PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

OPAMP - CSIR NET Physics PYQs

Electronics . All PYQs (2015-2025) with answer key

20 questions . Answer key included

www.physicsbyaaryan.com . www.csirnetphysics.com
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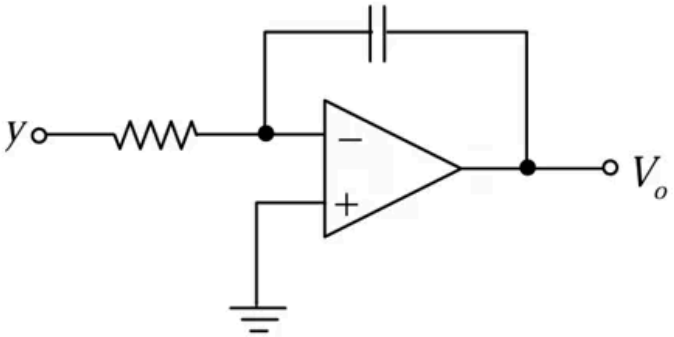
Q1. [Dec 2015] . 3.5 marks

Electronics > OPAMP

CSIR NET	2015 Dec	3.5 M

If the parameters y and x are related by $y = \log(x)$, then the circuit that can be used to produce an output voltage V_0 varying linearly with x is

1.



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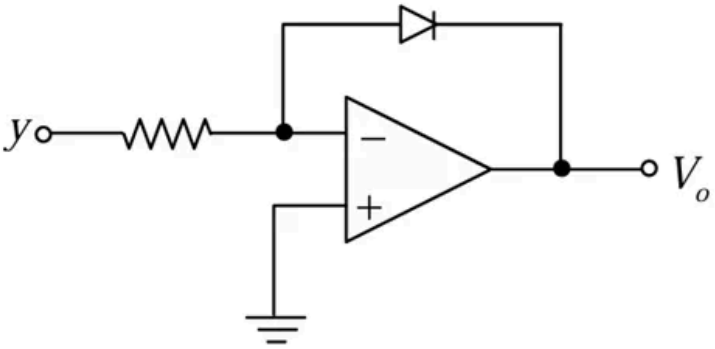

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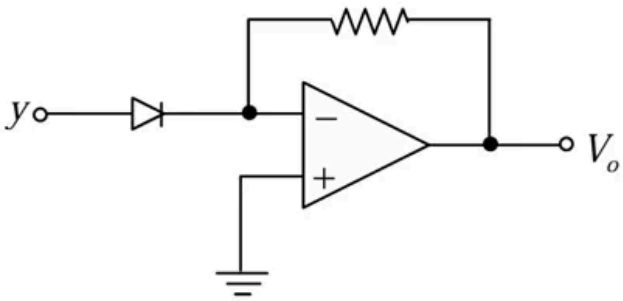

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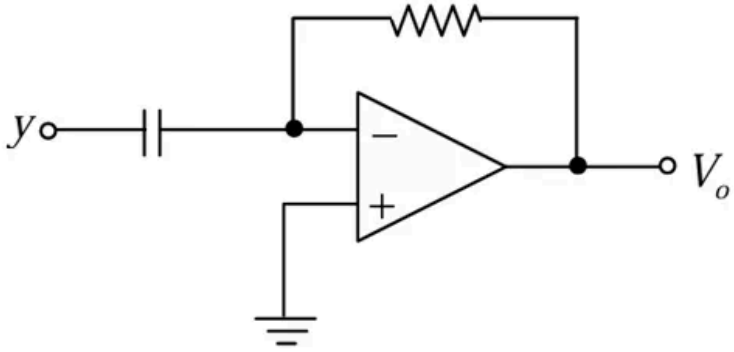
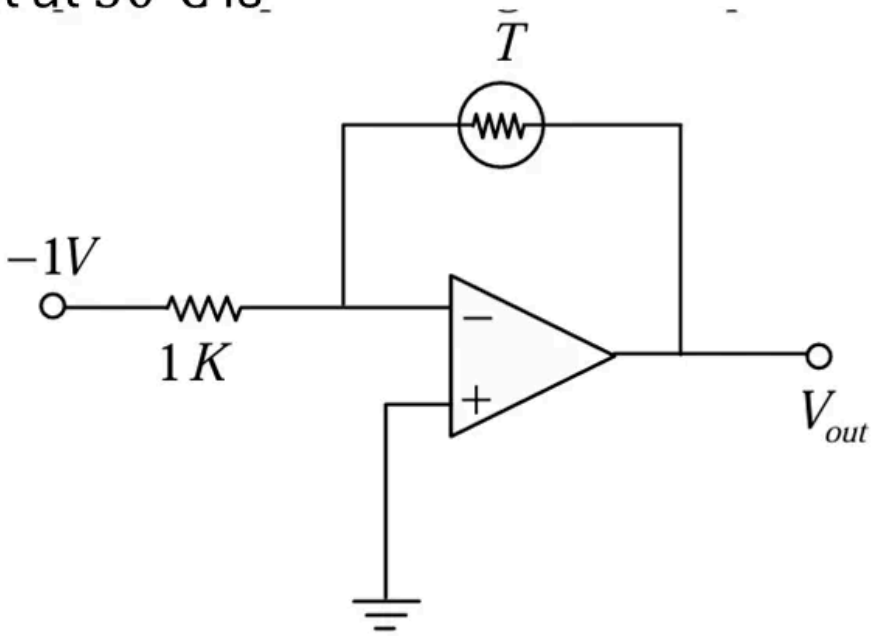


Q2. [June 2015] . 5.0 marks

Electronics > OPAMP

CSIR NET	2015 June	5 M

In the circuit given below, the thermistor has a resistance $3\text{k}\Omega$ at 25°C. Its resistance decreases by 150Ω per $^\circ\text{C}$ upon heating. The output voltage of the circuit at 30°C is



1. -3.75 V
2. -2.25 V
3. 2.25 V
4. 3.75 V

Q3. [Dec 2016] . 5.0 marks

Electronics > OPAMP

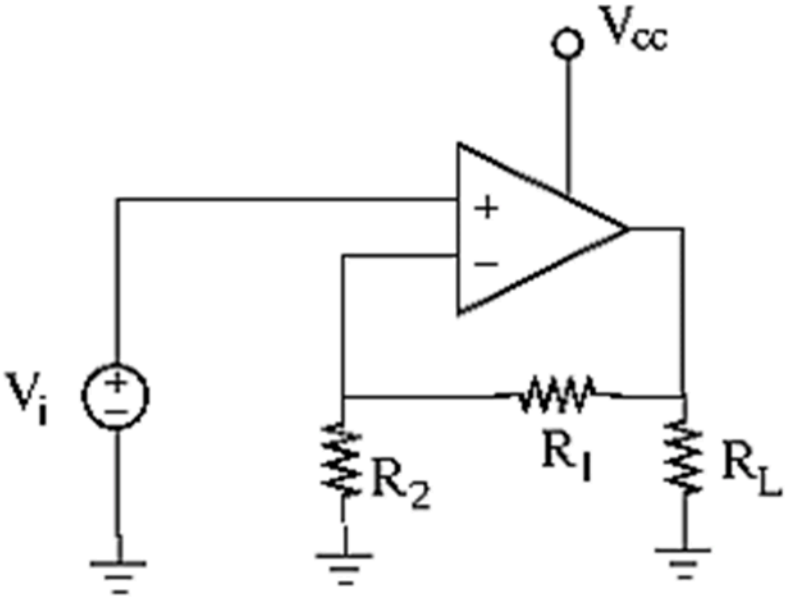
CSIR NET	2016 Dec	5M

In the circuit below, the input voltage V_i is $2\ V$,

$V_{cc} = 16\ \text{V}, R_2 = 2\text{k}\Omega$ and $R_L = 10\text{k}\Omega$.

