1. Which configuration of an operational amplifier (op-amp) provides a phase shift of 180 degrees between input and output?

a) Inverting amplifier
b) Non-inverting amplifier
c) Summing amplifier
d) Integrator

Answer: a) Inverting amplifier
Explanation: In an inverting amplifier configuration, the output signal is 180 degrees out of phase with the input signal.

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2. What is the primary function of a differential input and differential output amplifier?

a) Increase signal gain
b) Provide isolation between input and output
c) Amplify the difference between two input voltages
d) Generate a sinusoidal output

Answer: c) Amplify the difference between two input voltages
Explanation: Differential amplifiers amplify the voltage difference between two input terminals.

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3. Which type of feedback is employed in a voltage-series feedback amplifier?

a) Positive feedback
b) Negative feedback
c) No feedback
d) Voltage divider feedback

Answer: b) Negative feedback
Explanation: Voltage-series feedback amplifier uses negative feedback to stabilize gain and performance.

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4. What is the function of a log/antilog amplifier?

a) Amplify high-frequency signals
b) Perform logarithmic or antilogarithmic operations on input signals
c) Generate triangular waveforms
d) Act as a voltage-controlled oscillator

Answer: b) Perform logarithmic or antilogarithmic operations on input signals
Explanation: Log/antilog amplifiers are used to convert signals into logarithmic or antilogarithmic scales.

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5. Which type of filter exhibits a constant gain within its passband and a sharp roll-off beyond the cutoff frequency?

a) Butterworth filter
b) Chebyshev filter
c) Band reject filter
d) Notch filter

Answer: a) Butterworth filter
Explanation: Butterworth filters have a maximally flat magnitude response in the passband.

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6. What is the characteristic of a high pass filter?

a) Passes low-frequency signals
b) Attenuates low-frequency signals
c) Passes high-frequency signals
d) Attenuates high-frequency signals

Answer: c) Passes high-frequency signals
Explanation: High pass filters allow high-frequency signals to pass through while attenuating low-frequency signals.

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7. Which type of filter is designed to attenuate a specific range of frequencies while allowing all others to pass?

a) Low pass filter
b) High pass filter
c) Band pass filter
d) Band reject filter

Answer: d) Band reject filter
Explanation: Band reject filters attenuate a specific range of frequencies while allowing all others to pass.

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8. What is the primary purpose of an analog multiplier such as MPY634?

a) Generate sine waves
b) Perform mathematical operations on analog signals
c) Convert digital signals to analog
d) Amplify audio signals

Answer: b) Perform mathematical operations on analog signals
Explanation: Analog multipliers are used to perform mathematical operations like multiplication on analog signals.

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9. Which type of oscillator generates triangular or rectangular waveforms?

a) Phase-shift oscillator
b) Wein bridge oscillator
c) Triangular wave oscillator
d) Rectangular wave oscillator

Answer: c) Triangular wave oscillator
Explanation: Triangular wave oscillators generate triangular waveforms.

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10. What is the primary function of a comparator?

a) Amplify input signals
b) Provide linear output
c) Compare two input voltages and produce a digital output
d) Generate sinusoidal waveforms

Answer: c) Compare two input voltages and produce a digital output
Explanation: Comparators compare two input voltages and produce a digital output based on their relative magnitudes.

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11. What is the primary application of a zero-crossing detector?

a) Generating square wave signals
b) Detecting the zero points of a waveform
c) Filtering out low-frequency noise
d) Amplifying high-frequency signals

Answer: b) Detecting the zero points of a waveform
Explanation: Zero-crossing detectors detect the points at which a waveform crosses the zero axis.

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12. How does an integrator differ from a differentiator in terms of their output response to input signals?

a) Integrator outputs a derivative, while differentiator outputs an integral
b) Integrator outputs an integral, while differentiator outputs a derivative
c) Both integrator and differentiator output the same response
d) Integrator amplifies, while differentiator attenuates input signals

Answer: b) Integrator outputs an integral, while differentiator outputs a derivative
Explanation: Integrators produce an output signal that is the integral of the input signal, while differentiators produce an output signal that is the derivative of the input signal.

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13. What is the primary function of AGC (Automatic Gain Control) in op-amp circuits?

a) Provide constant voltage supply
b) Adjust the gain of the amplifier to maintain a constant output level
c) Generate sinusoidal waveforms
d) Stabilize the operating temperature

Answer: b) Adjust the gain of the amplifier to maintain a constant output level
Explanation: AGC adjusts the gain of the amplifier to maintain a constant output level despite changes in input signal strength.

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14. Which type of filter is designed to pass a specific range of frequencies while attenuating all others?

a) Band reject filter
b) Low pass filter
c) High pass filter
d) Band pass filter

Answer: d) Band pass filter
Explanation: Band pass filters allow a specific range of frequencies to pass through while attenuating frequencies outside that range.

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15. What is the primary application of an instrumentation amplifier?

a) Audio amplification
b) Measuring small differential voltages accurately
c) Generating square wave signals
d) Filtering out high-frequency noise

Answer: b) Measuring small differential voltages accurately
Explanation: Instrumentation amplifiers are used for precise measurement of small differential voltages, often in sensor applications.

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16. What is the purpose of a phase-shift oscillator?

a) To shift the phase of input signals by 180 degrees
b) To generate sinusoidal output signals
c) To amplify input signals
d) To compare two input signals

Answer: b) To generate sinusoidal output signals
Explanation: Phase-shift oscillators generate sinusoidal output signals.

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17. Which type of feedback is employed in a voltage-shunt feedback amplifier?

a) Positive feedback
b) Negative feedback
c) No feedback
d) Voltage divider feedback

Answer: b) Negative feedback
Explanation: Voltage-shunt feedback amplifier uses negative feedback to stabilize gain and performance.

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18. What is the primary function of a summing amplifier?

a) Amplify the sum of multiple input signals
b) Provide isolation between input and output
c) Generate square wave signals
d) Filter out high-frequency noise

Answer: a) Amplify the sum of multiple input signals
Explanation: Summing amplifiers add together multiple input signals with weighted coefficients.

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19. What is the main difference between a Wein bridge oscillator and a phase-shift oscillator?

a) Wein bridge oscillator produces square wave outputs, while phase-shift oscillator produces sinusoidal outputs
b) Wein bridge oscillator uses RC feedback network, while phase-shift oscillator uses an inverting amplifier
c) Wein bridge oscillator provides frequency stability, while phase-shift oscillator provides amplitude stability
d) Wein bridge oscillator employs an operational amplifier, while phase-shift oscillator does not

Answer: c) Wein bridge oscillator provides frequency stability, while phase-shift oscillator provides amplitude stability
Explanation: Wein bridge oscillators are known for their frequency stability, while phase-shift oscillators are known for their amplitude stability.

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20. Which type of filter is commonly used in audio applications to separate bass frequencies from midrange and treble frequencies?

a) Low pass filter
b) High pass filter

c) Band pass filter
d) Band reject filter

Answer: a) Low pass filter
Explanation: Low pass filters allow low-frequency signals, such as bass, to pass through while attenuating higher frequencies.