1. What is the main function of a diode?
   (A) Allowing current flow in one direction through its two terminals
   (B) Amplification in a three-terminal device
   (C) Generating optical signals
   (D) A type of integrated circuit

2. Identify the transistor type that consists of three layers, namely emitter, base, and collector.
   (A) MOSFET
   (B) JFET
   (C) BJT
   (D) CMOS

3. What advantage do CMOS integrated circuits offer over bipolar ICs?
   (A) Higher speed
   (B) Lower power consumption
   (C) Better linearity
   (D) Greater thermal stability

4. Which essential feature characterizes an operational amplifier (op-amp)?
   (A) Low input impedance
   (B) Low output impedance
   (C) High voltage gain
   (D) High power dissipation

5. Which component is commonly used as an optical source in opto-electronics?
   (A) Photodiode
   (B) Light-emitting diode (LED)
   (C) Zener diode
   (D) Schottky diode

6. In a P-type semiconductor, what are the majority carriers?
   (A) Electrons
   (B) Holes
   (C) Protons
   (D) Photons

7. How does a MOSFET function in terms of controlling the flow of charge carriers?
   (A) Electrons
   (B) Holes
   (C) Both electrons and holes
   (D) None of the above

8. Among the given options, which one represents a non-linear application of operational amplifiers?
   (A) Voltage follower
   (B) Inverting amplifier
   (C) Integrator
   (D) Differential amplifier

9. What is the primary purpose of an oscillator in electronic circuits?
   (A) Amplifying signals
   (B) Regulating voltage
   (C) Generating repetitive waveforms
   (D) Providing isolation between circuits

10. Which type of diode is commonly used for voltage regulation applications?
   (A) Schottky diode
   (B) Zener diode
   (C) Light-emitting diode (LED)
   (D) Tunnel diode

11. Ohm's law states that the current passing through a conductor between two points is directly proportional to :
   (A) The voltage across the conductor
   (B) The resistance of the conductor
   (C) The square of the voltage across the conductor
   (D) The product of voltage and resistance

12. In a DC circuit, Kirchhoff's Voltage Law (KVL) state that the algebraic sum of voltage drops across the circuit elements in any closed loop is equal to :
    (A) Zero
    (B) The resistance of the loop
    (C) The current flowing in the loop
    (D) The total power dissipated in the loop

13. For analyzing a complex electrical circuit with multiple loops, which method is commonly used?
    (A) Ohm's law
    (B) Mesh analysis
    (C) Nodal analysis
    (D) Kirchhoff's Current Law (KCL)

14. Faraday's law of electromagnetic induction states that the induced electromotive force (EMF) in a circuit is directly proportional to :
    (A) The resistance of the circuit
    (B) The magnetic field strength
    (C) The number of turns in the coil
    (D) The rate of change of magnetic flux through the circuit

15. According to Lenz's law, the direction of the induced current in a closed circuit is such that it opposes the change in:
    (A) Magnetic field strength
    (B) Circuit resistance
    (C) Circuit capacitance
    (D) Circuit inductance

16. In a single-phase AC circuit, the power factor is the ratio of :
    (A) Real power to apparent power
    (B) Apparent power to real power
    (C) Reactive power to apparent power
    (D) Apparent power to reactive power

17. Transformers are primarily used to:
    (A) Convert DC to AC power
    (B) Increase current in a circuit
    (C) Increase voltage in a circuit
    (D) Store electrical energy

18. In an electrical power system, efficiency is calculated as the ratio of :
    (A) Real power output to real power input
    (B) Apparent power output to apparent power input
    (C) Reactive power output to reactive power input
    (D) Total power output to total power input

19. Which type of machine converts mechanical energy into electrical energy?
    (A) Induction machine
    (B) Synchronous machine
    (C) DC machine
    (D) Generator

20. Among the following, which is considered a renewable source of electrical power?
    (A) Hydroelectric power
    (B) Nuclear power
    (C) Thermal power
    (D) Fossil fuel-based power

21. Which material among the following has the highest electrical conductivity in electrical engineering?
    (A) Aluminum
    (B) Copper
    (C) Steel
    (D) Silicon

22. Crystal defects in materials can result in:
    (A) Increased mechanical strength
    (B) Decreased electrical resistance
    (C) Enhanced optical properties
    (D) Reduced material stability

23. Why are ceramic materials widely used in electrical engineering?

    (A) High electrical conductivity

    (B) Low mechanical strength

    (C) Excellent thermal conductivity

    (D) High dielectric strength

24. Insulating laminates used in electronics are made by combining layers of:

    (A) Metals and ceramics

    (B) Glass and polymers

    (C) Metals and polymers

    (D) Ceramics and polymers

25. Which type of magnetic material exhibits strong attraction to magnetic fields and retains its magnetism after the field is removed?