The value of R_1 required to deliver 10 mW of power across R_L is

1. $12\text{k}\Omega$
2. $4\text{k}\Omega$
3. $8\text{k}\Omega$
4. $14\text{k}\Omega$

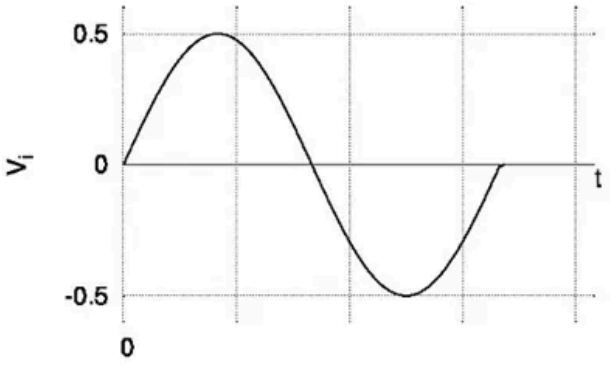


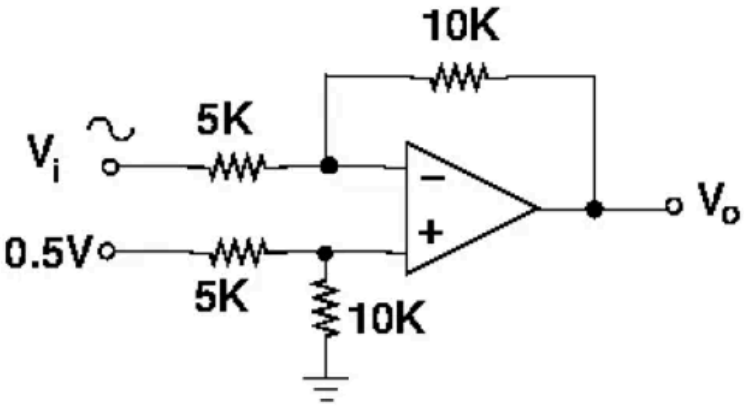
Q4. [June 2016] . 3.5 marks

Electronics > OPAMP

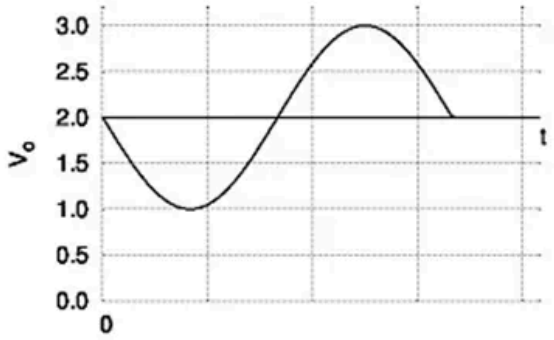
CSIR NET	2016 June	3.5M

Given the input voltage V_i, which of the following waveforms correctly represents the output voltage V_0 in the circuit shown below?





1.



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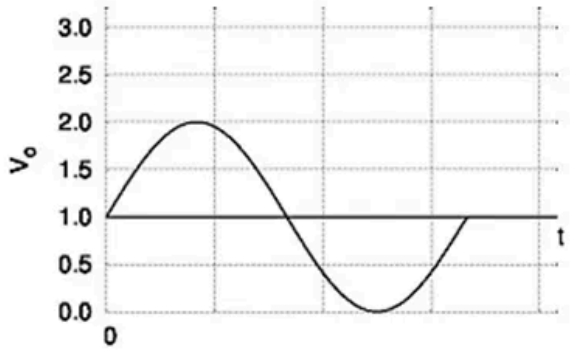

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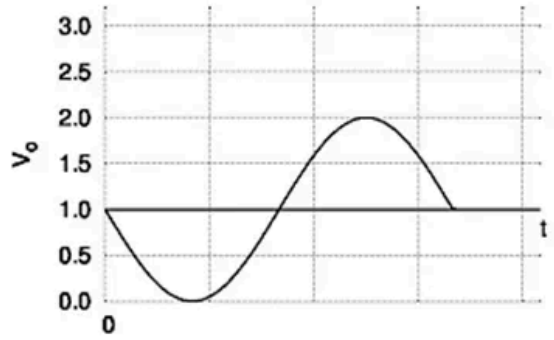

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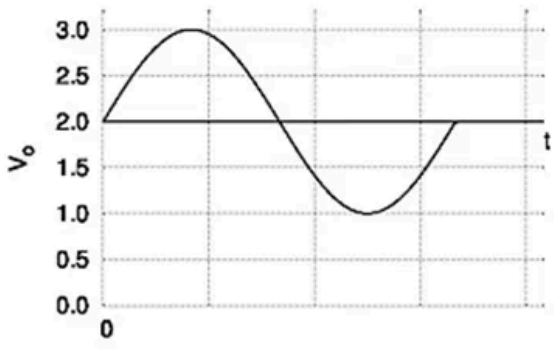
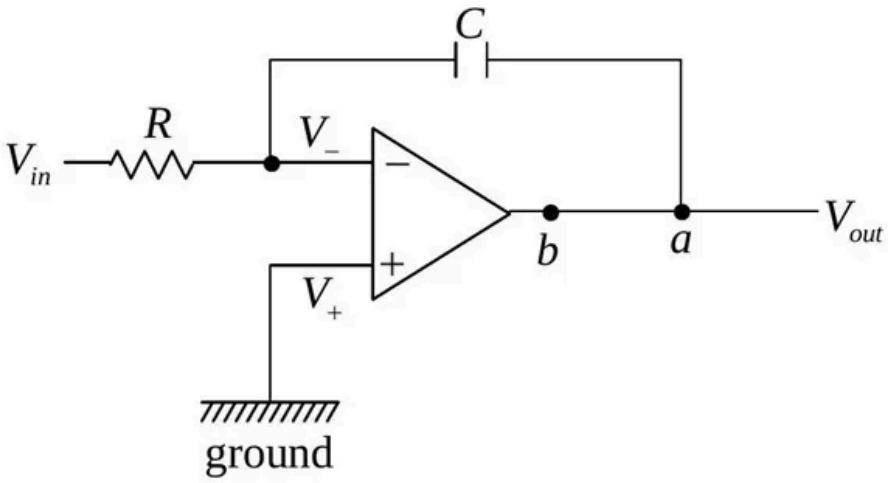


Q5. [June 2017] . 3.5 marks

Electronics > OPAMP

CSIR NET	2017 June	3.5M

The gain of the circuit given below is $-\frac{1}{\omega RC}$.



