# INSTRUMENTATION
(Final)

1. If the net force 'F' acting on an object is a non-zero constant, which of the following could also be a constant?

   (A) Position
   (B) Velocity
   (C) Speed
   (D) Acceleration

2. The dimensional formula for density is

   (A) ML^{-1}
   (B) ML^{-2}
   (C) ML^{-3}
   (D) None of the above

3. The unit of pressure in SI units is

   (A) Pascal
   (B) Fermi
   (C) Joule
   (D) Erg

4. Double refraction is exhibited by

   (A) Water
   (B) NaCl
   (C) Calcite
   (D) Oxygen

5. A superconducting material in the superconducting state is

   (A) paramagnetic
   (B) diamagnetic
   (C) ferromagnetic
   (D) None of the above

6. The distance between two charges is doubled. Then the force between them becomes

   (A) double
   (B) same
   (C) half
   (D) one fourth

7. When the velocity of a moving body is doubled, its kinetic energy

   (A) is doubled
   (B) becomes 3 times
   (C) becomes 4 times
   (D) becomes 6 times

8. Let vectors $\mathbf{a} = 2\,\mathbf{i} + \mathbf{j} - \mathbf{k}$, and $\mathbf{b} = \mathbf{i} + 2\,\mathbf{j} + \mathbf{k}$, the angle between the vectors $\mathbf{a}$ and $\mathbf{b}$ is

   (A) $\pi/2$
   (B) $\pi/3$
   (C) $2\pi/3$
   (D) $\pi/8$

9. When θ is represented in radians, the expression $\left(\frac{\theta}{1!}\right) - \left(\frac{\theta^3}{3!}\right) + \left(\frac{\theta^5}{5!}\right) \ldots \ldots$ is equal to

   (A) $\sin\theta$
   (B) $\cos\theta$
   (C) $\tan\theta$
   (D) None of the above

10. Visible region in the electromagnetic spectrum is

    (A) 10 to 200 nm   (B) 200 to 400 nm
    (C) 400 to 800 nm   (D) 800 to 1200 nm

11. A freshly prepared radioactive source of half-life 2 hours emits radiation of intensity which is 64 times the permissible safe level. The minimum time after which it would be possible to work safely with the source is

    (A) 6 hours   (B) 12 hours
    (C) 24 hours   (D) 48 hours

12. A device that converts electric energy into mechanical energy is

    (A) dynamo   (B) motor
    (C) transformer   (D) None of the above

13. In Young's double slit experiment, the two slits act as coherent sources of equal amplitude A and of wavelength λ. In another experiment with the same setup, the two slits are sources of equal amplitude A and wavelength λ but are incoherent. The ratio of the intensity of light at the midpoint of the screen in the first case of that in the second case is

    (A) 1 : 1   (B) 1 : 2
    (C) 2 : 1   (D) $\sqrt{2}$: 1

14. Impulse is equal to change of

    (A) velocity   (B) acceleration
    (C) momentum   (D) energy

15. An LED emitting at 1µm with spectral width of 50nm is used in a Michelson's interferometer. To obtain sustained interference, the maximum optical path difference between the two arms of the interferometer is:

    (A) 200µm   (B) 20µm
    (C) 1µm   (D) 50nm

16. For a vector $\vec{E}$, which one of the following statements is NOT TRUE?

    (A) $\vec{\nabla}.\vec{E} = 0$, $\vec{E}$ is called solenoidal,
    (B) $\vec{\nabla} \times \vec{E} = 0 \vec{E}$ is called conservative
    (C) $\vec{\nabla}.\vec{E} = 0$, $\vec{E}$ is called irrotational
    (D) $\vec{\nabla} \times \vec{E} = 0$, $\vec{E}$ is called irrotational

17. Optical fibers employ the principle of

    (A) interference   (B) diffraction
    (C) refraction   (D) total internal reflection

18. If 'C$_v$' is the velocity of light in vacuum and the 'C$_m$' is the velocity of light in a medium, then the refractive index of the medium is given as,