    (A) Ferrites

    (B) Ferromagnetic materials

    (C) Paramagnetic materials

    (D) Diamagnetic materials

26. What characteristic defines nano materials?

    (A) Large grain size

    (B) Low melting point

    (C) Small particle size at nanoscale

    (D) Brittle nature

27. For what purpose are nano-optical materials used?

    (A) High-temperature applications

    (B) Conductive coatings

    (C) Enhancing light absorption and emission

    (D) High-strength structural components

28. Superconductivity is a phenomenon observed in certain materials where :
    (A) Electrical resistance increases at low temperatures
    (B) Electrical resistance becomes zero at low temperatures
    (C) Magnetic susceptibility increases at low temperatures
    (D) Magnetic susceptibility becomes zero at low temperatures

29. What is the main purpose of the sintering process?
    (A) Create nanomaterials
    (B) Improve the mechanical properties of ceramics
    (C) Join metal components using a filler material
    (D) Remove impurities from metals

30. One of the primary applications of superconductors is in :
    (A) High-speed communication cables
    (B) Magnetic resonance imaging (MRI) machines
    (C) Low-power electronic devices
    (D) High-temperature furnaces

31. The term that represents the closeness between the measured value and the true value of a quantity is :
    (A) Precision
    (B) Accuracy
    (C) Sensitivity
    (D) Resolution

32. What is the main purpose of Analog-to-Digital Converters (ADCs) in measurement systems?
    (A) Convert digital signals to analog signals
    (B) Measure continuous analog signals and convert them into digital form
    (C) Measure digital signals and convert them into analog form
    (D) Amplify analog signals

33. The static characteristics of a measurement system describe its behavior :
    (A) Over time
    (B) Under changing conditions
    (C) At a specific instant

(D) When subjected to external disturbances

34. Hysteresis error in a measurement system refers to :
    (A) The difference between the indicated value and the true value
    (B) The delay in the response of the system to changing conditions
    (C) The inability to repeat the same measurement result under identical conditions
    (D) The variation in output for a constant input when approached from different directions

35. Telemetry involves the process of :
    (A) Measuring electrical quantities only
    (B) Transmitting data over long distances using wireless communication
    (C) Monitoring and controlling physical quantities remotely
    (D) Converting analog signals to digital signals

36. Which of the following is an example of a primary transducer used to measure temperature?
    (A) Thermocouple
    (B) Strain gauge
    (C) LVDT (Linear Variable Differential Transformer)
    (D) Piezoelectric sensor

37. The process of curve fitting in measurement systems involves :
    (A) Aligning the measurement system's output with the reference standard
    (B) Identifying and compensating for errors in the measurement system
    (C) Reducing measurement errors by calibrating the system periodically
    (D) Finding a mathematical function that best approximates the measured data points

38. Data acquisition systems (DAQ) are used to :
    (A) Measure only electrical quantities
    (B) Collect, store, and analyze data from various sensors and instruments
    (C) Transmit data wirelessly to remote locations
    (D) Perform calculations to improve measurement accuracy

39. Which type of display is commonly used to visualize measurement results on an oscilloscope?
    (A) LED display
    (B) CRT display
    (C) LCD display

(D) OLED display

40. Which of the following is an example of a non-electrical quantity that can be measured using a measurement system?
    (A) Voltage
    (B) Current
    (C) Temperature
    (D) Frequency

41. What does network theory primarily deal with?
    (A) Biological networks in living organisms
    (B) Social networks and their dynamics
    (C) Electrical circuits and their behavior
    (D) Transport networks and traffic flow

42. The Y-Δ transformation is used to convert a _____ network to a _____ network.
    (A) Parallel, series
    (B) Series, parallel
    (C) Delta, Y
    (D) Y, Delta

43. Time domain analysis of RLC circuits involves solving linear constant coefficient differential equations using techniques like:
    (A) Laplace transforms
    (B) Fourier transforms
    (C) Z-transforms
    (D) Hankel transforms

44. The Laplace transform is used to solve network equations in the _____ domain analysis of RLC circuits.
    (A) Time
    (B) Frequency
    (C) Phase

(D) Amplitude

45. The parameters used to describe the behavior of a 2-port network are :
   (A) Driving point and transfer functions
   (B) Admittance and impedance
   (C) Capacitance and inductance
   (D) Resistance and reactance

46. State equations are used to analyze networks that have _____ elements.
   (A) Passive
   (B) Active
   (C) Non-linear
   (D) Reactive

47. Steady-state sinusoidal analysis deals with finding the _____ response of a network subjected to sinusoidal excitation.
   (A) Transient
   (B) Frequency
   (C) Time
   (D) Inductive

48. In a series RLC circuit, the impedance becomes purely resistive at :
   (A) Resonant frequency
   (B) Half the resonant frequency
   (C) One-third the resonant frequency
   (D) Twice the resonant frequency

49. The driving point impedance of a network is the ratio of :
   (A) Output voltage to input current
   (B) Input voltage to output current
   (C) Output current to input voltage
   (D) Input current to output voltage

50. The transfer function of a network is defined as the ratio of :
   (A) Output voltage to input voltage
   (B) Input voltage to output voltage
   (C) Output current to input voltage

(D) Input voltage to output current

51. The small signal equivalent circuit of a diode is typically represented as a :
   (A) Voltage-controlled voltage source
   (B) Current-controlled current source
   (C) Voltage-controlled current source
   (D) Current-controlled voltage source

52. Which diode circuit is used to stabilize voltage and filter out ripples in power supplies?
   (A) Clipping circuit
   (B) Clamping circuit
   (C) Rectifier circuit
   (D) Voltage regulator circuit