The modification in the circuit required to introduce a dc feedback is to add a resistor

1. between a and b
2. between positive terminal of the op-amp and ground
3. in series with C
4. parallel to C

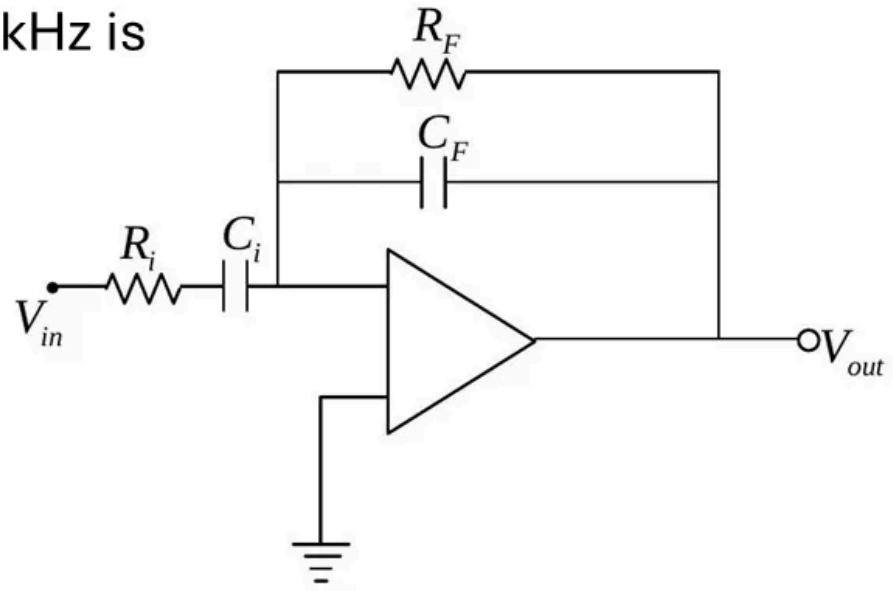
Q6. [June 2017] . 5.0 marks

Electronics > OPAMP

CSIR NET	2017 June	5M

In the following operational amplifier circuit $C_{\text{in}} = 10nF, R_{\text{in}} = 20k\Omega, R_F = 200k\Omega$ and $C_F = 100pF$. The magnitude of the gain at a input signal frequency of 16 kHz is

1. 67
2. 0.15
3. 0.3
4. 3.5

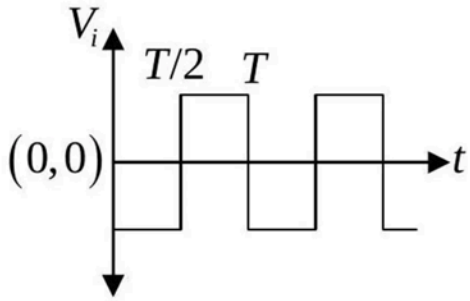


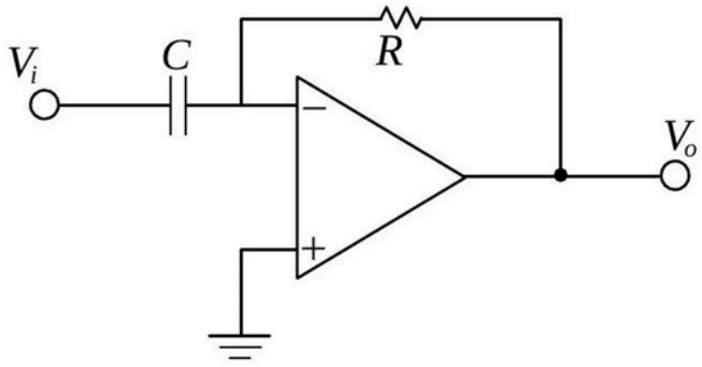
Q7. [Dec 2018] . 5.0 marks

Electronics > OPAMP

CSIR NET	2018 Dec	5M

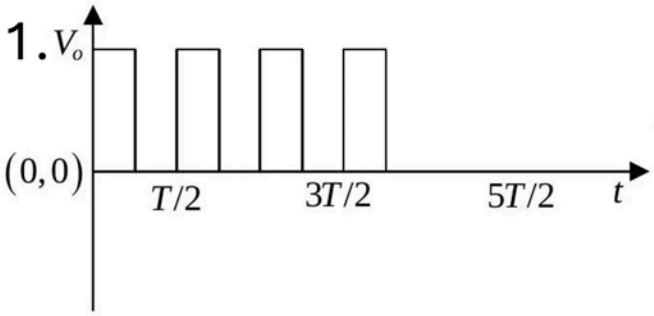
The input V_i to the following circuit is a square wave as shown in the following figure.



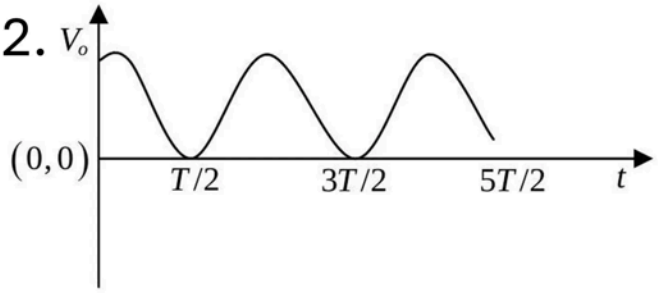


which of the waveforms best describes the output?

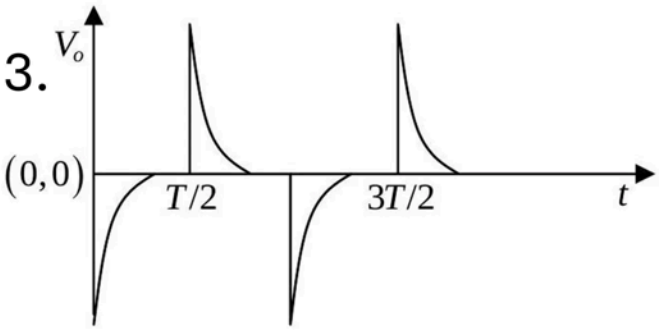
1.



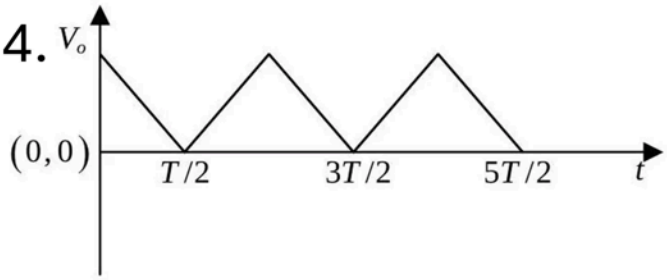
2.



3.



4.

