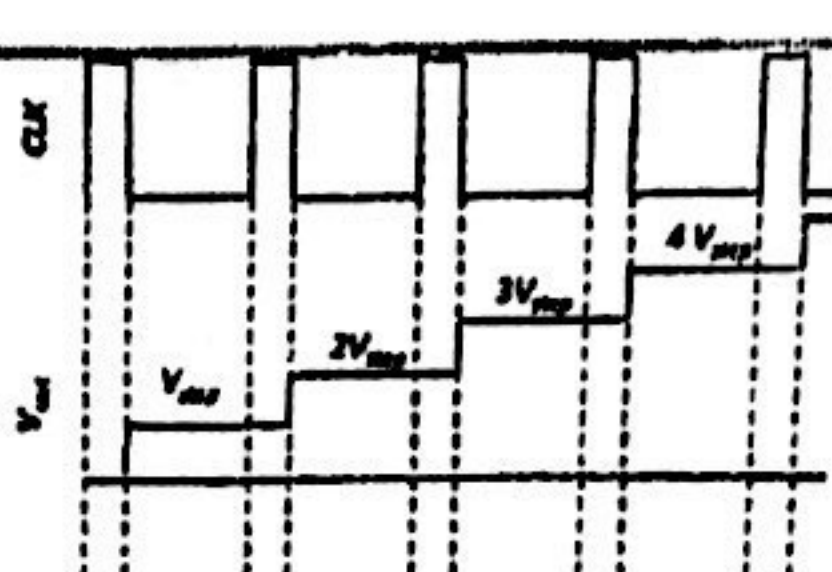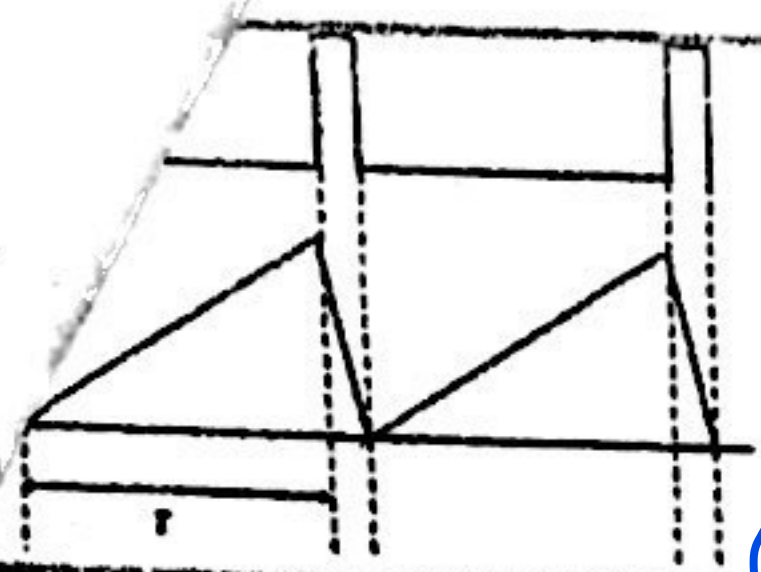
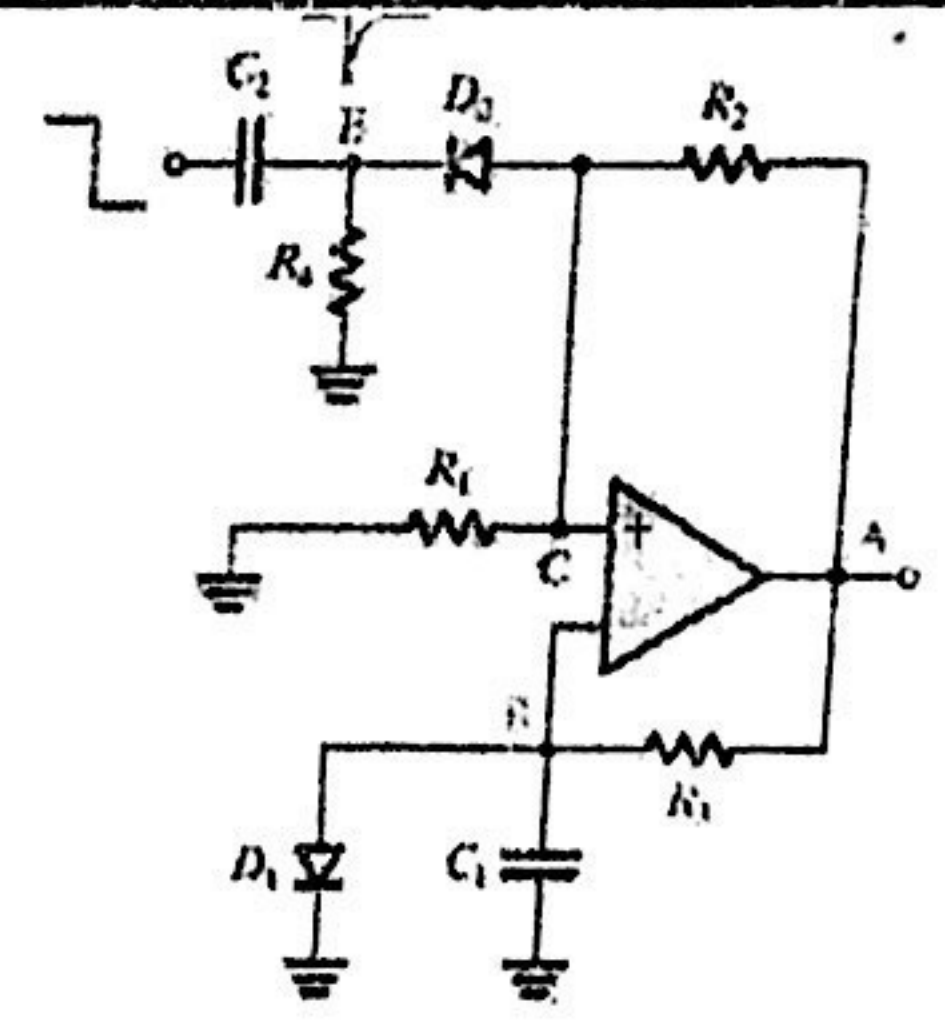**21) How many steps to reach the output voltage $3V$?**

A. 1.5 B. 2 C. 6 D. 5

22) What is the output waveform?

D. None of them

r the circuit shown in Figure:

given that: $V_{DD} = \pm 10V$, $R_1 = 1K\Omega$, $R_2 = 1K\Omega$, $R = 1K\Omega$, and $C = 4.3nF$.

= 5v

23) What is the circuit name?

A. Bistable   B. Astable   C. Monostable   D. Comparator

24) What is the time period of Multivibrator circuit?

A. $T \cong \tau \ln(\frac{1}{1-\beta})$ B. $T = 4\beta\tau$ C. $T = 2\tau \ln(1 + 2R_1/R_2)$ D. $T = \beta\tau$

25) Calculate the period (in Sec.) = 2.98 * 10^-6

A. $2\mu s$ B. $9\mu s$ C. $3\mu s$ D. $12ms$

26) What is the output waveform at A?

A.   B.   C.   D.

27) What is the output waveform at B?

A.   B.   C.   D.

28) What is the output waveform at C?

A.   B.   C.   D.

$$f = \frac{low}{low + high}$$

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