53. The stability of a BJT or JFET amplifier circuit depends on its :
   (A) Gain
   (B) Input impedance
   (C) Biasing
   (D) Output impedance

54. In amplifier design, what is the main purpose of biasing a transistor?
   (A) To provide power to the amplifier
   (B) To ensure the transistor operates in the active region
   (C) To eliminate distortion in the output signal
   (D) To improve the efficiency of the amplifier

55. A single-stage amplifier has a voltage gain of 40 dB. If the input signal is 10 mV, what will be the output voltage?
   (A) 40 mV
   (B) 100 mV
   (C) 1 V
   (D) 100 V

56. What is the primary function of feedback in amplifier circuits?
   (A) To increase the overall gain of the amplifier
   (B) To reduce the input impedance of the amplifier

(C) To stabilize the operating point of the amplifier

(D) To reduce distortion and improve linearity

57. Active filters are used in electronic circuits to:

(A) Filter out high-frequency noise

(B) Amplify weak signals

(C) Convert analog signals to digital signals

(D) Regulate the power supply voltage

58. In digital electronics, Boolean algebra is used to :

(A) Design analog filters

(B) Analyze linear amplifier circuits

(C) Simplify and analyze digital logic circuits

(D) Calculate complex impedance values in networks

59. Which logic gate output is true (high) when all its inputs are false (low)?

(A) AND gate

(B) OR gate

(C) XOR gate

(D) NOR gate

60. In digital IC families, which type of logic gate consumes the least power and is suitable for battery-operated devices?

(A) TTL (Transistor-Transistor Logic)

(B) CMOS (Complementary Metal-Oxide-Semiconductor)

(C) ECL (Emitter-Coupled Logic)

(D) RTL (Resistor-Transistor Logic)

61. Which theory deals with the analysis of random signals, noise, and the transmission of information over a communication channel?

(A) Probability theory

(B) Information theory

(C) Random signal theory

(D) Noise theory

62. In analog communication systems, which modulation technique is used to vary the amplitude of the carrier signal in accordance with the modulating signal?

(A) Frequency Shift Keying (FSK)

(B) Phase Shift Keying (PSK)

(C) Amplitude Shift Keying (ASK)

(D) Quadrature Amplitude Modulation (QAM)

63. The Signal-to-Noise Ratio (SNR) is an important parameter in communication systems. A higher SNR indicates:

(A) Stronger modulation

(B) Better channel capacity

(C) Less noise interference

(D) Lower data rate

64. Which type of communication system uses continuous signals to transmit information?

(A) Analog communication system

(B) Digital communication system

(C) Both analog and digital communication systems

(D) None of the above

65. What is the purpose of multiplexing in digital communication systems?

(A) To convert analog signals to digital signals

(B) To transmit multiple digital signals simultaneously over a single channel

(C) To amplify the digital signals for better transmission

(D) To encrypt the digital signals for security

66. In digital communication, PCM (Pulse Code Modulation) is used for:

(A) Modulating the carrier signal

(B) Encoding analog signals into digital form

(C) Filtering out noise from the received signal

(D) Demodulating the received signal

67. Which optical communication medium uses thin strands of glass or plastic to transmit data as pulses of light?

(A) Coaxial cable

(B) Twisted-pair cable

(C) Fiber optics

(D) Radio waves

68. Which digital modulation technique is based on varying the phase of the carrier signal to represent digital data?
(A) Amplitude Shift Keying (ASK)
(B) Frequency Shift Keying (FSK)
(C) Phase Shift Keying (PSK)
(D) Quadrature Amplitude Modulation (QAM)

69. In multiple access communication, FDMA (Frequency Division Multiple Access) is used to:
(A) Divide the available frequency spectrum into multiple non-overlapping frequency bands
(B) Assign time slots to different users for transmission
(C) Use spread spectrum techniques to enable multiple users to share the same frequency band
(D) Divide the available transmission power among multiple users

70. Information theory deals with:
(A) The analysis of random signals and noise
(B) The transmission of data over optical fibers
(C) The mathematical representation of information and data compression
(D) The modulation and demodulation of digital signals

71. Which of the following is NOT a classification of signals?
(A) Continuous-time and discrete-time signals
(B) Periodic and non-periodic signals
(C) Analog and digital signals
(D) Deterministic and stochastic signals

72. In control systems, the process of converting the mathematical representation of a system into a physical implementation is known as:
(A) System realization
(B) Signal flow graph
(C) Nyquist plot
(D) Routh-Hurwitz criteria

73. The Laplace transform is commonly used to analyze control systems. What property of the Laplace transform makes it useful for this purpose?
(A) It converts a time-domain signal into a frequency-domain signal
(B) It converts a frequency-domain signal into a time-domain signal