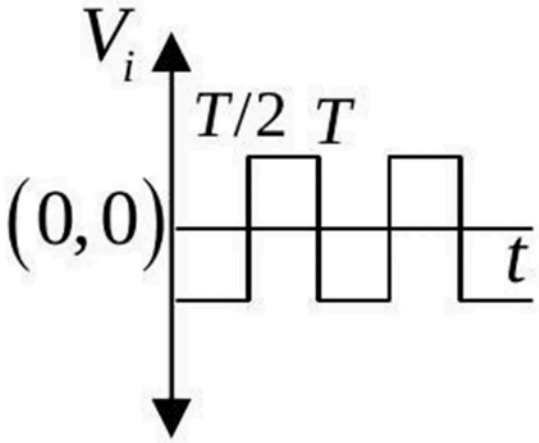


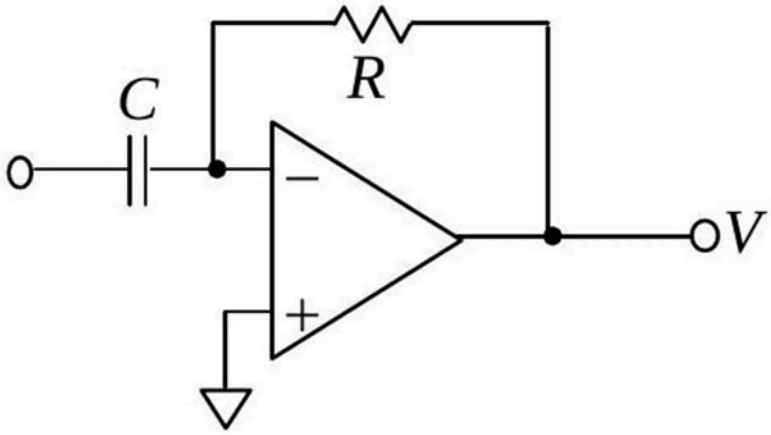
Q8. [June 2018] . 5.0 marks

Electronics > OPAMP

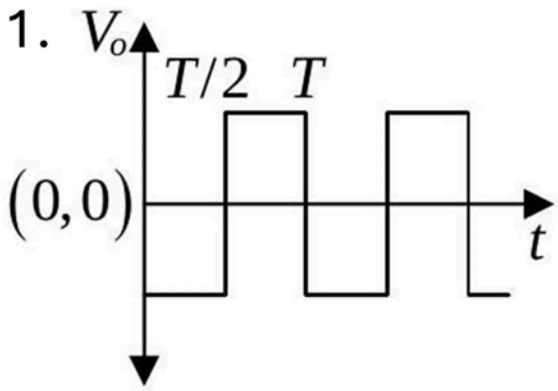
CSIR NET	2018 June	5M

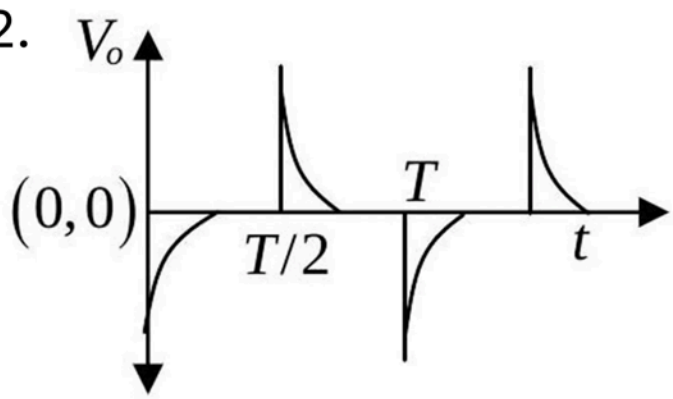
The input V_i to the following circuit is a square wave as shown in the following figure.

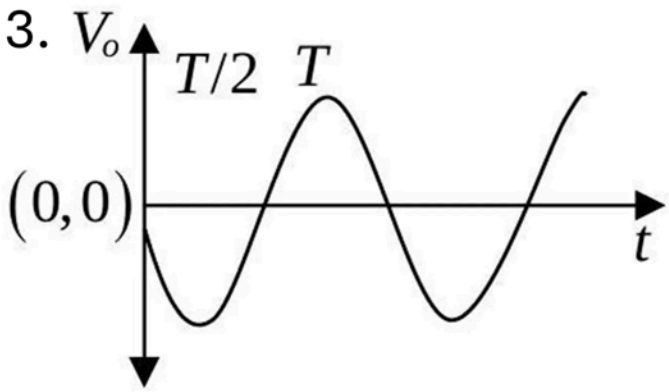


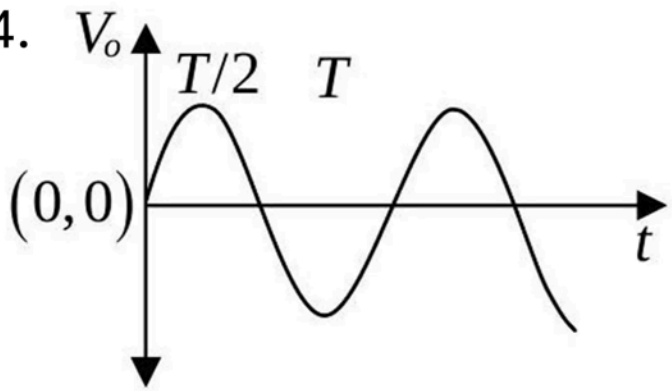


Which of the waveforms V_0 best describes the output?

1. 

2. 

3. 

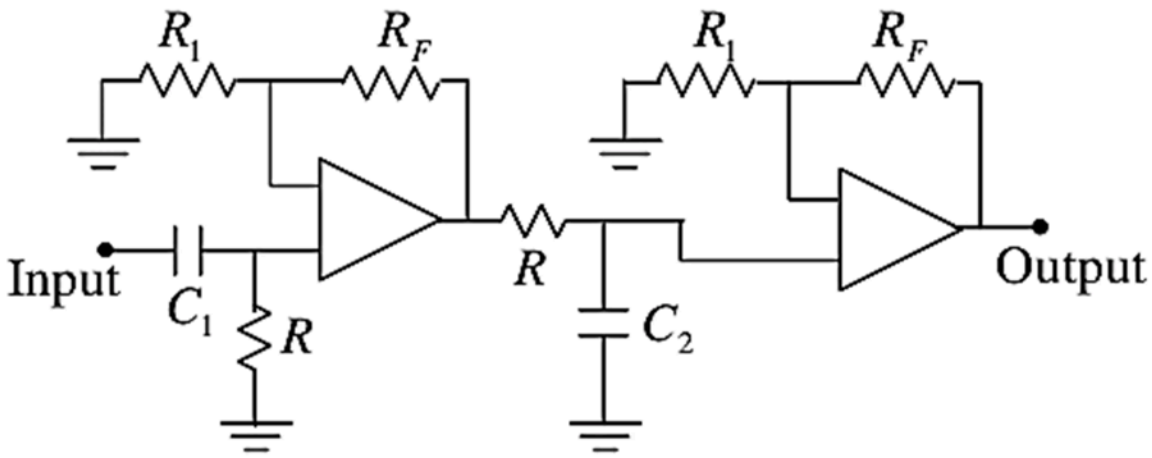
4. 

Q9. [Dec 2019] . 5.0 marks

Electronics > OPAMP

CSIR NET	2019 Dec	5M

In the circuit diagram of a band pass filter shown below, $R = 10k\Omega$.



