Unit 6 - Op-Amp Applications

Week 6 Assignment 6

The due date for submitting this assignment has passed. Due on 2018-03-07, 23:59 IST.

Submitted assignment

1) The gain of a second order low pass filter ____________

- Decreases at the rate 20 dB/Decade
- Decreases at the rate of 40 dB/Decade
- Increases at the rate of 40 dB/Decade
- Increases at the rate 20 dB/Decade

No, the answer is incorrect.
Score: 0
Accepted Answers:
Decreases at the rate of 40 dB/Decade

2) Given V1 = 4 V and op-amp is supplied with ±12 V. What will be the allowable range of V2?

- 4 V ≤ V2 ≤ 28 V
- 2 V ≤ V2 ≤ 4 V
- 4 V ≥ V2 ≥ 8 V
- 1 V ≤ V2 ≤ 2 V

No, the answer is incorrect.
Score: 0
Accepted Answers:
4 V ≤ V2 ≤ 28 V

3) Choose the minimum number of op-amps required to implement the given expression

\[ V_o = \left[ 1 + \frac{R_2}{R_1} \right] V_1 - \frac{R_2}{R_1} V_2 \]

- Four
- Three
- Two

No, the answer is incorrect.
Score: 0
Accepted Answers:
Four
4) The circuit shown is a
   - Low pass filter with f3dB = \( \frac{1}{(R1 + R2)C} \) rad/s
   - Low pass filter with f3dB = \( \frac{1}{R1C} \) rad/s
   - High pass filter with f3dB = \( \frac{1}{(R1 + R2)C} \) rad/s
   - High pass filter with f3dB = \( \frac{1}{R1C} \) rad/s

   **No, the answer is incorrect.**
   **Score: 0**

   **Accepted Answers:**
   - High pass filter with f3dB = \( \frac{1}{R1C} \) rad/s

5) Choose the appropriate transfer characteristics for the precision rectifier circuit shown (Assume ideal OP-amp and practical diodes)

   **No, the answer is incorrect.**
   **Score: 0**

   **Accepted Answers:**

6) Calculate output voltage \( V_o \) for the circuit shown
   - 22 V
   - 31 V
   - 9 V
   - 11 V

   **No, the answer is incorrect.**
   **Score: 0**
7) For the circuit shown, assuming ideal diodes; output waveform \( V_0 \) will be

![Voltage Waveform](image1)

No, the answer is incorrect.
Score: 0

Accepted Answers:
- 31 V
- 1 point

8) Given \( R_1 = 2 \, k\Omega \), \( R_2 = 1 \, k\Omega \), \( R_3 = 4 \, k\Omega \), \( R_f = 4 \, k\Omega \), \( V_1 = 2 \, V \), \( V_2 = 3 \, V \) and \( V_3 = 1 \, V \) respectively. Calculate the output voltage \( V_0 \) for the circuit shown.

![Circuit Diagram](image2)

- 17 V
- -17 V
- -20 V
- 20 V

No, the answer is incorrect.
Score: 0

Accepted Answers:
- -17 V

9) When light falls on the photodiode shown in the following circuit, the reverse saturation current of

![Circuit Diagram](image3)

- 1 point
the photodiode changes from 100 µA to 300 µA. Assume an ideal op-amp, the output voltage \( V_0 \) of the circuit

- Does not change
- Changes from 1.2 V to 3.6 V
- Changes from -1.2 V to -3.6 V
- Changes from -12 V to -36 V

No, the answer is incorrect.
Score: 0
Accepted Answers:
Changes from -1.2 V to -3.6 V

10. Calculate the output voltage \( V_0 \) for the circuit shown, given \( R_1 = 1 \, \text{kΩ}, R_2 = 2 \, \text{kΩ}, R_3 = 1.5 \, \text{kΩ}, R_4 = 3 \, \text{kΩ}, V_1 = 4 \, \text{V} \) and \( V_2 = 0.5 \, \text{V} \) respectively.

- -25 V
- 25 V
- 35 V
- -35 V

No, the answer is incorrect.
Score: 0
Accepted Answers:
-35 V

11. Consider a differential amplifier circuit as shown in the figure, where the input voltage is given to the V1 terminal and V2 terminal is open circuit. Then the gain of this circuit will be similar to which of the following.

- The inverting amplifier
- Both inverting and non-inverting amplifier
- The non-inverting amplifier
- None of the mentioned

No, the answer is incorrect.
Score: 0
Accepted Answers:
The inverting amplifier

12. The transfer function of a second order LPF filter shown in the given figure is

\[
\frac{R^2C^2s^2 + 1}{R^2C^2s^2 + 3RCs + 1}
\]

\[
\frac{RCs}{R^2C^2s^2 + 3RCs + 1}
\]

\[
\frac{R^2C^2s^2}{R^2C^2s^2 + 3RCs + 1}
\]

\[
\frac{1}{R^2C^2s^2 + 3RCs + 1}
\]
No, the answer is incorrect.  
Score: 0  
Accepted Answers: 

\[ \frac{1}{R^2C^2s^2 + 3RCs + 1} \]

13) For the circuits shown below, when an input voltage \( V_1 \) is applied as 2 V the output \( V_{o1} \) is 1 V and when \( V_2 \) is applied as 1 V from an independent voltage source separately the output voltage \( V_o \) is -2 V. Compute the output voltage \( V_o \) if \( V_{o1} \) is connected to \( V_2 \).

- 2 V  
- 1 V  
- 1.33 V  
1 V  

No, the answer is incorrect.  
Score: 0  
Accepted Answers: 
- 1.33 V

In continuation to the previous question 13, due to some design considerations the resistors are fixed and op-amp configuration is to be of inverting amplifier as shown in the Figure in Q 13. To achieve an output voltage of \( V_o \) as -2 V what kind of op-amp configuration would you prefer between \( V_{o1} \) and \( V_2 \)?

- Inverting Amplifier  
- Non-inverting Amplifier  
- Voltage follower  
- Instrumentation Amplifier  

No, the answer is incorrect.  
Score: 0  
Accepted Answers: 
- Voltage follower

15) What is the problem associated in the above circuit shown in Q13 and what is the purpose of \( R_5 \) resistor?

- Low input impedance and to compensate for bias currents  
- High input impedance and to compensate for bias currents  
- Low input impedance and to compensate for offset currents

https://onlinecourses.nptel.ac.in/noc18_ec09/un...
High input impedance and to compensate for offset Voltage

No, the answer is incorrect.

Score: 0

Accepted Answers:

Low input impedance and to compensate for bias currents