(C) It converts a continuous-time signal into a discrete-time signal

(D) It converts a discrete-time signal into a continuous-time signal

74. Root locus and Nyquist plots are graphical techniques used for:

(A) Signal flow analysis

(B) Transient response analysis

(C) Stability analysis

(D) Frequency response analysis

75. A closed-loop control system :

(A) Does not use feedback

(B) Uses feedback to maintain stability

(C) Does not require a controller

(D) Is less stable than an open-loop system

76. The Routh-Hurwitz stability criterion is used to determine:

(A) The number of poles and zeros of a transfer function

(B) The transient response of a system

(C) The stability of a control system based on the location of its poles

(D) The frequency response of a system

77. The steady-state response of a control system refers to the response:

(A) At the beginning of the system's operation

(B) When the system is transitioning from one state to another

(C) When the system reaches a constant, unchanging output

(D) When the system is oscillating

78. Which control system compensation element is used to increase the system's response speed?

(A) Lead compensator

(B) Lag compensator

(C) Proportional (P) controller

(D) Integral (I) controller

79. PID controllers are widely used in industrial control systems. What does PID stand for?
(A) Proportional-Increase-Derivative
(B) Proportional-Integral-Differential
(C) Periodic-Integral-Derivative
(D) Proportional-Increment-Delay

80. Which graphical representation is used to show the frequency response of a control system?
(A) Nyquist plot
(B) Root locus plot
(C) Bode plot
(D) Routh-Hurwitz plot

81. The CPU (Central Processing Unit) is responsible for :
(A) Managing input/output devices
(B) Storing data in memory
(C) Executing instructions and performing calculations
(D) Managing the operating system

82. Which of the following is NOT a basic component of computer architecture?
(A) CPU
(B) Memory
(C) Input devices
(D) Operating system

83. The term "virtual memory" refers to :
(A) A type of memory that can be physically touched
(B) A memory management technique that uses secondary storage as an extension of RAM
(C) Memory used for storing video files and multimedia content
(D) A memory chip used in modern CPUs

84. The process of converting data from analog to digital form is called :
(A) Data representation
(B) Data programming

(C) Data encoding

(D) Data conversion

85. Which component of a computer is responsible for permanently storing data even when the power is turned off?

(A) RAM (Random Access Memory)

(B) ROM (Read-Only Memory)

(C) Cache memory

(D) Secondary storage

86. The primary purpose of an operating system is to :

(A) Manage hardware resources and provide a user interface

(B) Execute application software

(C) Store data and files

(D) Handle networking and internet connectivity

87. Concurrency control in databases refers to :

(A) The process of ensuring that data is stored redundantly for backup purposes

(B) The process of managing multiple users accessing and modifying data simultaneously

(C) The process of compressing data to save storage space

(D) The process of encrypting data for security reasons

88. Which programming language element allows the reuse of code and simplifies program development?

(A) Functions

(B) Variables

(C) Loops

(D) Conditions

89. What is the role of the memory management unit in a computer system?

(A) Managing the input and output devices

(B) Storing data in memory

(C) Translating virtual addresses to physical addresses in virtual memory systems

(D) Executing instructions and performing calculations

90. Which of the following is NOT a characteristic of a well-designed database?

(A) Data redundancy

(B) Data integrity

(C) Data consistency

(D) Data security

91. Which theorem relates a surface integral over a closed surface to the volume integral of the divergence of a vector field?

(A) Gauss' theorem

(B) Stokes' theorem

(C) Faraday's theorem

(D) Ampere's theorem

92. Maxwell's equations describe the fundamental principles of electromagnetism. How many equations are there in total?

(A) 2

(B) 3

(C) 4

(D) 5

93. In wave propagation, which of the following media allows the fastest speed of light?

(A) Air

(B) Water

(C) Glass

(D) Vacuum

94. Smith's chart is a graphical tool used for:

(A) Analyzing waveguides

(B) Impedance matching and transformation in transmission lines

(C) Analyzing antennas

(D) Analyzing wave propagation in different media

95. S-parameters in microwave engineering represent:

(A) Scattering parameters that describe the relationship between incident and reflected waves at ports in a network

(B) Speed parameters that describe the velocity of electromagnetic waves

(C) Shielding parameters that measure the effectiveness of electromagnetic shielding

(D) Sensitivity parameters that describe the sensitivity of antennas to different frequencies

96. In waveguides, the cutoff frequency is the frequency below which :

(A) The wave is fully transmitted through the waveguide

(B) The wave is attenuated and cannot propagate

(C) The wave is reflected back in the opposite direction

(D) The wave changes its polarization

97. Antennas are devices used for :

(A) Impedance matching in transmission lines

(B) Propagating electromagnetic waves in optical fibers

(C) Transmitting and receiving electromagnetic waves

(D) Shielding electronic circuits from interference

98. The radiation pattern of an antenna describes :

(A) The efficiency of the antenna in converting electrical power to radiated energy

(B) The directionality of the antenna's radiation in three-dimensional space

(C) The frequency range over which the antenna operates

(D) The polarization of the radiated electromagnetic waves

99. A dipole antenna is a type of antenna that :

(A) Emits circularly polarized waves

(B) Has high gain and directivity

(C) Consists of two conducting elements with opposite polarity

(D) Is used only for receiving electromagnetic waves

100. An antenna array is a group of multiple antennas arranged in a specific configuration. What is the main advantage of using an antenna array?

(A) It increases the power handling capacity of the antennas

(B) It reduces the complexity of the antenna system

(C) It enhances the radiation pattern and directivity

(D) It eliminates the need for impedance matching

101. VLSI technology involves the fabrication of integrated circuits. What is the primary material used in modern VLSI fabrication?

(A) Silicon

(B) Copper

(C) Aluminum

(D) Gold

102. Which process in VLSI technology involves transferring a pattern from a photomask onto a semiconductor wafer coated with a light-sensitive material?