In order to get a lower cut-off frequency of 150 Hz and an upper cut-off frequency of 10 kHz , the appropriate values of C_1 and C_2 respectively are

1. $0.1\mu F$ and $1.5nF$
2. $0.3\mu F$ and $5.0nF$
3. $1.5nF$ and $0.1\mu F$
4. $5.0nF$ and $0.3\mu F$

Q10. [June 2019] . 5.0 marks

Electronics > OPAMP

CSIR NET	2019 June	5M

For optimal performance of an op-amp based current-to-voltage converter circuit, the input and output impedance should be

1. Low input impedance and high output impedance
2. low input impedance and low output impedance
3. high input impedance and high output impedance
4. high input impedance and low output impedance

Q11. [June 2019] . 5.0 marks

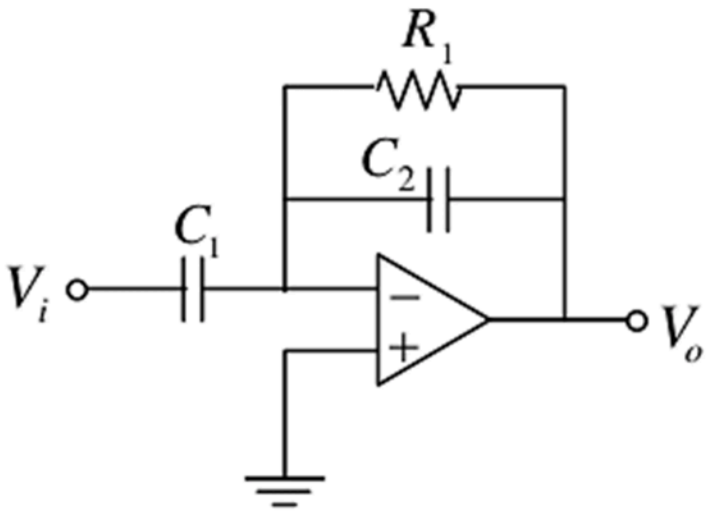
Electronics > OPAMP

CSIR NET	2019 June	5M

A circuit constructed using op-amp, resistor $R_1 = 1k\Omega$ and capacitors $C_1 = 1\mu F$ and $C_2 = 0.1\mu F$ is shown in the figure below.

This circuit will act as a

1. high pass filter
2. low pass filter
3. band pass filter
4. band reject filter

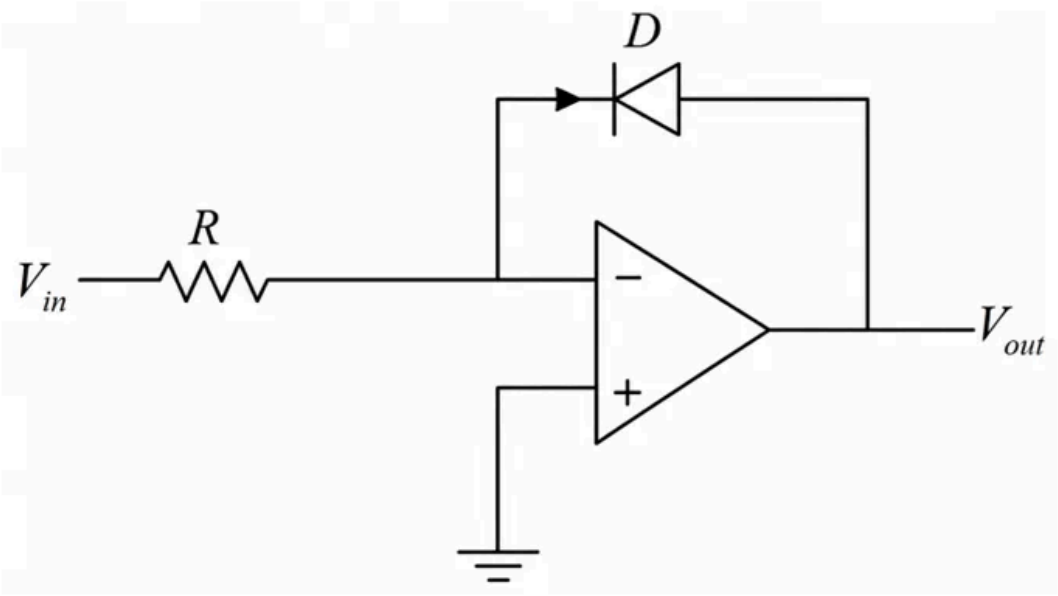


Q12. [June 2020] . 5.0 marks

Electronics > OPAMP

CSIR NET	2020 June	5M

The $I-V$ characteristics of the diode D in the circuit below is given by $I = I_s\left(e^{\frac{qV}{k_BT}} - 1\right)$ where I_s is the reverse saturation current, V is the voltage across the diode and T is the absolute temperature.



If the input voltage is V_{in}, then the output voltage V_{out} is

1. $I_S R \ln\left(\frac{qV_{in}}{k_BT} + 1\right)$
2. $\frac{1}{q} k_B T \ln\left(\frac{q(V_{in}+I_S R)}{k_BT}\right)$
3. $\frac{1}{q} k_B T \ln\left(\frac{V_{in}}{I_S R} + 1\right)$
4. $-\frac{1}{q} k_B T \ln\left(\frac{V_{in}}{I_S R} + 1\right)$

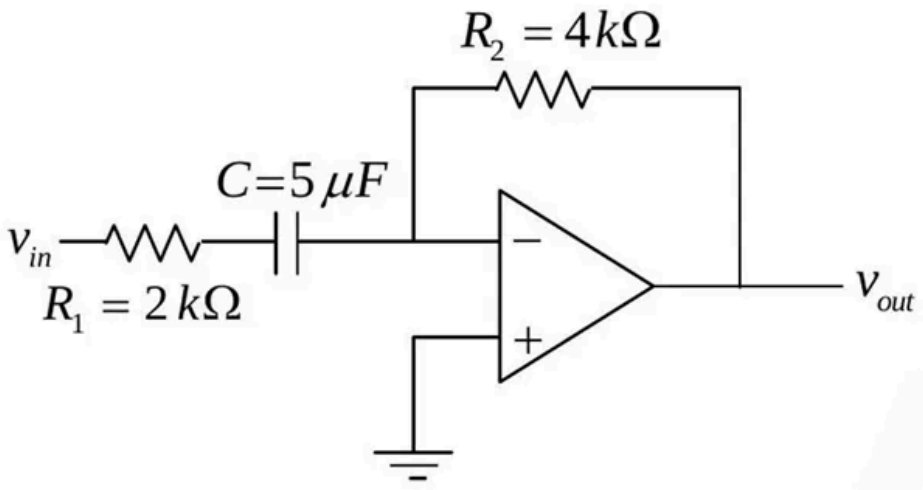
Q13. [June 2020] . 5.0 marks

Electronics > OPAMP

CSIR NET	2020 June	5M

In the circuit shown below, the gain of the op-amp in the middle of its bandwidth is 10^5. A sinusoidal voltage with angular frequency $\omega = 100\,\mathrm{rad/s}$ is applied to the input of the op-amp. The phase difference between the input and the output voltage is

1. $5\pi/4$
2. $3\pi/4$
3. $\pi/2$
4. π



Q14. [June 2022] . 5.0 marks

Electronics > OPAMP

CSIR NET	2022 June	5M

An amplifier with a voltage gain of 40 dB without feedback is used in an electronic circuit. A negative feedback with a fraction $1/40$ is connected to the input of this amplifier. The net gain of the amplifier in the circuit is closest to

