1. What do you call an amplifier which has an output current flowing during the whole input current cycle?
   A. class AB amplifier
   B. class B amplifier
   C. class A amplifier
   D. class C amplifier
   ANSWER: C

2. Class A amplifier can be built from what transistor configuration?
   A. common base
   B. common emitter
   C. common collector
   D. all of the above
   ANSWER: D

3. If a transistor amplifier provides a 360° output signal, it is classified as
   A. class A
   B. class B
   C. class C
   D. class D
   ANSWER: A

4. An amplifier that delivers an output signal of 180° only.
   A. class A
   B. class B
   C. class AB
   D. class D
   ANSWER: B

5. A class of amplifiers wherein the output signal swings more than 180° but less than 360°.
   A. class A
   B. class B
   C. class C
   D. class AB
   ANSWER: D

6. What is the distinguishing feature of a class C amplifier?
   A. Output is present for less than 180 degrees of the input signal cycle
   B. Output is present for the entire signal cycle
   C. Output is present for exactly 180 degrees of the input signal cycle
   D. Output is present for more than 180 degrees but less than 60 degrees of the input signal cycle
   ANSWER: A

7. A full 360° sine-wave signal is applied as an input to an unknown class of amplifier, if the output delivers only a pulse of less than 180°, of what class does this amplifier belongs?
   A. class AB
   B. class B
   C. class C
   D. class D

ANSWER: C

8. Which class of amplifiers that is intended for pulse operation?
   A. class B
   B. class C
   C. class D
   D. class S

   ANSWER: C

9. How do you classify an amplifier used to amplify either amplitude modulated (AM) or frequency modulated (FM) signals?
   A. class C
   B. class BC
   C. class D
   D. class S

   ANSWER: D

10. Which class of amplifiers that has the highest efficiency?
    A. class A
    B. class B
    C. class C
    D. class D

    ANSWER: D

11. What is the efficiency of a series-fed class A amplifier?
    A. 25%
    B. 50%
    C. 78.5%
    D. above 90%

    ANSWER: A

12. A class A amplifier has an efficiency of only 25%, but this can be increased if the output is coupled with a transformer. Up to how much is its efficiency will reach due to coupling?
    A. 36.5%
    B. 50%
    C. 68.5%
    D. 78.5%

    ANSWER: B

13. Class B amplifiers deliver an output signal of 180° and have a maximum efficiency of
    A. 50%
    B. 68.5%
    C. 78.55
    D. above 90%

    ANSWER: C

14. Transistorized class C power amplifiers will usually have an efficiency of
    A. 25%
    B. 33%
    C. 50%

D. 78.5%
ANSWER: B

15. For pulse-amplification, class D amplifier is mostly used. How efficient is a class D amplifier?
    A. about 25% efficient
    B. less efficient than class B
    C. more efficient than class A but less efficient than class B
    D. its efficiency reaches over 90%
    ANSWER: D

16. An amplifier of class AB means its output signal is between the output of class B and A, such that it varies from 180° (class B) to 360° (class A). How about its efficiency?
    A. Efficiency of class AB is in between the efficiency of class A and B, that is from 25% - 78.5%.
    B. It is always as efficient as class A (25%).
    C. It is always as efficient as class B (78.5%)
    D. The efficiency of class AB is the average of the efficiencies of both class A and class B (25% + 78.5%)/2 = 51.75%
    ANSWER: A

17. Among the given amplifiers below, which is the most efficient?
    A. class A (series-fed)
    B. class A (transformer-coupled)
    C. class A (directly-coupled)
    D. class A (capacitor-coupled)
    ANSWER: B

18. In order to have the best efficiency and stability, where at the loadline should a solid state power amplifier be operated?
    A. Just below the saturation point
    B. At 1.414 times the saturation point
    C. Just above the saturation point
    D. At the saturation point
    ANSWER: A

19. In most transistor class A amplifiers, the quiescent point is set at
    A. near saturation
    B. near cutoff
    C. below cutoff
    D. at the center
    ANSWER: D

20. For a class B amplifier, the operating point or Q-point is set at
    A. the top of the load line
    B. saturation
    C. the center
    D. cutoff
    ANSWER: D

21. The Q-point for class A amplifier is at the active region, while for class B it is at cutoff region, how about for class AB?
    A. it is slightly below saturation
    B. it is slightly above cutoff
    C. it is slightly above saturation
    D. it is at the saturation region
    ANSWER: B

22. Where does the Q-point of a class C amplifier positioned?
    A. at saturation region
    B. at active region
    C. at cutoff region
    D. below cutoff region
    ANSWER: D