(A) Etching
(B) Lithography
(C) Diffusion
(D) Oxidation

103. In VLSI design, what is the function of a Multiplexer (MUX)?
(A) It is used to store data in digital memory
(B) It is used to perform arithmetic operations
(C) It is used to select one of many input signals and forward it to a single output
(D) It is used to amplify analog signals

104. Moore's and Mealy's circuit designs are related to:
(A) VLSI technology
(B) Digital filters
(C) Microprocessors
(D) Finite state machines

105. What is the purpose of pipeline concepts in computer architecture?
(A) To increase the clock speed of the processor
(B) To reduce the size of the processor
(C) To increase the number of transistors in the processor
(D) To increase the overall processing speed by dividing tasks into smaller stages

106. Design for testability in VLSI involves:
(A) Designing circuits with multiple testing points for fault detection
(B) Designing circuits that are difficult to test for security purposes
(C) Designing circuits with complex interconnects for better performance
(D) Designing circuits with advanced lithography techniques

107. Digital Signal Processing (DSP) deals with:
(A) Processing analog signals
(B) Processing continuous-time signals
(C) Processing discrete-time signals
(D) Processing both analog and digital signals

108. What is the main difference between FIR (Finite Impulse Response) and IIR (Infinite Impulse Response) digital filters?
(A) FIR filters have a finite memory, while IIR filters have an infinite memory

(B) FIR filters are used for audio processing, while IIR filters are used for image processing

(C) FIR filters have a recursive structure, while IIR filters do not

(D) FIR filters have a higher order than IIR filters

109. Which component of a microcontroller is responsible for handling external events or asynchronous signals?

(A) DMA (Direct Memory Access)

(B) ALU (Arithmetic Logic Unit)

(C) Interrupt controller

(D) Memory unit

110. Embedded systems are specialized computing systems designed for specific tasks. What is a key characteristic of embedded systems?

(A) They are large and complex systems used for general-purpose computing

(B) They run multiple operating systems simultaneously

(C) They are tightly integrated into the products they control

(D) They have high-performance graphics processing capabilities

111. Output is not equal to input at the initial time is known as

(A) Static response

(B) Dynamic response

(C) Desired response

(D) Transient response

112. The ON-OFF controller is a/an ———————— System.

(A) Digital

(B) Analog

(C) Closed loop

(D) Open loop

113. The positive feedback of a closed loop system is subjected to 10 V. The system has a forward gain of 5 and feedback factor is 0.1. Determine the output voltage.

(A) 100 V

(B) 50 V

(C) 10 V

(D) 5 V

114. Which of the following statement is true regarding open loop and closed loop control system?

(A) Open loop system is oscillate but closed loop not

(B) Closed loop system is oscillate but open loop not

(C) Open loop system and closed loop system both oscillate

(D) Both are stable

115. The impulse response of a linear time variant system is given as $g(t)=te^{t}, t>0$. The transfer function of the system is equal to :

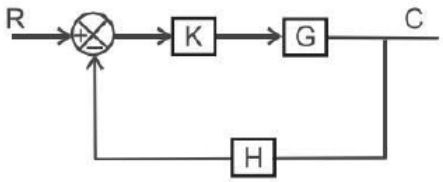
(A) $\frac{1}{(s+1)^2}$

(B) $\frac{1}{(s-1)^2}$

(C) $\frac{s}{(s-1)^2}$

(D) $\frac{s}{(s+1)}$

116. The close loop system output of the given block does not change when forward path gain KG is



(A) Positive

(B) Negative

(C) Zero

(D) Very large

117. The Laplace transform of $\frac{d^2x(t)}{dt^2}+\frac{dx(t)}{dt}+x(t)=y(t)$ when the system is at rest is

(A) $s^2x(s)+sx(s)+x(s)=y(s)$

(B) $s^2X(s)+sX(s)+X(s)=y(s)$

(C) $s^2x(s)+2sx(s)+x(s)=y(s)$

(D) $2s^2x(s)+sx(s)+x(s)=y(s)$

118. The initial condition is assumed ———————— while deriving the transfer function of a system.

(A) Zero

(B) One

(C) Infinity

(D) Can't say

119. The system with open loop transfer function is $\frac{k}{s(s+1)(s-1)}$. Which of the following option is correct?

(A) Type 1 and order 3

(B) Type 3 and order 3

(C) Type 1 and order 1

(D) Type 3 and order 1

120. The settling time for the 2% tolerance band, a second order control system, approximately depends upon ———— times of the time constant.