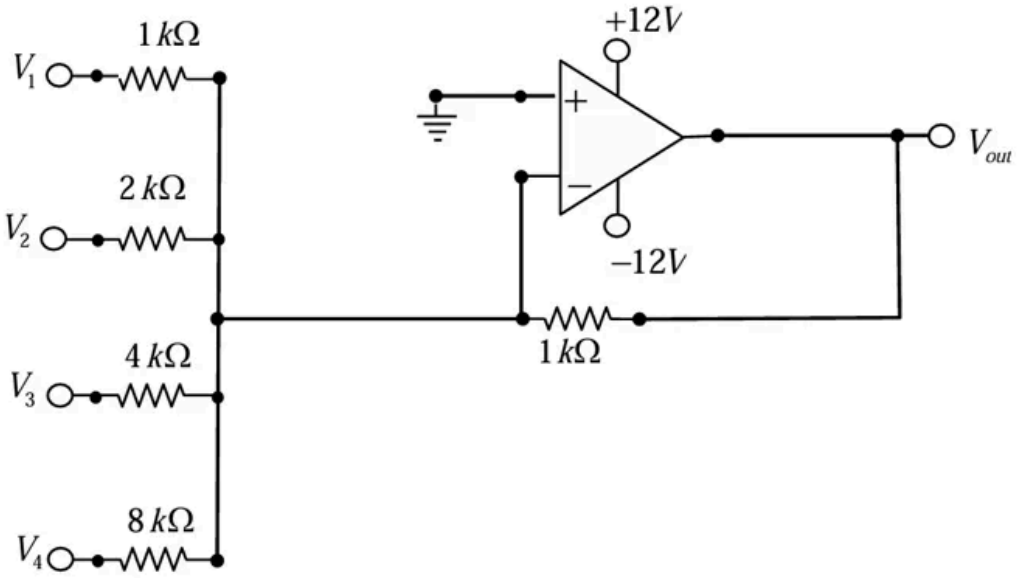
1. 40 dB
2. 37 dB
3. 29 dB
4. 20 dB

Q15. [Dec 2023] . 3.5 marks

Electronics > OPAMP

CSIR NET	2023 Dec	3.5 M

In the circuit shown below using an ideal opamp, inputs $V_j (j = 1,2,3,4)$ may either be open or connected to a -5 V battery.



The minimum measurement range of a voltmeter to measure all possible values of V_{out} is

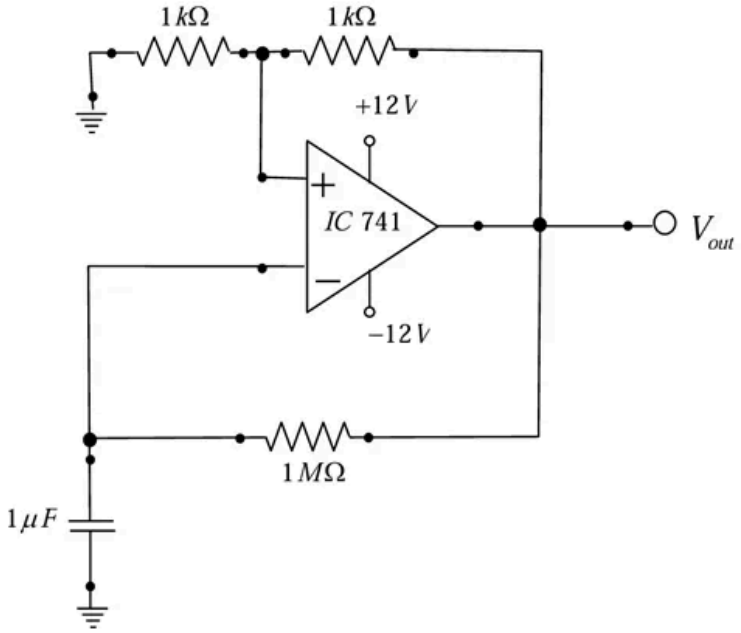
1. 10 V
2. 30 V
3. 3 V
4. 1 V

Q16. [Dec 2023] . 5.0 marks

Electronics > OPAMP

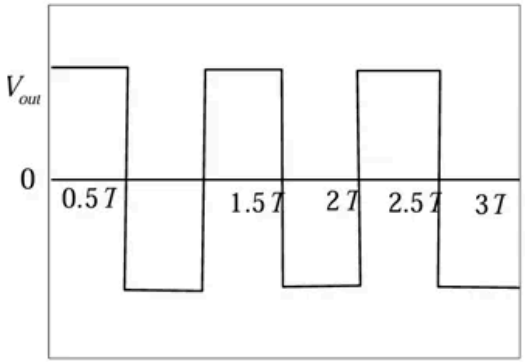
CSIR NET	2023 Dec	5 M

A circuit with operational amplifier is shown in the figure below.



The output voltage waveform V_{out} will be closest to

1.



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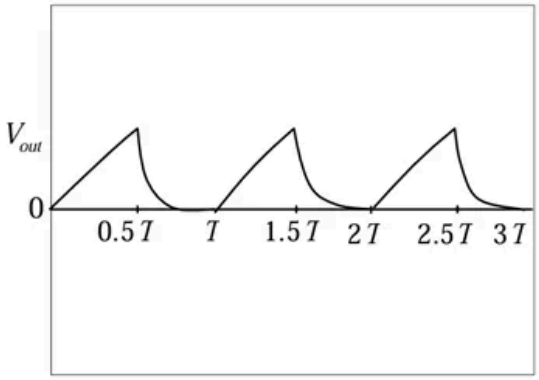

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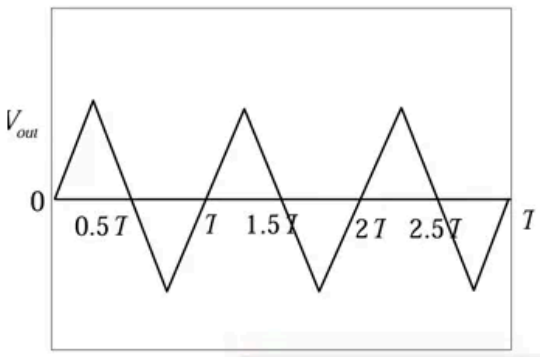