23. The Q-point of a class D amplifier can be set or positioned at what region in the load line?
    A. below saturation
    B. above cutoff
    C. at cutoff
    D. any of the above
    ANSWER: D

24. Which of the amplifiers given below that is considered as non-linear?
    A. class A
    B. class B
    C. class AB
    D. class C
    ANSWER: D

25. Which amplifiers can be used for linear amplification?
    A. class A
    B. class B
    C. class C
    D. class A or B
    ANSWER: D

26. What do you call an amplifier that is biased to class C but modulates over the same portion of the curve as if it were biased to class B?
    A. class S
    B. class D
    C. class AB
    D. class BC
    ANSWER: D

27. Two class B amplifiers connected such that one amplifies the positive cycle and the other amplifies the remaining negative cycle. Both output signals are then coupled by a transformer to the load.
    A. transformer-coupled push –pull amplifier
    B. complementary-symmetry amplifier
    C. quasi-complementary push-pull amplifier

D. transformer-coupled class A amplifier
ANSWER: A

28. A push-pull amplifier that uses *npn* and *pnp* transistors to amplify the positive and negative cycles respectively.
    A. transformer-coupled push –pull amplifier
    B. complementary-symmetry amplifier
    C. quasi-complementary push-pull amplifier
    D. transformer-coupled class A amplifier
    ANSWER: B

29. A push-pull amplifier that uses either *npn* or *pnp* as its final stage. The circuit configuration looks like the complementary-symmetry.
    A. transformer-coupled push –pull amplifier
    B. complementary-symmetry amplifier
    C. quasi-complementary push-pull amplifier
    D. feed-back pair amplifier
    ANSWER: C

30. Amplifiers conversion efficiency are calculated using what formula?
    A. ac-power/dc-power
    B. ac-power/dissipated power
    C. dc-power/ac-power
    D. A or B are correct
    ANSWER: D

31. Basically, which class of amplifiers has the least distortion?
    A. class A
    B. class B
    C. class C
    D. class D
    ANSWER: A

32. A type of distortion wherein the output signal does not have the desired linear relation to the input.
    A. linear distortion
    B. nonlinear distortion
    C. cross-over distortion
    D. all of the above
    ANSWER: B

33. Distortion that is due to the inability of an amplifier to amplify equally well all the frequencies present at the input signal.
    A. nonlinear distortion
    B. amplitude distortion
    C. harmonic distortion
    D. cross-over distortion
    ANSWER: B

34. A nonlinear distortion in which the output consists of undesired harmonic frequencies of the input signal.

A. amplitude distortion
B. frequency distortion
C. cross-over distortion
D. harmonic distortion

ANSWER: D

35. Calculate the 2nd harmonic distortion for an output signal having a fundamental amplitude of 3V and a 2nd harmonic amplitude of 0.3V.
A. 1.0%
B. 10%
C. 23.33%
D. 43.33%

ANSWER: B

36. An amplifier has the following percent harmonic distortions; D2=10%, D3=5% and D4=1%. What is the amplifier % THD?
A. 5.33%
B. 11.22%
C. 16.0%
D. 22.11%

ANSWER: B

37. Which of the following refers to the gain of a circuit?
A. Input quantity of an amplifier divided by the output quantity.
B. The difference between the input voltage and the output voltage of a circuit.
C. The ratio of the output quantity to input quantity of an amplifier.
D. The total increase in output quality over the input quantity of an amplifier.

ANSWER: C

38. The overall gain of an amplifier in cascade is
A. the sum
B. the average of each
C. the product
D. 100% the sum

ANSWER: C

39. If three amplifiers with a gain of 8 each are in cascade, how much is the overall gain?
A. 72
B. 24
C. 512
D. 8

ANSWER: C

40. A multistage transistor amplifier arranged in a conventional series manner, the output of one stage is forward-coupled to the next stage.
A. cascaded amplifier
B. cascoded amplifier
C. darlington configuration
D. feed-back pair configuration

ANSWER: A

41. A direct-coupled two-stage transistor configuration wherein the output of the firs transistor is directly coupled and amplified by the second transistor. This configuration gives a very high current gain.
    A. cascade configuration
    B. cascode configuration
    C. darlington configuration
    D. feed-back pair
    ANSWER: C

42. A two-stage transistor amplifier in which the output collector of the first stage provides input to the emitter of the second stage. The final output is then taken from the collector of the second stage.
    A. cascade configuration
    B. cascode configuration
    C. quasi-complementary
    D. complementary amplifier
    ANSWER: B