(A) 5

(B) 4

(C) 3

(D) 2

121. Common collector configuration in Bipolar Junction Transistor has ———— current gain and ————voltage gain.

(A) High, high

(B) High, Low

(C) Low, High

(D) Low, Low

122. Output signal of Class A amplifier varies for a ———— of Conduction.

(A) Full cycle 360°

(B) Half cycle 180°

(C) Slightly more than 180°

(D) Slightly less than 180°

123. In a single stage CE amplifier, $R_L = 500\,\Omega$, $h_{ie} = 6\,\text{k}\Omega$ and $h_{fe} = 100$, $g_m = 100\,mA/v$ $f_T = 400\,\text{MHz}$. Determine the values $r_{b'e}$

(A) 4 kΩ

(B) 6 kΩ

(C) 3 kΩ

(D) 1 kΩ

124. In n-channel Enhancement type MOSFET which type of substrate is used?
   (A) Lightly doped P-type substrate
   (B) Lightly doped N-type substrate
   (C) Heavily doped P-type substrate
   (D) Heavily doped N-type substrate

125. If the same signals are applied in both the inputs in an ideal Differential amplifier, then the output will be
   (A) Same as input
   (B) Double of the input
   (C) Zero
   (D) Infinite

126. When a capacitor is used as a feedback resistor between input and output of an inverting Operational Amplifier, the circuit would be
   (A) Differentiator
   (B) Integrator
   (C) Logarithmic
   (D) Summer

127. For an OP-AMP having a slew rate = 2V/ μs , what is the maximum closed-loop voltage gain that can be used when the input varies by 0.2 V in 10 μs ?
   (A) 20
   (B) 40
   (C) 60
   (D) 100

128. Number of flip-flops required to design Decade counter is
   (A) 4
   (B) 3
   (C) 2
   (D) 1

129. To check output data accurate in 4-bit serial in, parallel out shift registers we can use
   (A) Divide-by-4 clock pulse
   (B) Multiplexer
   (C) Strobe line

(D) Adder

130. In a DFF if the present state is 'HIGH', what will be the output of the next state in the complement side?
(A) 10
(B) 01
(C) 0
(D) 1

131. JK flip flop convert to 'T' flip flop by
(A) $J = K = T$
(B) $J = Q,\ K = \overline{Q}$
(C) $J = K = \overline{T}$
(D) $J = \overline{Q}, K = T$

132. In JK flip flop same input, the output will oscillate back and forth between 0 and 1. At the end of the clock pulse the value of output Q is uncertain. The condition is referred to as?
(A) Lock out Condition
(B) Variable condition
(C) Race around condition
(D) Confused condition

133. Which of the following is used to generate the sawtooth voltage required to deflect the beam in the horizontal section in CRO?
(A) Horizontal amplifier
(B) Vertical amplifier
(C) Delay line
(D) Time base

134. Light intensity in a CRT mostly depends upon
(A) Momentum of electrons
(B) Trigger circuit
(C) Voltage
(D) Current

135. The Horizontal deflection system in CRO consists of
(A) A time base generator and an output amplifier
(B) A trigger circuit and an AC heater supply

(C) A electron gun and an AC heater supply

(D) A electron gun and a trigger circuit

136. The operating point of a transistor is known as

(A) Threshold point

(B) Quiescent point

(C) Active point

(D) Cut-off point

137. To amplify power, voltage and current signals the BJT use in ———— configuration respectively.

(A) CB, CC and CE

(B) CB, CE and CC

(C) CE, CB and CC

(D) CC, CB and CE

138. Stability factors is defined as the rate of change of ———— with respect to the ———— keeping both the base current and the current gain β constant.

(A) Emitter current, collector base leakage current

(B) Collector base leakage current, Emitter current

(C) Collector current, collector base leakage current

(D) Collector base leakage current, collector current

139. Collector to base bias configuration of common emitter transistor implicitly employs

(A) Current series negative feedback

(B) Current shunt negative feedback

(C) Voltage series positive feedback

(D) Voltage shunt negative feedback

140. In a common emitter configuration, BJT has ———— current gain and ———— leakage current.

(A) Low, very small

(B) Low, very large

(C) High, very small

(D) High, very large

141. Amount of energy that a Valence electron must have in order to jump from Valence band to conduction band is called

(A) Potential width

(B) Energy band

(C) Energy gap

(D) Thermal gap

142. The probabilities of finding an electron below the Fermi level, at the Fermi level and above the Fermi level at absolute zero temperature (0 K) is respectively
(A) 0, 0.5, 1
(B) 0, 0.5, 0
(C) 1, 0.5, 1
(D) 1, 0.5, 0

143. Input signal of common drain amplifier is applied to the Gate through
(A) Variable resistor
(B) Coupling capacitor
(C) Input inductor
(D) Input resistor

144. Diffusion capacitance of a PN Junction diode increases with increase in ———— and ————.
(A) Mean life time of minority carriers, thermal voltage
(B) Mean life time of minority carriers, diode current
(C) Thermal voltage, ideality factor (η)
(D) Diode current, thermal voltage

145. Built-in potential at the p-n junction increases with increase in
(A) Acceptor atoms impurity and intrinsic carrier concentration
(B) Donor atoms impurity and intrinsic carrier concentration
(C) Thermal voltage and intrinsic carrier concentration
(D) Donor and Acceptor atoms impurity

146. What is the maximum electric field when $V_{bi} = 3V$, $V_R = 4V$ and the width of the semiconductor is 7cm?
(A) – 200 V/m
(B) – 400 V/m
(C) 200 V/m
(D) 300 V/m

147. To reverse-bias the p-n junction, the p side is made more negative, making it ————— for electrons moving across the junction.
(A) Equilibrium state

(B) Downhill

(C) Uphill

(D) Easy

148. The change in current through a junction diode is 1.5 mA when forward bias voltage is changed by 0.6 V. The dynamic resistance is

