# CHAPTER-6. OP-AMP

**[1]. A non inverting closed loop op amp circuit generally has a gain factor**

**A.** Less than one
**B. Greater than one**
**C.** Of zero
**D.** Equal to one

**HINT: -** For non inverting amplifier the gain is A = **[**1 + (Rf/Rin)**]**. So it will be always more than one

[2]. **If ground is applied to the (+) terminal of an inverting op-amp, the (–) terminal will**

**A.** Not need an input resistor
**B. Be virtual ground**
**C.** Have high reverse current
**D.** Not invert the signal

**HINT: -** Other options are not suitable. Please refer the Goodrich Interview Post for understanding inverting amplifier and virtual ground.

[3**] The closed-loop voltage gain of an inverting amplifier equal to**

**A.** The ratio of the input resistance to feedback resistance
**B.** The open-loop voltage gain
**C. The feedback resistance divided by the input resistance**
**D.** The input resistance

[4]. **When a number of stages are connected in parallel, the overall gain is the product of the individual stage gains**

**A.** True
**B. False**

**[5]. An ideal OP-AMP is an ideal**

a) Current controlled Current source
**b) Current controlled voltage source**
c) Voltage controlled voltage source
d) voltage controlled current source

**HINT: -** The ideal Opamp output voltage is maintained constant. It is controlled by input current.

**[6]. The ideal OP-AMP has the following characteristics.**

**a) Ri=∞ ,A=∞ ,R0=0**
b) Ri=0 ,A=∞ ,R0=0
c) Ri=∞ ,A=∞ ,R0=∞
d) Ri=0 ,A=∞ ,R0=∞

**HINT: -** Please refer the golden rules of Opamp.

**[7].Calculate the cutoff frequency of a first-order low-pass filter for R1 = 2.5kΩ and C1 = 0.05Mf**

**A. 1.273kHz**
**B.** 12.73kHz
**C.** 127.3 kHz
**D.** 127.3 Hz

**HINT:** low pass filter cut off frequency f = 1/(2πRC)

**[8]. How many op-amps are required to implement this equation**

$$V_o = -\left(\frac{R_f}{R_1}V_1 + \frac{R_f}{R_2}V_2 + \frac{R_f}{R_3}V_3\right)$$

**A.** 2
**B. 3**
**C.** 4
**D.** 1

**HINT**: - The output voltage of inverting amplifier is Vout = (-Rf/Rin)Vin. By keeping 3 inverting amplifier, we can get this equation.

**[9]. How many op-amps are required to implement this equation Vo = V1**

**A.**4
**B.**3
**C.**2
**D.1**

**HINT**: - The voltage follower which has one opamp has the output of Vo = Vin

**[10]. An OPAMP has a slew rate of 5 V/µ S .The largest sine wave O/P voltage possible at a frequency of 1 MHZ is**

**A.** 10 volts

**B.** 5 volts

**C.** 5/ volts

**D.** 5/2 volts

**HINT**: - Slew rate is defined as the max. rate of change of output voltage. Its unit is V/µS.

Time period = 1/f = 1/1MHz = 1µS

V= Vm. sin(ωt) = Vm. sin(2πf.t)

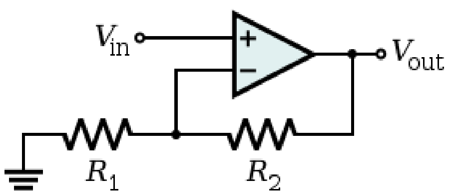
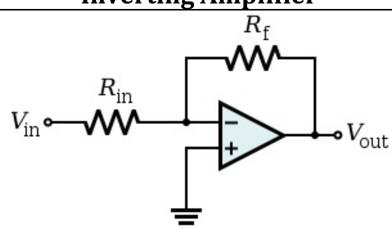
slew rate = dV/dt = d(Vm. sin(2πf.t)/ dt=Vm. 2πf. cost

**[11] Explain the amplifier operation of OP-AMP?**

**The golden rules of OP-AMP are:**

1. Vout = **A.** Delta Vin **[** A = Gain, Delta Vin = V+ - V-**]**
2. V-- < Vout < V++
3. Zout = 0 , Zin+ = Zin- = Infinity