    (A) C$_v$ / C$_m$ (B) C$_m$ / C$_v$
    (C) C$_v$C$_m$ (D) 1 / C$_v$ C$_m$

19. Which one of the following is a vector quantity,

    (A) Potential energy   (B) Force
    (C) Mass   (D) Temperature

20. At which value of x, the function $f(x) = 2x^3 - 3x^2 - 36x + 10$ has maxima?

    (A) –2   (B) 3
    (C) 6   (D) None of the above

21. The effect, which explains the splitting of spectral lines by external magnetic field, is

    (A) Zeeman effect   (B) Stark effect
    (C) Raman effect   (D) Compton effect

22. Modulus of $\dfrac{(2+3i)(2-i)}{(2+i)}$ is

    (A) $\sqrt{23}$ (B) $\sqrt{13}$
    (C) $\sqrt{10}$ (D) $\sqrt{17}$

23. Given: $f(z) = \dfrac{1}{z+1} - \dfrac{2}{z+3}$. If C is a counter-clockwise path in the z-plane such that $|z + 1| = 1$, the value of $\dfrac{1}{2\pi j} \oint_c f(z)dz$ is,

    (A) - 2   (B) -1
    (C) 1   (D) 2

24. Which of the following is the characteristic of ideal operational amplifier?

    (A) Input impedance zero   (B) Output impedance zero
    (C) Bandwidth zero   (D) Gain zero

25. Current through a p-n junction diode in reverse biased condition is due to

    (A) minority carriers   (B) majority carriers
    (C) both majority and minority (D) cannot be determined
         carriers

26. Which of the following amplifiers offers high common mode rejection?

    (A) Differential amplifier   (B) Instrumentation amplifier
    (C) Isolation amplifier   (D) Non-inverting amplifier

27. Which of the following bridge configurations offers linear response and more sensitivity?

    (A) Quarter bridge
    (B) Half bridge
    (C) Full bridge
    (D) None of the above

28. The $|V_o/V_{in}|$ of 10 kHz (f_c), – 20 dB/decade low-pass filter for the 10 kHz signal is

    (A) 1
    (B) 0.707
    (C) 0.5
    (D) 0

29. The gain magnitude of 1 kHz, – 40 dB/decade low-pass filter for the 100 kHz noise would be

    (A) –20 dB
    (B) –40 dB
    (C) –60 dB
    (D) –80 dB

30. Time domain expressions for the voltage $V_1(t)$ and $V_2(t)$ are given as:
    $V_1(t) = V_{max} \sin(10t – 130^o)$ and $V_2(t) = \cos(10t + 10^o)$.
    Which one of the following statements is true?

    (A) $V_1(t)$ leads $V_2(t)$ by 130°
    (B) $V_1(t)$ lags $V_2(t)$ by 130°
    (C) $V_1(t)$ lags $V_2(t)$ by $–130^o$
    (D) $V_1(t)$ leads $V_2(t)$ by $–130^o$

31. In the circuit given below, the neon lamp flickers at a rate set by 'R', 'C' and 'Vin'. If 'C' is increased what would happen to the rate of flickering?
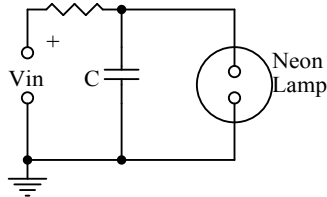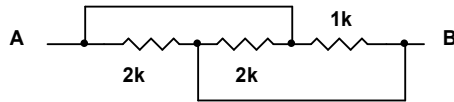

    (A) increase
    (B) decrease
    (C) remains same
    (D) can't be determined

32. When a 50Hz sinusoidal voltage is applied to the input of a full-wave rectifier, the output frequency is

    (A) 0Hz
    (B) 50Hz
    (C) 100Hz
    (D) 200Hz

33. A diode that has a negative resistance characteristics is the

    (A) Schottky diode
    (B) tunnel diode
    (C) laser diode
    (D) hot-carrier diode

34. Which of the following type of ADCs require S/H amplifier?

    (A) Integration type
    (B) Successive approximation type
    (C) Flash converter
    (D) Sigma-Delta converter

