Operational Amplifiers (OP-AMPS)

1. The op amp can amplify
   a. AC signals only
   b. DC signals only
   c. Both ac and dc signals
   d. Neither ac not dc signals

2. The input offset current equals the
   a. Difference between the two base currents
   b. Average of the two base currents
   c. Collector current divided by current gain
   d. Difference between the two base-emitter voltages

3. When the two input terminals of a diff amp are grounded
   a. The base currents are equal
   b. The collector currents are equal
   c. An output error voltage usually exists
   d. The ac output voltage is zero

4. A common-mode signal is applied to
   a. The non- inverting input
   b. The inverting input
   c. Both inputs
   d. The top of the tail resistor

5. The common-mode voltage gain is
   a. Smaller than the voltage gain
   b. Equal to the voltage gain
   c. Greater than the voltage gain
   d. None of the above

6. The input stage of an op amp is usually a
   a. Differential amp
   b. Class B push-pull amplifier
   c. CE amplifier
   d. Swamped amplifier

7. The common-mode rejection ratio is
   a. Very low
   b. As high as possible
   c. Equal to the voltage gain
   d. Equal to the common-mode voltage gain

8. The typical input stage of an op amp has a
   a. Single-ended input and single-ended output
   b. Single-ended input and differential output
   c. Differential input and single-ended output
   d. Differential input and differential output

9. The input offset current is usually
   a. Less than the input bias current
   b. Equal to zero
   c. Less than the input offset voltage
   d. Unimportant when a base resistor is used

10. With both bases grounded, the only offset that produces an error is the
   a. Input offset current
   b. Input bias current
   c. Input offset voltage
   d. β

11. The voltage gain of a loaded differential amp is
   a. Large than the unloaded voltage gain
   b. Equal to R_C / r_e
   c. Smaller than the unloaded voltage gain
   d. Impossible to determine

12. At the unity-gain frequency, the open-loop voltage gain is
   a. 1
   b. $A_{V(mid)}$
   c. Zero
   d. Very large

13. If the cutoff frequency is 20 Hz and the mid-band open-loop voltage gain is 1,000,000 the unity-gain frequency is
   a. 20 Hz
   b. 1 MHz
   c. 2 MHz
   d. 20 MHz

14. When the initial slope of a sine wave is greater than the slew rate.
   a. Distortion occurs
   b. Linear operation occurs
   c. Voltage gain is maximum
   d. The op amp works best

15. A 741 C contains
   a. Distortion resistors
   b. Inductors
   c. Active-load resistors
   d. A large coupling capacitor

16. The input impedance of a BIFET op amp is
   a. Low
   b. Medium
   c. High
   d. Extremely high

17. The 741 C has a unity-gain frequency of
   a. 10 Hz
   b. 20 Hz
   c. 1 MHz
   d. 15 MHz

18. An op amp has a voltage gain of 200,000. If the output voltage is 1 V, the input voltage is
    a. 2 µV
    b. 5 µV
    c. 10 V
    d. 1 V

19. A 741 C has
    a. A voltage gain of 100,000
    b. An input impedance of 2 MΩ
    c. An output impedance of 75 Ω
    d. All of the above

20. The voltage follower has a
    a. Closed-loop voltage gain of unity
    b. Small open-loop voltage gain
    c. Closed-loop bandwidth of zero
    d. Large closed-loop output impedance

21. An instrumentation amplifier has a high
    a. Output impedance
    b. Power gain
    c. CMRR
    d. Supply voltage

22. In a differential amplifier, the CMRR is limited mostly by the
    a. CMRR of the op amp
    b. Gain-bandwidth product
    c. Supply voltages
    d. Tolerance of the resistors

23. The input signal for an instrumentation amplifier usually comes from
    a. An inverting amplifier
    b. A resistor
    c. A differential amplifier
    d. A wheat- stone bridge

24. In a nonlinear op-amp circuit, the
    a. Op amp never saturates
    b. Feedback loop is never opened
    c. Output shape is the same as the input shape
    d. Op amp may saturate

25. To detect when the input is greater than a particular value, use a
    a. Comparator
    b. Clamper
    c. Limiter
    d. Relaxation

26. The voltage out of a Schmitt trigger is
    a. A low voltage
    b. A high voltage
    c. Either a low or a high voltage
    d. A sine wave

27. Hysteresis prevents false triggering associated with
    a. A sinusoidal input
    b. Noise voltages
    c. Stray capacitances
    d. Trip points

28. If the input is a rectangular pulse, the output of an integrator is a
    a. Sine wave
    b. Square wave
    c. Ramp
    d. Rectangular pulse

29. When a large sine wave drives a Schmitt trigger, the output is a
    a. Rectangular wave
    b. Triangular wave
    c. Rectified sine wave
    d. Series of ramps

30. A comparator with a trip point of zero is sometimes called a
    a. Threshold detector
    b. Zero-crossing detector
    c. Positive limit detector
    d. Half-wave detector

31. A Schmitt trigger uses
    a. Positive feedback
    b. Negative feedback
    c. Compensating capacitors
    d. Pull up resistors

32. A Schmitt trigger
    a. Is a zero-crossing detector
    b. Has two trip points
    c. Produces triangular output waves
    d. Is designed to trigger on noise

33. The trip point of a comparator is the input voltage that causes
    a. The circuit to oscillate
    b. Peak detection of the input signal
    c. The output to switch states
    d. Clamping to occur

34. An active half-wave rectifier has a knee voltage of
    a. V_K
    b. 0.7 V
    c. More than 0.7 V
    d. Much less than 0.7 V

35. In an active peak detector, the discharging time constant is
    a. Much longer than the period
    b. Much shorter than the period
    c. Equal to the period
    d. The same as the charging time constant

36. A window comparator
    a. Has only one usable threshold
    b. Uses hysteresis to speed up response
    c. Clamps the input positively
    d. Detects an input voltage between two limits

Answers

1.	(c)	2.	(a)	3.	(c)	4.	(c)
5.	(a)	6.	(a)	7.	(b)	8.	(c)
9.	(a)	10.	(c)	11.	(c)	12.	(a)
13.	(d)	14.	(a)	15.	(c)	16.	(d)
17.	(c)	18.	(b)	19.	(d)	20.	(a)
21.	(c)	22.	(d)	23.	(d)	24.	(d)
25.	(a)	26.	(c)	27.	(b)	28.	(c)
29.	(a)	30.	(b)	31.	(a)	32.	(b)
33.	(c)	34.	(d)	35.	(a)	36.	(d)