The opamp will work as inverting amplifier and non- inverting amplifier based on the supply applied to its terminals.

| **Non Inverting Amplifier** | **Inverting Amplifier** |
|---|---|
|  |  |
| $V_{out} = V_{in}\left(1 + \frac{R_2}{R_1}\right)$ | $V_{out} = -\frac{R_f}{R_{in}} V_{in}$ |

**[12]Interrupted and Asked to derive the equation...**

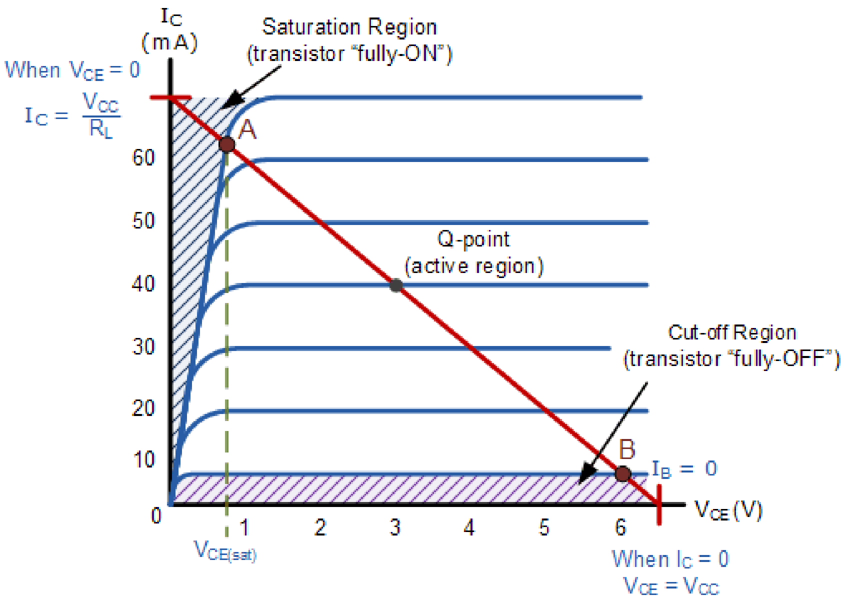
Current i = (Vin-Vout) / (Rin+Rf)

=( Vin - Vx)/Rin = (Vout - Vx)/Rf

Vx = virtual ground =the node at inverting input terminal =0

**[13] Explain how transistor acts as a switch?**

The areas of operation for a transistor switch are known as the Saturation Region and the Cut-off Region. This means then that we can ignore the operating Q-point biasing and voltage divider circuitry required for amplification, and use the transistor as a switch by driving it back and forth between its "fully-OFF" (cut-off) and "fully-ON" (saturation) regions as shown below.




**[**14] Interrupted and asked what is virtual ground?Explained.
then i = Vin/Rin - Vx/Rin = Vout/Rf- Vout/Rf

Rearranging we will get the final equation.

**[15]** Which of the following amplifier is used in a digital to analog converter?

- **A.** non inverter
- **B.** voltage follower
- **C. summer**
- **D.** difference amplifier

**[16]** Differential amplifiers are used in

- **A. instrumentation amplifiers**
- **B.** voltage followers
- **C.** voltage regulators
- **D.** buffers

**[17]** For an ideal op-amp, which of the following is true?

- **A.** The differential voltage across the input terminals is zero
- **B.** The current into the input terminals is zero
- **C. The current from output terminal is zero**
- **D.** The output resistance is zero

**[18]** The two input terminals of an opamp are labeled as

- **A.** High and low
- **B.** Positive and negative
- **C. Inverting and non inverting**
- **D.** Differential ans non differential

**[19]** When a step-input is given to an op-amp integrator, the output will be

- **A. a ramp.**
- **B.** a sinusoidal wave.
- **C.** a rectangular wave.
- **D.** a triangular wave with dc bias.