43. Famous transistor amplifier configuration designed to eliminate the so called Miller effect.
    A. cascode amplifier
    B. darlington amplifier
    C. differential amplifier
    D. complementary-symmetry
    ANSWER: A

44. What are the transistor configurations used in a cascade amplifier?
    A. common-base and common-emitter
    B. common-base and common-collector
    C. common-collector and common-emitter
    D. common-emitter and common-base
    ANSWER: D

45. Transistor configuration known to have a super-beta (β2).
    A. cascade
    B. cascode
    C. darlington
    D. differential
    ANSWER: C

46. What is the approximate threshold voltage between the base-emitter junction of a silicon darlington transistor?
    A. 0.3 V
    B. 0.6 V
    C. 1.6 V
    D. 3.0 V
    ANSWER: C

47. Transistor arrangement that operates like a darlington but uses a combination of pnp and npn transistors instead of both npn.
    A. differential

B. common
C. cascode
D. feedback pair

ANSWER: D

48. An amplifier basically constructed from two transistors and whose output is proportional to the difference between the voltages applied to its two inputs.
A. differential amplifier
B. cascode amplifier
C. complementary amplifier
D. quasi-complementary amplifier

ANSWER: A

49. An amplifier having high direct-current stability and high immunity to oscillation, this is initially used to perform analog-computer functions such as summing and integrating.
A. operational amplifier (op-amp)
B. parametric amplifier (par-amp)
C. instrumentation amplifier
D. DC-amplifier

ANSWER: A

50. One of the most versatile and widely used electronic device in linear applications.
A. SCR
B. FET
C. UJT
D. op-amp

ANSWER: D

51. It is a very high-gain differential amplifier with very high input impedance and very low output impedance.
A. par-amp
B. op-amp
C. differential amp
D. complementary amp

ANSWER: B

52. What are the possible applications of operational amplifiers (op-amps)?
A. ac and dc-amplifiers
B. oscillators and signal conditioning
C. voltage-level detectors and comparators
D. all of the above

ANSWER: D

53. An operational amplifier must have at least how many usable terminals?
A. 3 terminals
B. 5 terminals
C. 8 terminals
D. 14 terminals

ANSWER: B

54. The circuit at the input stage of operational amplifiers

A. differential amplifier
B. cascaded amplifier
C. current mirror
D. complementary amplifier

ANSWER: A

55. An amplifier whose output is proportional to the difference between the voltages applied to its two inputs.
A. differential amplifier
B. differencing
C. delta amp
D. cascode-amp

ANSWER: A

56. In op-amps functional block diagram, what follows the differential amplifier?
A. cascode-amplifier
B. complementary amplifier
C. level shifter
D. high gain amplifier

ANSWER: D

57. A good op-amp has a
A. very high input resistance
B. very low input resistance
C. very high output resistance
D. very low CMRR

ANSWER: A

58. Ideally, op-amps have infinite input resistance and _____ output resistance.
A. infinite
B. zero
C. variable
D. a highly stabilized

ANSWER: B

59. How does the input of an op-amp made high?
A. by using super beta transistor at the input differential stage
B. by using FETs at the input differential stage
C. by connecting a very high resistance in series with the input differential stage
D. A and B above

ANSWER: D

60. What type of amplifier commonly used at the output stage of op-amps?
A. differential amplifier
B. cascade-amplifier
C. complementary amplifier
D. darlington stage amplifier

ANSWER: C

61. The transistor configuration used at the output complementary stage of most op-amps
A. cascode configuration

B. common emitter
C. common collector
D. common base

ANSWER: C

62. Why do most op-amps use a common collector at the output stage?
A. to have a higher output power
B. to have a better frequency response
C. to have a low harmonic distortion
D. to have a very low output resistance

ANSWER: D

63. The stage followed by the output complementary in op-amps functional block diagram.
A. level shifter
B. phase shifter
C. current mirror
D. polarizer

ANSWER: A

64. What is the purpose of a level shifter in op-amps?
A. to set and/or adjust the output voltage to zero when the input signal is zero
B. to set and/or adjust the input offset voltage to zero
C. to shift the input offset current to zero
D. all of the above

ANSWER: A

65. Primarily, op-amps are operated with bipolar power supply, however, we can also use single polarity power supply by
A. generating a reference voltage above ground.
B. “floating” the negative supply terminal (V-) of the op-amp.
C. simply connecting the negative supply terminal (V-) of the op-amp to ground.
D. isolating the negative supply terminal (V-) by a capacitor.