35. A MOSFET differs from a JFET in the sense that it has no

    (A) Channel   (B) Gate
    (C) P-N junction between gate and   (D) Substrate
        channel

36. What is the equivalent resistance between points A and B in the network shown below?

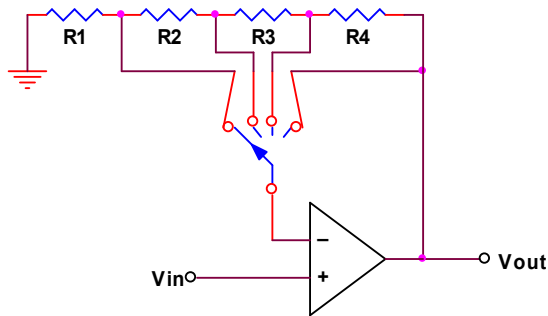   (A) (2/3) k   (B) 1.5 k
    (C) 0.5 k   (D) 2k

37. In a tuned LC circuit, if 'L' is decreased what would happen to the resonant frequency?

    (A) Increases   (B) Decreases
    (C) Remains same   (D) Can't be determined

38. Consider the following switch selectable gain non-inverting amplifier. The gains gains the values in ohms of R1, R2, R3 and R4 respectively should

    (A) 90, 900, 9000, 90000   (B) 100, 900, 9000, 90000
   (C) 10, 100, 1000, 10000   (D) None of the above

39. Which one of the following parameters of op amp indicates how fast the output can vary for the input variations?

    (A) Slew rate   (B) Unity gain bandwidth
    (C) Open loop gain   (D) Offset voltage

40. Electric field induced noise is reduced by shielding. Which of the following coupling is generally prevented by shielding a cable?

    (A) Resistive coupling   (B) Inductive coupling
   (C) Magnetic coupling   (D) Capacitive coupling

41.   Identify the circuit shown in the following figure.
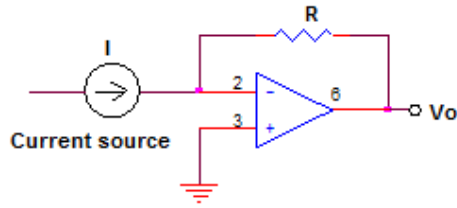
(A)   voltage to current converter   (B)   current to voltage converter
(C)   non-inverting amplifier   (D)   None of the above

42.   Which of the following types of ADCs is fastest?

(A)   Single-slope integrating type
(B)   Dual-slope integrating type
(C)   Successive approximation type
(D)   Flash

43.   The I-V characteristics of a diode in the circuit are given below:
$$i = \begin{cases} \frac{v-0.7}{500} A, if\ v \geq 0.7V, \\ 0A, if\ v < 0.7V \end{cases}$$, then current in the circuit is
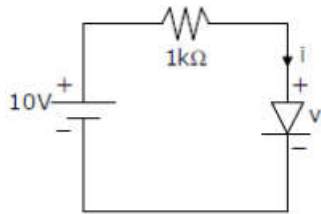
(A)   10mA   (B)   9.3mA
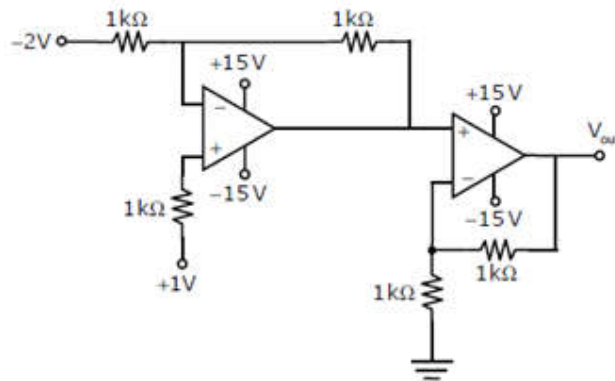(C)   6.67mA   (D)   6.2mA