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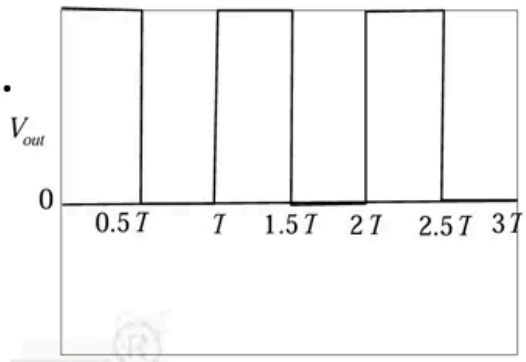
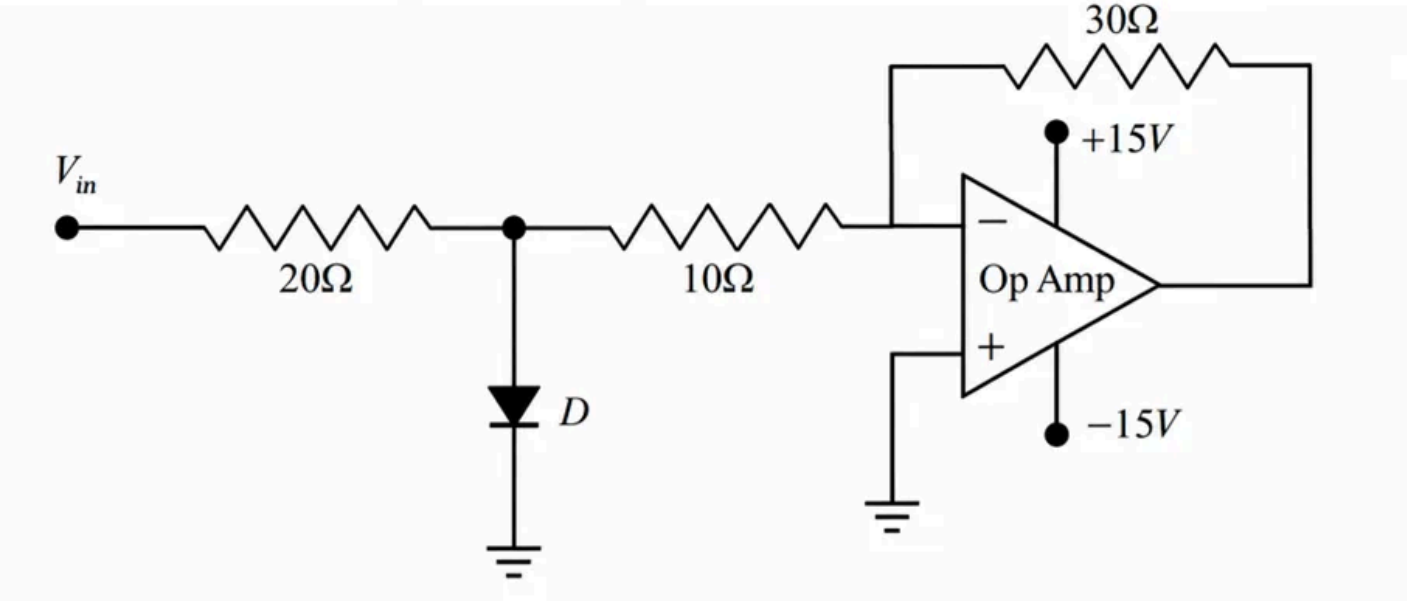


Q17. [June 2023] . 3.5 marks

Electronics > OPAMP

CSIR NET	2023 June	3.5M

In the circuit below, there is a voltage drop of 0.7 V across the diode D in forward bias, while no current flows through it in reverse bias.



If V_{in} is a sinusoidal signal of frequency 50 Hz with an RMS value of 1 V , the maximum current that flows through the diode is closest to

1. 1 A
2. 0.14 A
3. 0 A
4. 0.07 A

Q18. [Dec 2024] . 5.0 marks

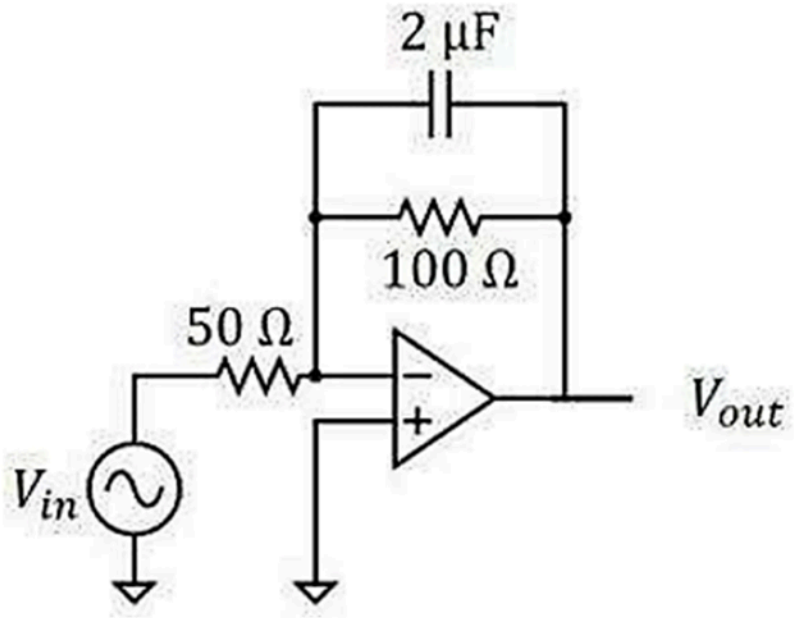
Electronics > OPAMP

CSIR NET	2024 Dec	5M

In the circuit shown below, the input voltage (in volts) is given by

$$V_{in}(t) = 0.1\sin(\omega_1 t) + \sin(\omega_2 t)$$

where $\omega_1 = 5 \times 10^2\ \mathrm{s}^{-1}$ and $\omega_2 = 5 \times 10^4\ \mathrm{s}^{-1}$.



The time varying part of the output voltage $V_{\mathrm{out}}\,(t)$ (in volts) is closest to

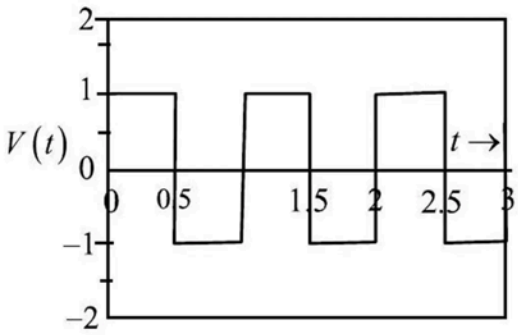
1. $-0.2\sin(\omega_1 t) - 2\sin(\omega_2 t)$
2. $-0.2\sin(\omega_1 t) + 0.2\cos(\omega_2 t)$
3. $2\cos(\omega_1 t) + 0.2\cos(\omega_2 t)$
4. $2\cos(\omega_1 t) - 2\sin(\omega_2 t)$

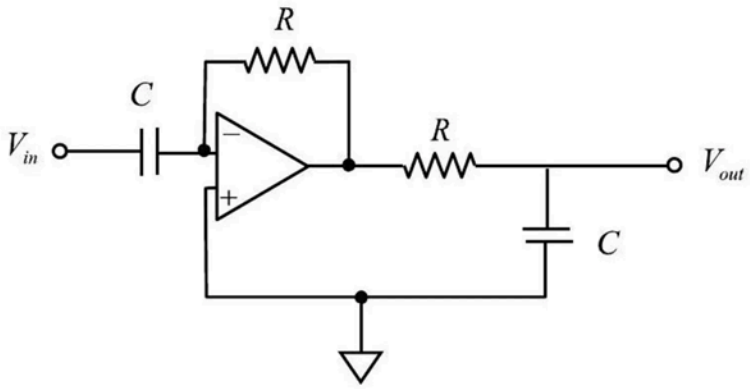
Q19. [June 2024] . 3.5 marks

Electronics > OPAMP

CSIR NET	2024 June	3.5M

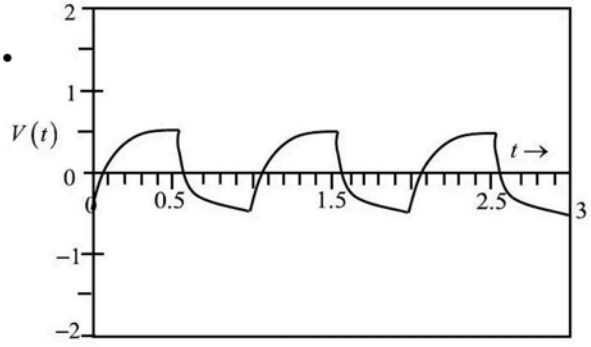
A train of square wave pulses is given to the input of an ideal opamp circuit shown below.