ANSWER: A

66. Op-amps have two input terminals namely, the inverting (-) and non-inverting (+) inputs. What is the significance of its name?
A. If a sine-wave is applied to the inverting (-) input, the output will be inverted or shifted by 180°, while if applied to the non-inverting (+) there will be no phase shift at the output.
B. If pulses are applied to the inverting (-) input, the positive pulse becomes negative at the output and vice versa, while if applied at the non-inverting (+) there will be no reversal of the pulse at the output.
C. In dc amplifier applications, increasing input at the inverting (-) terminal causes the output to decrease and vice versa, while at the non-inverting (+) input, the output magnitude goes with the input.
D. all of these are correct

ANSWER: D

67. When the same signal is applied to both inverting and non-inverting input terminals of an ideal op-amp, the output voltage would be
A. zero (0) V

B. +VSAT
C. –VSAT
D. offset voltage
ANSWER: A

68. The operating mode of an op-amp, when both inputs are tied together or when the input signal is common to both inputs.
A. differential mode
B. rejection mode
C. double-ended mode
D. common mode
ANSWER: D

69. What do you call of the gain of an op-amp if operated in common mode input?
A. differential gain
B. common gain
C. double-ended gain
D. rejection gain
ANSWER: B

70. When one input of the op-amp is connected to ground and the other is to the signal source, its operation is called
A. single-ended output
B. double-ended output
C. single-ended input
D. double-ended input
ANSWER: C

71. If op-amps are operated in differential mode, its gain is technically termed as
A. common-mode differential gain
B. differential gain
C. open-loop gain
D. closed-loop gain
ANSWER: B

72. In op-amps, which gain is the highest?
A. common-mode gain
B. differential gain
C. closed-loop gain
D. open-loop gain
ANSWER: D

73. The ratio of the differential gain and common gain of an op-amp
A. differential-common mode ratio
B. common-mode ratio
C. differential-mode rejection ratio
D. common-mode rejection ratio
ANSWER: D

74. An operational amplifier has a common-mode voltage gain of 10 and a differential-mode voltage gain of 20,000, calculate its common-mode rejection ratio (CMRR).

A. 200
B. 2,000
C. 20,000
D. 200,000
ANSWER: B

75. Calculate the CMRR of an op-amp having a common-mode gain of 10 and a differential-mode gain of 100,000.
A. 1000 dB
B. 100 dB
C. 80 dB
D. 40 dB
ANSWER: C

76. The non-inverting and inverting inputs of an op-amp have an input voltage of 1.5 mV and 1.0 mV, respectively. If the op-amp has a common-mode voltage gain of 10 and a differential-mode gain of 10,000, what is its output voltage?
A. 5.0 V
B. 5.0125 mV
C. 5.0125 V
D. 25.0125 V
ANSWER: C

77. What is the maximum output voltage swing of an op-amp?
A. +V to -V (supply voltage)
B. +VSAT to -VSAT
C. +½V to -½V
D. depends on the input signal
ANSWER: B

78. The μA741 op-amp has a CMRR of 90dB and a differential-mode voltage amplification of 200,000.What is the op-amp's common-mode voltage gain?
A. 31,622.778
B. 632.40
C. 6.324
D. 0.158
ANSWER: C

79. The current needed at the input of an op-amp to operate it normally
A. input bias current
B. input offset current
C. input threshold current
D. input holding current
ANSWER: A

80. Ideal op-amp requires no input current, but real op-amp needs a very small input current called input bias current. At both inputs, the bias currents have a slight difference. What do you call this difference?
A. differential input current
B. differential bias
C. input offset difference

D. input offset current
ANSWER: D

81. The change in input offset current due to temperature change
A. delta input offset current
B. slew rate
C. input offset current drift
D. PSRR
ANSWER: C

82. The reason why a slight difference between the input bias current occurs in op-amps is due to the unsymmetrical circuit component parameters. This unsymmetrical condition also produces a difference in input voltage called what?
A. drift voltage
B. differential voltage
C. input offset voltage
D. input threshold voltage
ANSWER: C

83. As electronic circuit operates, its operating temperature changes which causes device parameters to change. In op-amps, what do you call the change in input offset voltage due to the change in temperature?
A. input differential drift
B. input offset voltage drift
C. slew rate
D. PSRR
ANSWER: B

84. It is known through experiment that the input bias currents at the non-inverting (IB+) and inverting (IB-) inputs of a certain op-amp is 100 nA and 80 nA, respectively. Determine the op-amp's input offset current.
A. -20 nA
B. 20 nA
C. 90 nA
D. 180 nA
ANSWER: B