44.   The voltage gain, A_v of the circuit shown below is approximately equal to
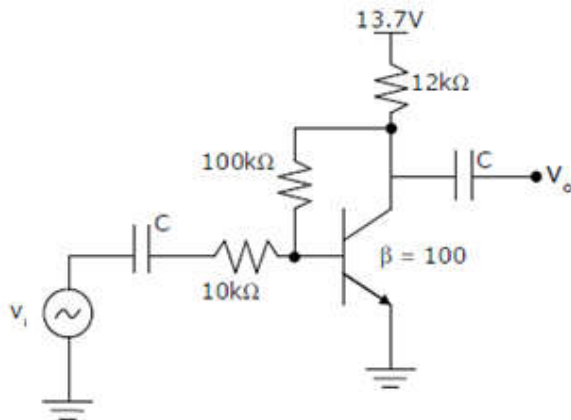
(A)   200   (B)   100
(C)   20   (D)   10

45. In the circuit shown below, what is the output V_{out} in volts?

1kΩ 1kΩ
−2V
+15V
+15V
V_{out}
−15V
1kΩ
−15V
1kΩ
+1V
1kΩ

(A) 4   (B) 6
(C) 8   (D) 10

46. A double convex lens is used to couple a laser beam of diameter 5mm into an optical fiber with a numerical aperture of 0.5. The minimum focal length of the lens that should be used in order to focus the entire beam into the fiber is

(A) 1.44 mm   (B) 2.50 mm
(C) 4.33 mm   (D) 5.00 mm

47. The Boolean expression $\overline{(\bar{A} + \bar{B} + \bar{C})}$ is equal to

(A) $(A.B.C)$ (B) $(A + B + C)$

(C) $(\bar{A} + \bar{B} + \bar{C})$ (D) $\overline{A + B + C}$

48. Find current output of 4-bit DAC based on R-2R ladder network for a digital input of 1011. The ladder network has resistor values of R = 10kΩ and the reference voltage is 10V.

(A) 0.5 mA   (B) 0.6875 mA
(C) 1.05 mA   (D) 1.6875 mA

49. Consider the logic circuit diagram given below.
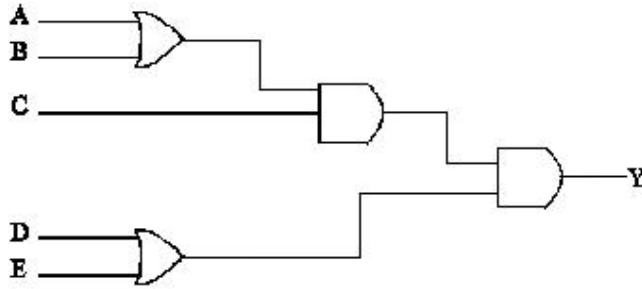
The output 'Y' is given as

(A) $(A.B + C).D.E$
(C) $(A + B).C.\overline{(D + E)}$
(B) $(A + B).C.(D + E)$
(D) $(A.B + C) + (D.E)$

50. A memory device has 16 bit address bus. How many locations are there?

(A) 4K
(C) 64K
(B) 16K
(D) 128K

51. Compared with static RAM, the dynamic RAM devices

(A) are slow
(C) are expensive
(B) have low packing density
(D) do not require refresh

52. In a stable multivibrator

(A) both states are not stable
(C) both states are stable
(B) one state is stable
(D) Not determined

53. Which one of the following logic functions is implemented by staircase switches?

(A) AND
(C) XOR
(B) OR
(D) NOT

54. j = 1;
    for (i = 1; i<10; i++) j = j * i;
    The above 'C' statements compute what?