(A) 600 Ω

(B) 500 Ω

(C) 400 Ω

(D) 300 Ω

149. In a p-n junction diode, change in temperature due to heating

(A) Affects the entire V-I characteristics of p-n junction diode

(B) Affects only forward resistance of p-n junction diode

(C) Affects only reverse resistance of p-n junction diode

(D) No change in resistance of p-n junction diode

150. Transition capacitance of a diode is inversely proportional to

(A) Permittivity of the material

(B) Width of depletion region

(C) Area of cross section

(D) Drift current

151. Which of the following semiconductor compound is not used in the construction of Light Emitting Diodes?

(A) GaAs

(B) GaP

(C) GaSe

(D) GaN

152. The depth of penetration of a wave in a lossy dielectric increases with increasing

(A) Conductivity

(B) Permeability

(C) Wavelength

(D) Permittivity

153. The VSWR can have any value between

(A) 0 and 1

(B) –1 and 1

(C) 1 and ∞

(D) 0 and ∞

154. Which one of the following statements is correct?

(A) ECL has the least propagation delay

(B) TTL has the least propagation delay

(C) CMOS has the highest power dissipation

(D) TTL has the lowest power consumption

155. Each cell of a static random access memory contains

(A) Six MOS transistors

(B) Four MOS transistors and two capacitors

(C) Two MOS transistors and four capacitors

(D) One MOS transistor and one capacitor

156. The measurement precision of an instrument defines the smallest change in measured quantity that can be observed, which is called

(A) Accuracy of the instrument

(B) Precision of the instrument

(C) Resolution of the instrument

(D) Significant figure of the instrument

157. Which one of the following statements is not correct for CMOS technology in comparison with bipolar technology?

(A) CMOS technology has low static power dissipation

(B) CMOS technology has high input impedance

(C) CMOS technology has high delay sensitivity to the load

(D) CMOS technology has high output drive current

158. Removing the redundant information before encoding is the basic idea behind

(A) Quantization

(B) Delta modulation

(C) Pulse-code modulation

(D) Differential pulse-code modulation

159. The subsystem that generates the input to the plant or process is known as

(A) Controller

(B) Controlled variable
(C) Controllability
(D) Compensator

160. Which one of the following addressing modes is used to compute the address of the operand by adding a constant value to the content of a register?
(A) Immediate addressing
(B) Indexed addressing
(C) Absolute addressing
(D) Direct addressing

161. The intrinsic impedance of free space is
(A) 107 Ω
(B) 214 Ω
(C) 377 Ω
(D) 754 Ω

162. The two random variables X and Y are uncorrelated if and only if their covariance is
(A) 0
(B) 1
(C) –1
(D) infinity

163. The power and energy of the unit step sequence are respectively,
(A) 1/2 and 0
(B) 1/2 and infinity
(C) 2 and 0
(D) 2 and infinity

164. Which one of the following instructions in a stack computer consists of an operation code only with no address field?
(A) PUSH X
(B) POP X
(C) ADD
(D) LOAD A

165. Which one of the following operations is not commutative?
(A) Scaling and reversal of a signal x[n]

(B) Scaling and folding of a signal x[n]

(C) Folding and time reversal of a signal x[n]

(D) Folding and time delaying of a signal x[n]

166. Which one of the following has all the poles of the function lie on the jw axis?

(A) L-C function

(B) R-L function

(C) R-C function

(D) Y function

167. If a resistor is known to have a resistance of 500 Ω with a possible error of ±50 Ω, the ±50 Ω is

(A) Relative error

(B) Absolute error

(C) Gross error

(D) Systematic error

168. The slope of the output characteristics of a transistor in CE configuration is higher than that in CB configuration due to which one of the following effects?

(A) Zener effect

(B) Early effect

(C) Avalanche effect

(D) Transistor effect

169. Which one of the following statements is correct regarding the comparison between Avalanche and Zener effect?

(A) Zener effect is caused by impact ionization

(B) Zener diodes have higher resistance

(C) Avalanche effect occurs at voltages usually above 7 V

(D) Avalanche diodes have lower resistance

170. Which one of the following statements is correct regarding integrated circuit fabrication?

(A) IC offers increased reliability, improved performance, high speed and lower power consumption

(B) IC is a miniature, low cost electronic circuit fabricated on a multi crystal chip of silicon

(C) IC is a miniature, high cost electronic circuit fabricated on a multi crystal chip of silicon

(D) IC offers decreased reliability, improved performance, low speed and higher power consumption

171. Which one of the following statements is correct regarding shunt-series feedback amplifier topology?

(A) The currents are compared and output voltages are sampled
(B) The currents are compared and output currents are sampled
(C) The voltages are compared and the output currents are sampled
(D) The voltages are compared and the output voltages are sampled

172. Silicon dioxide (SiO_2) is used in ICs, because it
(A) Facilitates the penetration of diffusants
(B) Has high heat conduction
(C) Prevents diffusion of impurities
(D) Controls the concentration of diffusants

173. The advantage of using a Class-B push-pull transistor amplifier over a Class-A push-pull transistor amplifier is
(A) A negligible power loss at no input signal
(B) Harmonic distortion is lower
(C) Self-bias can be used
(D) Supply voltages have good regulation