85. Ideally, the output voltage of an op-amp is zero when there is no input signal, however, in practical circuits, a small output voltage appears, this voltage is known as
A. minimum output voltage
B. pinch-off voltage
C. output offset voltage
D. saturation voltage
ANSWER: C

86. The output offset voltage of an op-amp is (are) due to
A. input offset current
B. input offset voltage
C. voltage and current drift
D. A and B above
ANSWER: D

87. Calculate the output offset voltage of an inverting amplifier using op-amp with an input offset current of 10 nA. The circuit is having an input resistance of 10 kΩ and a feedback resistance of 100 kΩ.
    A. 0.1 mV
    B. 1.0 mV
    C. 10.0 mV
    D. 100.0 mV
    ANSWER: B

88. An op-amp inverting amplifier uses a feedback resistor of 100 kΩ and input resistor of 10 kΩ. If the op-amps input offset voltage is 2.0 mV, approximate the amplifier output offset voltage due to this input offset voltage.
    A. 10 mV
    B. 11 mV
    C. 20 mV
    D. 22 mV
    ANSWER: D

89. The output offset voltage of an op-amp is due to the input offset current and voltage. If 1 mV is due to the input offset current and 22 mV due to the input offset voltage, what is the total output offset voltage of the op-amp?
    A. 11.5 mV
    B. 22 mV
    C. 23 mV
    D. 45 mV
    ANSWER: C

90. How will you minimize the output offset voltage due to the input offset current of an op-amp?
    A. by installing a bias-current-compensating resistor
    B. by increasing the value of the feedback resistor
    C. by decreasing the value of the input resistor
    D. B and C above
    ANSWER: A

91. What is a bias-current compensating resistor in op-amp circuits?
    A. A resistor used to reduce the undesired output offset voltage due to the input offset current.
    B. A resistor connected between the non-inverting terminal and ground.
    C. A resistor used to balance both input bias currents and therefore eliminates the input offset current.
    D. all of these
    ANSWER: D

92. The approximate value of the bias-current compensating resistor in op-amp circuits is
    A. equal to the feedback resistor
    B. equal to the input resistor
    C. equal to the series combination of the input and feedback resistors
    D. equal to the parallel combination of the input and feedback resistors
    ANSWER: D

93. In op-amp analysis, the input offset voltage is represented by
    A. a battery
    B. a signal generator
    C. Thevenin's voltage source
    D. Norton's current source
    ANSWER: A

94. The battery representing the input offset voltage in op-amp circuit analysis is connected where?
    A. between the inverting and ground terminal
    B. between the non-inverting and ground terminal
    C. between the inverting and non-inverting terminal
    D. either B and C above
    ANSWER: B

95. What is the effect of the input offset voltage to the output voltage if the op-amp has no feedback element?
    A. causes the output to be always at cutoff
    B. causes the output to saturate towards positive
    C. causes the output to saturate towards negative
    D. causes the output to saturate either towards positive or negative
    ANSWER: D

96. How can we minimize the effect of the input offset current and input offset voltage at the output offset voltage?
    A. by making the feedback resistance small
    B. by making the feedback resistance large
    C. by making the input resistance small
    D. by making the input resistance large
    ANSWER: A

97. An op-amp is wired as an inverting amplifier with an input and feedback resistances of 1 kΩ and 100 kΩ, respectively. When the input signal is set to zero, the output was found to have an offset voltage of 101 mV. Calculate the input offset voltage.
    A. 0.01 mV
    B. 0.1 mV
    C. 1.0 mV
    D. 10.0 mV
    ANSWER: C

98. What is the most effective way of minimizing the output offset voltage of an op-amp?
    A. by reducing the value of the feedback resistor
    B. by increasing the value of the input resistor
    C. by a capacitor-compensation technique
    D. by properly using and adjusting the offset-null terminals
    ANSWER: D

99. What cause(s) the well-adjusted output offset voltage of op-amps to change?
    A. change in operating temperature
    B. component aging

C. variations in supply voltage
D. all of the above

ANSWER: D

100. Which op-amp parameter(s) that normally affects its small signal dc-amplification performance?
A. input bias current
B. input offset voltage
C. input offset current
D. all of the above

ANSWER: D

101. Op-amp parameter(s) that is important in large signal dc-amplification.
A. input offset voltage
B. input offset current
C. slew rate
D. all of the above