(A) 9 !
(C) 11 !
(B) 10 !
(D) None of the above

55. Compared with CMOS devices, the TTL devices have

(A) high power consumption
(C) low speed operation
(B) low power consumption
(D) None of the above

56. What is the value in 'A' register after the following 8085 instructions are executed?
    MVI   A, 32H
    ANI   A, FFH

    (A) 32H   (B) 00H
    (C) FFH   (D) CDH

57. Four 20 μ fd capacitors are connected in series. Its effective value is

    (A) 10 μ fd   (B) 80 μ fd
    (C) 40 μ fd   (D) 5 μ fd

58. Data bus lines of the microprocessor are

    (A) input lines   (B) output lines
    (C) bidirectional lines   (D) None of the above

59. Which one of the logic gates function is implemented in the following circuit?
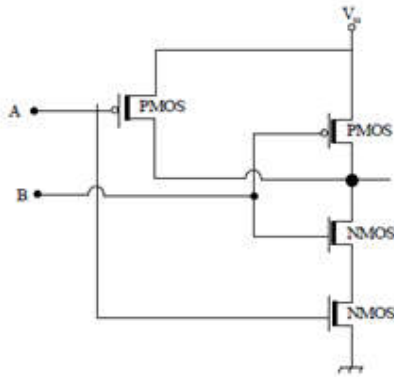
    (A) AND   (B) OR
    (C) XOR   (D) NAND

60. Gain '0.707' is given in decibels as

    (A) 3 dB   (B) –3 dB
    (C) 0 dB   (D) None of the above

61. Efficiency of bridge rectifier is

    (A) 20.3%   (B) 40.6%
    (C) 60.9%   (D) 81.2%

62. The primary colours are

    (A) Red, Green and Blue   (B) Yellow, Magenta and Orange
   (C) Black and White   (D) Red, Green and Violet

63. Ejection of electron in the innermost orbital leads to the emission of

   (A) UV-radiation
   (B) IR radiation
   (C) X-ray
   (D) Visible radiation

64. Which one of the following is a particle accelerator?

   (A) Nuclear reactor
   (B) Geiger-Miller counter
   (C) Cyclotron
   (D) None of the above

65. CT scanner uses

   (A) RF source
   (B) UV source
   (C) Ultrasonic source
   (D) X-ray source

66. The transfer function $\frac{V_2(s)}{V_1(s)}$ of the circuit shown below is
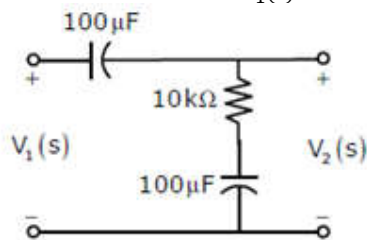
   (A) $\frac{0.5s + 1}{s + 1}$
   (B) $\frac{3s + 6}{s + 2}$
   (C) $\frac{s + 2}{s + 1}$
   (D) $\frac{s + 1}{s + 2}$

67. What is the resolution of 8-bit ADC operating in 10 V range?

   (A) 39.06 mV
   (B) 2.44 mV
   (C) 0.625 V
   (D) None of the above

68. Which of the following statements is NOT TRUE for a continuous time causal and stable LTI system?

   (A) All the poles of the system must lie on the left side of the $j\omega$ axis
   (B) All the roots of the characteristics equation must be located on the left side of the $j\omega$ axis
   (C) All the poles must lie within $|s| = 1$
   (D) Zeros of the system can lie anywhere in the s-plane

69. Assuming zero initial condition, the response y(t) of the system given below to a unit step input u(t) is

(A) $u(t)$
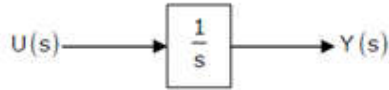
(B) $t\,u(t)$

(C) $\dfrac{t^2}{u}u(t)$

(D) $e^{-t}u(t)$

70. A band limited signal with a maximum frequency of 5 kHz is to be sampled. According to the sampling theorem, which one of following sampling frequencies is invalid?

(A) 5 kHz

(B) 12 kHz

(C) 15 kHz

(D) 20 kHz

71. The impulse response of a system is h(t) = t u(t). For an input 'u(t-1)', the output is

(A) $\dfrac{t^2}{2}u(t)$

(B) $\dfrac{t(t-1)}{2}u(t-1)$

(C) $\dfrac{(t-1)^2}{2}u(t-1)$

(D) $\dfrac{t^2-1}{2}u(t-1)$

72. When variable reluctance type tachometer has 150 teeth on the rotor and the counter records 13,500 pulses per second, then the rotational speed will be