**[20]** For an op-amp having differential gain Av and common-mode gain Ac the CMRR is given by

- **A.** Av + Ac

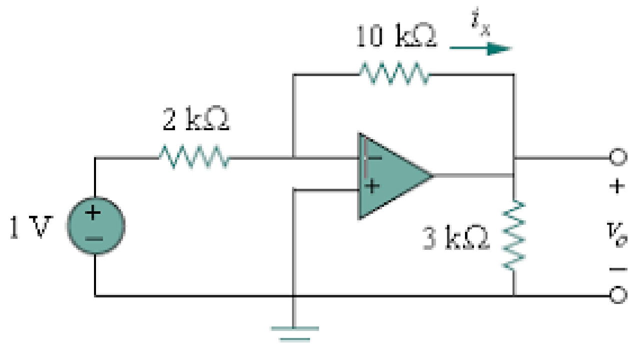
**B. Av / Ac**
**C.** 1 + **[**Av / Ac**]**
**D.** Ac / Av

**[21]** Hysteresis is desirable in Schmitt-trigger, because
**A.** energy is to be stored/discharged in parasitic capacitances.
**B.** effects of temperature would be compensate**D.**
**C. devices in the circuit should be allowed time for saturation and desaturation.**
**D.** it would prevent noise from causing false triggering.

**[22]** The output voltage Vo of the above circuit is
**A.** -6V
**B. -5V**
**C.** -1.2V
**D.** -0.2V

**[23]** In the above circuit the current *i*x is
**A.** 0.6A
**B. 0.5A**
**C.** 0.2A
**D.** 1/12A

**Circuit for questions 22 &23**




**[24]** Op-amp circuits may be cascaded without changing their input output relationships
**A. True**
**B.** False

**[25]** An ideal OP-AMP is an ideal
**A.** Current controlled Current source
**B. Current controlled Voltage source**
**C.** Voltage controlled Voltage source
**D.** Voltage controlled Current source

**[26]** A 741-Type OP-AMP has a gain-bandwith product of 1MHz. A non-inverting amplifier using this opamp & having a voltage gain of 20db will exhibit -3db bandwidth of
**A. 50KHz**
**B.** 100KHz
**C.** 1000/17KHz
**D.** 1000/7.07KHz

**[27]** An amplifier using an opamp with slew rate SR=1v/sec has a gain of 40d**B.**If this amplifier has to faithfully amplify sinusoidal signals from dc to 20KHz without introducing any slew-rate induced distortion, then the input signal level exceed
**A.** 795mV

**B.** 395mV

**C. 795mV**

**D.** 39.5mV

**[28]** The ideal OP-AMP has the following characteristics

**A. $R_i=\infty, A=\infty, R_0=0$**

**B.** $R_i=0, A=\infty, R_0=0$

**C.** $R_i=\infty, A=\infty, R_0=\infty$

**D.** $R_i=0, A=\infty, R_0=\infty$

**[29]** The approximate input impedance of the opamp circuit which has Ri=10k, Rf=100k, RL=10k

**A.** ∞

**B.** 120k

**C. 110k**

**D.** 10k

**[30]** An opamp has a slew rate of 5V/ S. the largest sine wave o/p voltage possible at a frequency of 1MHz is

**A. 10 V**

**B.** 5 V

**C.** 5V

**D.** 5/2 V

**[31]** Assume that the op-amp of the fig. is ideal. If Vi is a triangular wave, then V0 will be

**A.** square wave

**B.** Triangular wave

**C.** Parabolic wave

**D. Sine wave**

**[32]** A differential amplifier is invariably used in the i/p stage of all op-amps. This is done basically to provide the op-amps with a very high

**A.** CMMR

**B.** bandwidth

**C. slew rate**

**D.** open-loop gain

**[33]** A differential amplifier has a differential gain of 20,000. CMMR=80d**B.** The common mode gain is given by

**A.** 2

**B.** 1

**C. 1/2**

**D.**0

**[34]** In the differential voltage gain & the common mode voltage gain of a differential amplifier are 48db & 2db respectively, then its common mode rejection ratio is

**A.** 23dB

**B. 25dB**

**C.** 46dB

**D.** 50dB