ANSWER: C

102. In large signal dc-amplifiers using op-amp, which parameter has the least effect on its performance?
A. drift
B. slew rate
C. input offset voltage
D. input offset current

ANSWER: A

103. For ac-amplifiers using op-amps what parameters can affect its performance.
A. input offset current and voltage
B. input bias current and voltage
C. drift and slew rate
D. slew rate and frequency response

ANSWER: D

104. If an op-amp is used to amplify small ac-signals, what parameter you should greatly consider to ensure better performance?
A. input bias current
B. drift
C. frequency response
D. slew rate

ANSWER: C

105. What do we mean by internally compensated op-amps?
A. Op-amps with internal frequency compensation capacitor to prevent oscillation.
B. Op-amps with an internal compensating resistor to make the output offset voltage zero.
C. Op-amps with internal coupling capacitor to block dc-voltages and allows ac-voltages to pass.
D. Op-amps with internal active components to make its gain constant at the entire operating frequency.

ANSWER: A

106. The frequency at which the open-loop gain of an op-amp is 0.707 times its value at very low frequency
    A. threshold frequency
    B. break frequency
    C. minimum frequency
    D. operating frequency
ANSWER: B

107. What will happen to the voltage gain of op-amp when its operating frequency is increased?
    A. also increases
    B. increases exponentially
    C. will decrease
    D. decreases exponentially
ANSWER: C

108. The reduction of op-amps gain due to increasing operating frequency.
    A. Cutoff
    B. roll-off
    C. diminishing factor
    D. reduction step
ANSWER: B

109. What do we mean by a 20 dB/decade roll-off?
    A. a gain reduction by a factor of 10 per decade
    B. a gain reduction by a factor of 20 per decade
    C. a gain reduction by a factor of 10 per 10 Hz increased in frequency
    D. a gain reduction by a factor of 20 per 10 Hz increased in frequency
ANSWER: A

110. A reduction of op-amp's voltage gain by a factor of two each time the frequency doubles.
    A. 2 dB/octave
    B. 2 dB/decade
    C. 6 dB/octave
    D. 6 dB/decade
ANSWER: C

111. Frequency at which the voltage gain of op-amp reduces to unity.
    A. unity-gain frequency
    B. cutoff frequency
    C. bandwidth point
    D. unity-gain bandwidth product
ANSWER: D

112. The low and high cutoff frequencies of an amplifier is also called
    A. corner frequencies
    B. 0.707 frequencies
    C. 3-dB frequencies
    D. all of these are correct

ANSWER: D

113. Calculate the cutoff frequency (f_c)of an op-amp having a unity-gain bandwidth product B_1 = 1 MHz and a open-loop voltage gain A_{OL} = 100,000.
   A. 10 Hz
   B. 20 Hz
   C. 100 Hz
   D. 200 Hz

ANSWER: A

114. An op-amp has a specified transient response rise time of 0.3 µs, calculate its unity-gain bandwidth.
   A. 0.857 MHz
   B. 1.0 MHz
   C. 1.167 MHz
   D. 2.334 MHz

ANSWER: C

115. Rise time is defined as the time required for the output voltage to rise from _____ to _____ of its final value.
   A. 0% - 100%
   B. 1% - 99%
   C. 5% - 95%
   D. 10% - 90%

ANSWER: D

116. The maximum output voltage rate of change of an op-amp.
   A. rise time
   B. maximum voltage swing
   C. differential rate
   D. slew rate

ANSWER: D

117. Factor(s) or parameter(s) that determine(s) the op-amps maximum operating temperature
   A. PSRR
   B. slew rate
   C. unity-gain bandwidth product
   D. B and C above

ANSWER: D

118. What is the maximum signal frequency that can be used in an op-amp having a specified slew rate of 0.5 V/µsec? The maximum output voltage desired is 5 V.
   A. 16 kHz
   B. 32 kHz
   C. 100 kHz
   D. 1 MHz

ANSWER: A

119. What must be the slew rate of an op-amp to be used in order to provide an undistorted output voltage of .10 V ac a frequency of 100,000 rad/sec?