(A) 4800 rpm

(B) 5400 rpm

(C) 6000 rpm

(D) 7200 rpm

73. In clinical laboratories, colourimeter is used to measure

(A) heat content

(B) colour of a liquid

(C) optical density

(D) None of the above

74. The impulse response of an LTI system is given as $\dfrac{\omega_c}{\pi}$ if n = 0, and $\dfrac{\sin\omega_c n}{\pi n}$ if n ≠ 0. It represents an ideal

(A) non-causal low-pass filter

(B) causal low-pass filter

(C) non-causal high-pass filter

(D) causal high-pass filter

75. In a time-of-flight mass spectrometer if 'q' is the charge and 'm' is the mass of ionized species, then the time of flight is proportional to

(A) $\dfrac{\sqrt{m}}{\sqrt{q}}$

(B) $\dfrac{\sqrt{q}}{\sqrt{m}}$

(C) $\dfrac{m}{\sqrt{q}}$

(D) $\dfrac{q}{\sqrt{m}}$

76. The following symbol refers to
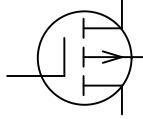
    (A) FET   (B) n-channel MOSFET
    (C) p-channel MOSFET   (D) None of the above

77. Thermal conductivity is low for

    (A) brass   (B) wood
    (C) aluminum   (D) silver

78. The wavelength of Helium-Neon Laser beam is

    (A) 632.8 nm   (B) 452 nm
    (C) 589.00 nm   (D) 380.00 nm

79. Heavy water is represented by

    (A) H_2O (B) D_2O
    (C) T_2O (D) T_3O

80. A 300 Hz sine wave is sampled at 500 Hz. What is the aliased frequency?

    (A) 800 Hz   (B) 250 Hz
    (C) 200 Hz   (D) 300 Hz

81. Anti-aliasing filter is a

    (A) low-pass filter   (B) high-pass filter
    (C) band-pass filter   (D) notch filter

82. In signal flow graph, a node which has only outgoing branches is called

    (A) input node   (B) output node
    (C) mixed node   (D) general node

83. Signal flow graphs can be used to represent

    (A) only linear system
    (B) only non-linear systems
    (C) both linear and non-linear systems
    (D) time invariant, time varying systems

84. If the characteristic equation of a system is $s^2 + 2s + 1 = 0$, then the system is

    (A) undamped   (B) overdamped
    (C) critically damped   (D) under damped

85. The pH value of water is

    (A) 0
    (B) 7
    (C) 14
    (D) None of the above

86. Conversion time of 8-bit successive approximation type ADC driven by clock of frequency 1MHz is

    (A) 8μsec
    (B) 9μsec
    (C) 8msec
    (D) 9msec

87. Sampling theorem states that if f_s is the sampling frequency and f_H is the highest frequency in the signal, then

    (A) $f_s > 2f_H$
    (B) $f_s < 2f_H$
    (C) $2f_s > f_H$
    (D) $2f_s < 2f_H$

88. The instrument used to measure the wavelengths of X-ray is

    (A) Spherometer
    (B) Monochromator
    (C) Bragg spectrometer
    (D) Spectrophotometer

89. A purely mechanical instrument cannot be used for dynamic measurements because

    (A) high inertia
    (B) high time constant
    (C) high response time
    (D) All of the above

90. A measurement system with input x (t) and output y (t) is described by the differential equation 3dy/dt + 5y = 8x. The static sensitivity of the system is

    (A) 0.60
    (B) 1.60
    (C) 1.67
    (D) 2.67

91. Which of the following is an active transducer?

    (A) Piezoelectric
    (B) Thermistor
    (C) Potentiometer
    (D) LVDT

92. The best way of specifying accuracy of an instrument is

    (A) as a percentage of true value
    (B) as a percentage of full scale deflection
    (C) as a percentage of span
    (D) either (A) or (C)

93. The standard voltage and current signal used in instrumentation industries are

    (A) 1 to 5V and 4 to 20 mA
    (B) 0 to 5V and 0 to 20 mA
    (C) Either (A) or (B)
    (D) None of the above