174. The overall decibel (dB) voltage gain of a multistage amplifier is
(A) The dB voltage gain of the first stage
(B) The product of the dB voltage gains of the individual stages
(C) The sum of the dB voltage gains of the individual stages
(D) The dB voltage gain of the last stage

175. Which one of the following is correct for an ideal operational amplifier?
(A) Input resistance $R_i=\infty$, output resistance $R_o=0$ and bandwidth=0
(B) Input resistance $R_i=0$ output resistance $R_o=\infty$ and bandwidth=0
(C) Input resistance $R_i=\infty$, output resistance $R_o=0$ and bandwidth=∞
(D) Input resistance $R_i=0$, output resistance $R_o=0$ and bandwidth=∞

176. Which one of the following statements regarding slew rate is correct?
(A) It signifies how rapidly the output of an op-amp can change in response to changes in the frequency of the input signal
(B) It does not change with change in voltage gain
(C) It should be smaller for high-speed op-amp applications
(D) It is not fixed for an op-amp

177. Ceramic materials are

(A) Organic and metallic
(B) Inorganic and metallic
(C) Inorganic and non metallic
(D) Organic and non metallic

178. Which one of the following is commonly used piezoelectric ceramics?
(A) Yttrium oxide (Y_2O_3)
(B) Boron carbide (B_4C)
(C) Barium titanate ($BaTiO_3$)
(D) Tungsten carbide (WC)

179. Which one of the following is composed of two characteristics: conformity and the number of significant figures to which a measurement may be made?
(A) Sensitivity
(B) Resolution
(C) Accuracy
(D) Precision

180. For a two-port network, the condition of Reciprocity in terms of h-parameter is
(A) $h_{12} = h_{21}$
(B) $h_{12} = h_{22}$
(C) $h_{12} = -h_{21}$
(D) $h_{12} = -h_{22}$

181. K-map is used to minimize the number of
(A) Flip-flops in digital circuits
(B) Layout spaces in digital circuits for fabrication
(C) Functions of 3, 4, 5 or 6 variables
(D) Registers in CPU

182. The mapping function that assigns a number to each outcome is called
(A) Sample space
(B) Random variable
(C) Discrete variable
(D) Event

183. A finite state machine
   (A) is same as that of abstract model of sequential circuit
   (B) Consists of combinational logic circuits only
   (C) Contains infinite number memory devices
   (D) Does not exist in practice

184. A logic circuit that accepts several data inputs and allows only one of them at a time to get through to the output is called
   (A) Multiplexer
   (B) De-multiplexer
   (C) Transmitter
   (D) Receiver

185. The memory technology which needs the least power is
   (A) ECL
   (B) MOS
   (C) CMOS
   (D) TTL

186. Frequency modulated signal with single-tone modulation has a frequency deviation of 15 kHz and bandwidth of 50 kHz. The frequency of the modulating signal will be
   (A) 5 kHz
   (B) 10 kHz
   (C) 20 kHz
   (D) 30 kHz

187. When the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of 50%, the power saving will be
   (A) 84.4%
   (B) 88.6%
   (C) 94.4%
   (D) 98.6%

188. An output contains of balanced modulator contains
   (A) Carrier, LSB and USB
   (B) Modulation frequency, carrier frequency and LSB
   (C) Modulation frequency, carrier frequency and USB
   (D) Modulation frequency, LSB and USB

189. If bandwidth is of primary concern, which one of the following scheme is generally not considered?
   (A) PSK
   (B) ASK
   (C) DPSK
   (D) FSK

190. The process of assigning to each one of the sample values of the message signal, a discrete value from prescribed set of a finite number of such discrete values is called
   (A) Filtering
   (B) Noise removal
   (C) Decoding
   (D) Quantization

191. Which one of the following types of fiber suffers with modal dispersion?
   (A) Single-mode step-index fiber
   (B) Multimode graded-index fiber
   (C) Multimode step-index fiber
   (D) Single-mode graded-index fiber

192. The signal flow graph of a system is constructed from its
   (A) Differential equations
   (B) Algebraic equations
   (C) Algebraic equations through the cause-and-effect relations
   (D) Differential equations through the cause-and-effect relations

193. The compensator required to improve the steady state response of a system is
   (A) Lag
   (B) Lead
   (C) Lag-lead
   (D) Zero

194. Which one of the following types of controller is sometimes called automatic reset?
   (A) Proportional
   (B) Integral
   (C) Derivative

(D) PID

195. In an assembly language program END is a/an
   (A) Machine instruction
   (B) Pseudo instruction
   (C) Micro instruction
   (D) Interrupt

196. The memory that communicates directly with CPU is called
   (A) Auxiliary memory
   (B) USB storage
   (C) Main memory
   (D) Micro-program memory

197. Virtual memory is normally implemented by
   (A) Demand paging
   (B) Buses
   (C) Device drivers
   (D) Bus Matrix

198. PUSH and POP operations are performed by
   (A) Program counter register
   (B) General purpose register
   (C) Stack pointer register
   (D) Link register

199. A cascaded arrangement of flip-flops, where the output of one flip-flop drives the clock input of the following flip-flop, is known as
   (A) synchronous counter
   (B) ripple counter
   (C) ring counter
   (D) up counter

200. The number of flip-flops required to construct an 8-bit shift register will be

(A) 32

(B) 16

(C) 8

(D) 4

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