A. 0.1 V/μsec
B. 0.5 V/μsec
C. 1.0 V/μsec
D. 6.28 V/μsec
ANSWER: C

120. When an op-amp is used as a comparator, the output voltage would be +VSAT if
A. V+ > V-
B. V- > V+
C. V- = V+
D. V- and V+ are both zero
ANSWER: A

121. Two comparators using op-amps, configured such that it can detect voltage levels within a certain range of values rather than simply comparing whether a voltage is above or below a certain reference.
A. analog comparator
B. regenerative comparator
C. parallel comparator
D. window comparator
ANSWER: D

122. What gain is significant when an op-amp is used as a voltage comparator?
A. open-loop gain
B. common gain
C. differential closed loop gain
D. closed loop gain
ANSWER: A

123. An op-amp zero-crossing detector without hysteresis,
A. uses a resistor as its feedback element
B. uses a capacitor as its feedback element
C. uses an inductor as its feedback element
D. has no feedback
ANSWER: D

124. The feedback element of a differentiator constructed from op-amp is
A. a resistor
B. an inductor
C. a capacitor
D. an RC network
ANSWER: A

125. An active integrator uses an op-amp, what is its feedback element?
A. Resistor
B. capacitor
C. inductor
D. RC network
ANSWER: B

126. The voltage gain of an op-amp voltage follower.

A. unity
B. Rf/Ri
C. 1 + Rf/Ri
D. depends on the type of op-amp

ANSWER: A

127. Calculate the closed-loop voltage gain of an inverting amplifier having a feedback and an input resistance of 100 kΩ and 10 kΩ, respectively.
A. 10
B. 11
C. 100
D. 110

ANSWER: A

128. The gain of an inverting amplifier is determined by the ratio of the feedback and input resistors (Rf/Ri), meaning we can select any value of resistors as long as its ratio is the same. What op-amp parameter that helps us determine the appropriate values of these resistors?
A. CMRR
B. PSRR
C. SR
D. input bias current

ANSWER: D

129. What is the noise gain of op-amps?
A. equal to the open loop gain
B. Rf/Ri
C. 1 + Rf/Ri
D. equal to the common gain

ANSWER: C

130. A unity-gain summing amplifier has three inputs, V1 = 1.0 mV, V2 = 1.5 mV, and V3 = 2.5 mV, calculate the total output voltage.
A. 2.5 mV
B. 3.5 mV
C. 4.0 mV
D. 5.0 mV

ANSWER: D

131. The random voltage at the output of an op-amp which could occupy the entire bandwidth.
A. noise
B. hash
C. interference
D. all of the above

ANSWER: D

132. Which of the following of the resistor combinations that provides lesser noise in op-amp circuits?
A. Make both the feedback and input resistances as large as possible
B. Make the feedback as large as possible, while the input as low as possible.

C. Make the feedback as low as possible, while the input as large as possible.
D. Make the feedback and input resistances as small as possible.

ANSWER: D

133. In most ac-amplifiers using op-amps, the feedback resistor is shunted with a very small capacitance, what is its purpose?
A. to prevent oscillation
B. to improve stability
C. to minimize high frequency noise
D. to compensate for high frequency loss

ANSWER: C

134. Approximate the noise gain of an inverting adder using op-amps if it has five inputs.
A. unity (1)
B. two (2)
C. four (4)
D. six (6)

ANSWER: D

135. Op-amps with internal frequency compensation are very stable with respect to signal frequencies. However, the trade-off for frequency stability is (are)
A. limited small-signal bandwidth
B. slow slew rate
C. limited open-loop frequency response
D. all of these

ANSWER: D

136. What do we mean by externally compensated op-amps?
A. op-amps with frequency-compensation terminals
B. op-amps with provision to externally compensate for frequency stability
C. op-amps whose gain is externally compensated
D. A and B above

ANSWER: D

137. What is true about the external frequency-compensation capacitor?
A. the higher its value, the wider is its bandwidth
B. the lower its value, the wider is its bandwidth
C. the higher its value, the faster its slew rate
D. A and C above

ANSWER: B

138. Typical value of the external frequency-compensating capacitor of op-amps.
A. 3 - 30 nF
B. 30 - 300 nF
C. 0.3 - 3.0 µF
D. 3.0 - 30 µF

ANSWER: D

139. What do we mean by a general-purpose op-amps?
A. op-amps with limited unity-gain bandwidth up to approximately 1 MHz
B. op-amps with slew rate about 0.5 V/µsec

C. op-amps that has unlimited application
D. A and B above

ANSWER: D

140. Op-amps designed to operate at high slew rate, about 2000 V/μsec and at high frequencies, more than 50 MHz.
A. general purpose op-amps
B. high power op-amps
C. high-stability op-amps
D. high-frequency, high-slew rate op-amps

ANSWER: D

141. Generally, where does hybrid op-amps found its application?
A. for high-output voltage
B. for high-output current
C. for high-frequency
D. A and B above