Given that the period of the input pulses $T \ll RC$ and the opamp does not get into saturation, which of the following best represents the output waveform?

1.



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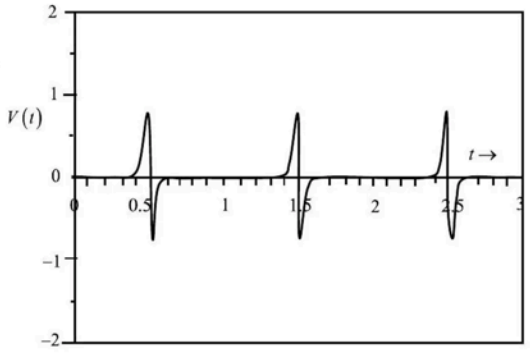

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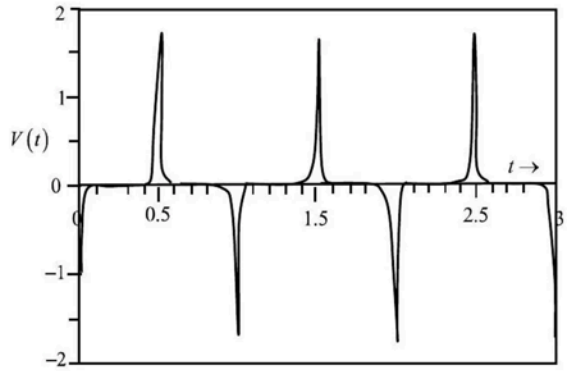
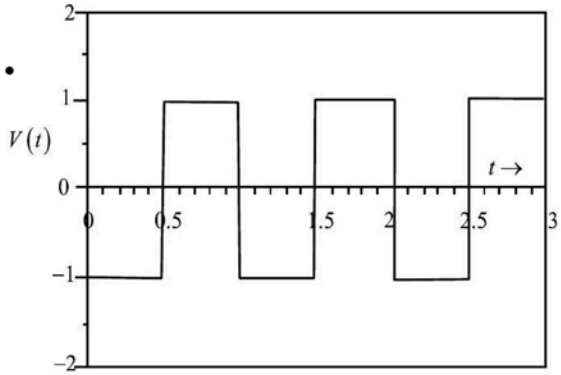


4.

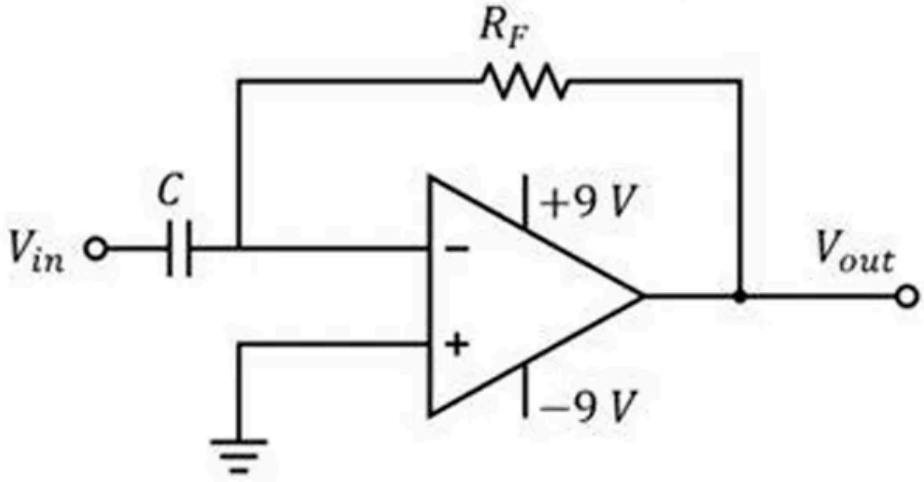


Q20. [Dec 2025] . 3.5 marks

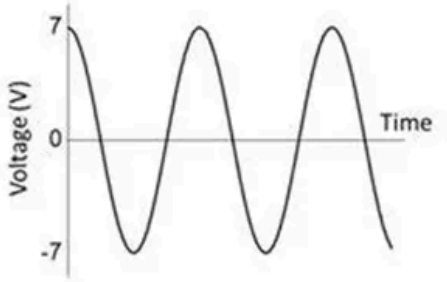
Electronics > OPAMP

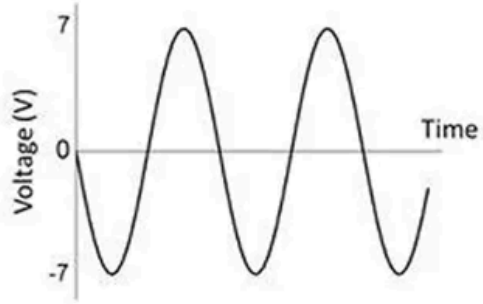
CSIR NET	2025 Dec	3.5M	Electronics

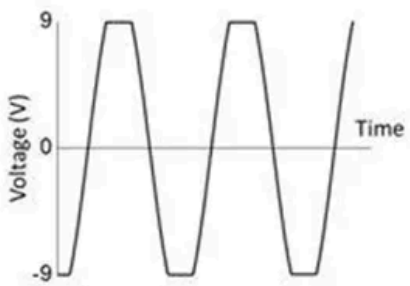
In the circuit shown below, the input voltage is $V_{\text{in}}(t) = 0.3\sin 50t$ (Volts) and $C = 100\mu F$, $R_F = 10k\Omega$.

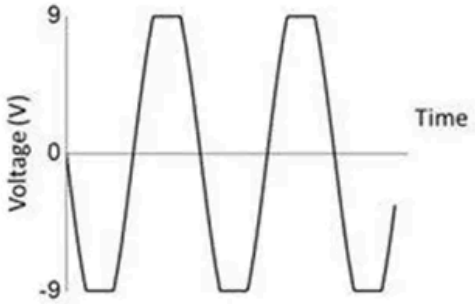


Considering the opamp to be ideal and neglecting the transients, the best representation of the output voltage $V_{\text{out}}(t)$ is

1.


2.


3.


4.


Answer Key

20 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Electronics	OPAMP	**3**
Q2	Electronics	OPAMP	**3**
Q3	Electronics	OPAMP	**3**
Q4	Electronics	OPAMP	**2**
Q5	Electronics	OPAMP	**4**
Q6	Electronics	OPAMP	**4**
Q7	Electronics	OPAMP	**None**
Q8	Electronics	OPAMP	**None**
Q9	Electronics	OPAMP	**1**
Q10	Electronics	OPAMP	**2**
Q11	Electronics	OPAMP	**1**
Q12	Electronics	OPAMP	**3**
Q13	Electronics	OPAMP	**1**
Q14	Electronics	OPAMP	**3**
Q15	Electronics	OPAMP	**1**
Q16	Electronics	OPAMP	**1**
Q17	Electronics	OPAMP	**3**
Q18	Electronics	OPAMP	**2**
Q19	Electronics	OPAMP	**4**
Q20	Electronics	OPAMP	**3**

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