ANSWER: D

142. The magnitude of the op-amps input offset voltage before it can be classified as a low-input offset voltage op-amp
A. 0.2 mV
B. 2.0 mV
C. 2.5 mV
D. 5.0 mV

ANSWER: A

143. Op-amps whose internal transistor biasing can be controlled externally are categorize as
A. general purpose op-amps
B. programmable op-amps
C. variable op-amps
D. externally compensated op-amps

ANSWER: B

144. What op-amp parameter(s) that can be governed by the bias control in a programmable op-amp?
A. open-loop gain and slew rate
B. unity-gain bandwidth
C. input bias current
D. all of the above

ANSWER: D

145. The most popular op-amp packages are the metal can, 8-pin DIP, and the SMT. Which of these corresponds to TO-99?
A. metal can
B. 8-pin DIP
C. SMT
D. all of the above

ANSWER: A

146. Dual-in-line or DIL package is designated as
    A. TO-99
    B. TO-91
    C. TO-116
    D. TO-220
ANSWER: C

147. For high density ICs involving many op-amps, what packaging is suitable?
    A. metal can
    B. 14-pin DIL
    C. SMT
    D. flat-pack
ANSWER: C

148. Example(s) of surface-mounted technology (SMT) devices.
    A. PLCCs
    B. SOICs
    C. LCCCs
    D. all of the above
ANSWER: D

149. Which condition must exist for a circuit to oscillate?
    A. It must have a negative feedback sufficient to cancel the input
    B. It must have a gain of less than 1
    C. It must have a positive feedback sufficient to overcome losses
    D. It must be neutralized
ANSWER: C

150. Which of the following is not an essential part of an oscillator?
    A. Source of energy that supply the losses in tank circuit.
    B. A resistor IC combination circuit.
    C. Resonant circuit consist of inductance and capacitance.
    D. Regenerative feedback circuit.
ANSWER: B

151. Circuits that produces alternating or pulsating current or voltage.
    A. Damper
    B. Generator
    C. oscillator
    D. mixer
ANSWER: C

152. What do you call the oscillator circuit that uses a tapped coli in the tuned circuit?
    A. Pierce
    B. Colpitts
    C. Hartley
    D. Ultraudion
ANSWER: C

153. What determines the resonant frequency of a crystal?
    A. external components

B. the temperature of the crystal
C. the size and thickness of the crystal material
D. the hermitic seal

ANSWER: C

154. Type of oscillator whose frequency is dependent on the charge and discharge of RC networks.
A. Hartley oscillator
B. Copitts oscillator
C. Relaxation oscillator
D. Klystron oscillator

ANSWER: C

155. A microwave oscillator
A. Hartley oscillator
B. Copitts oscillator
C. Relaxation oscillator
D. Klystron oscillator

ANSWER: D

156. A self-excited oscillator in which the tank is divided into input and feedback portions by a capacitive voltage divider.
A. Hartley capacitor
B. Copitts oscillator
C. Relaxation oscillator
D. Klystron oscillator

ANSWER: B

157. A self-excited oscillator in which the tank is divided into input and feedback portions by an inductive voltage divider or a tapped coil.
A. Hartley oscillator
B. Copitts oscillator
C. Relaxation oscillator
D. Klystron oscillator

ANSWER: A

158. A circuit usually containing two transistors or tubes in an RC-coupled amplifier, the two active devices switch each other alternately on and off.
A. Multivibrator
B. Signal generator
C. Oscillator
D. Thyristor

ANSWER: A

159. A multivibrator that generates one output pulse for each input trigger pulse.
A. monostable
B. astable
C. bistable
D. tristate

ANSWER: A

160. Monostable multivibrator is also known as
    A. one shot
    B. single shot
    C. direct shot
    D. one shot or single shot
ANSWER: D

161. What determines the pulse time in a monostable multivibrator?
    A. resistor combinations
    B. capacitor combinations
    C. inductor combinations
    D. resistor and capacitor combinations
ANSWER: D

162. A multivibrator having two stable state
    A. monostable
    B. bistable
    C. astable
    D. unstable
ANSWER: B

163. Is also known as Eccles/Jordan circuit
    A. Monostable multivibrator
    B. bistable multivibrator
    C. astable multivibrator
    D. unstable multivibrator
ANSWER: B

164. Flip-flop is actually a _____ multivibrator.
    A. Monostable
    B. bistable
    C. astable
    D. unstable
ANSWER: B

165. Considered as a free-running multivibrator
    A. monostable
    B. bistable
    C. astable
    D. unstable
ANSWER: C