94. The threshold and resolution is

   (A) Smallest measurable input and input change
   (B) Smallest measurable output and output change
   (C) Smallest measurable input change and input
   (D) None of the above

95. An 0 - 10 A ammeter has a guaranteed accuracy of 1 percent of full scale deflection. The limiting error while reading 2.5 A is

   (A) 1%   (B) 2%
   (C) 4%   (D) None of the above

96. In a moving coil ammeter if the strength of the permanent magnet is reduced to 95% of the original value, the error induced in measurement is

   (A) Gross error   (B) Random error
   (C) Systematic error   (D) Error caused by loading effect

97. The time constant is defined as

   (A) time taken to reach 63.2% of the final value
   (B) time taken to fall to 36.8% of its initial value
   (C) time taken by the response to reach the final value if initial slope is maintained
   (D) All of the above

98. Dynamic error is the

   (A) difference between the true value of the quantity changing with time and measured value
   (B) difference between the true value and measured value
   (C) difference between the true values of the quantity changing with time
   (D) All of the above

99. The function of a transducer is to

   (A) amplify the input signal
   (B) average the fluctuating input signal
   (C) transduce the input signal
   (D) regulate the input signal

100. Repeatability of the instrument with respect to a fixed input is

   (A) Accuracy   (B) Precision
   (C) Resolution   (D) Sensitivity

101. The A transducer is subjected to a sudden change in the measurand. It takes 10 seconds to reach the steady state condition. How long will it take to read half the measurand?

   (A) 5sec   (B) 2.5sec
   (C) 2.39 sec   (D) 1.39 sec

102. The degree of damping desirable for analog indicating instrument is

   (A) zero
   (B) critical
   (C) somewhat less than critical
   (D) somewhat higher than the critical

103. The amplitude ratio of a first order instrument must be

   (A) zero   (B) higher than zero but any value
   (C) equal to one   (D) less than zero

104. The Bandwidth , a frequency domain concept, is indicative of

   (A) Rise time in time domain
   (B) Settling time in time domain
   (C) Steady state error in time domain
   (D) None of the above

105. A first order system subjected to a step input, the dynamic error is almost equal to zero when the time equals

   (A) 3τ (B) 2τ
   (C) 5τ (D) None of the above

106. The resolution of the potentiometric displacement transducer can be improved by

   (A) Thin film resistive element
   (B) Using bifilar winding
   (C) Multiturn potentiometer
   (D) All the above

107. In resistance potentiometer, the non linearity

   (A) increases with increase of load to potentiometer resistance
   (B) decreases with increase of load to potentiometer resistance
   (C) independent of load resistance to potentiometer resistance ratio
   (D) None of the above

108. Piezo-resistive strain gauges offer

   (A) High gauge factor
   (B) High temperature coefficient of resistance (TCR)
   (C) Both high GF and TCR
   (D) High GF and low TCR

109. A p-type semiconductor strain gauge has a nominal resistance of 1000 Ω and a gauge factor of +200 at 25℃. The resistance of the strain gauge in ohms when subjected to a strain of + 10^{-4} m/m at the same temperature is

    (A) 1010 Ω   (B) 1020 Ω
    (C) 1100 Ω   (D) Cannot be determined

110. The torque transmitted by a cylindrical shaft is to be measured by using two strain gauges. The angles for mounting the strain gauges relative to the axis of the shaft for maximum sensitivity are

    (A) ±45°   (B) ±60°
    (C) ±90°   (D) ±180°

111. The most sensitive strain sensing transducer is

    (A) Potentimetric transducer   (B) Wire resistance strain gauge
    (C) Extensometer   (D) Semiconductor strain gauge

112. Metal foil strain gauges are better to wire type strain gauges because of

    (A) higher heat dissipation capacity
    (B) easier bonding due to large surface area
    (C) economic fabrication using thin film deposition techniques
    (D) All of the above

113. Two active strain gauges subjected to opposite strains, connected in the adjacent arms of the Wheatstone bridge offers

    (A) higher sensitivity and temperature compensation
    (B) higher sensitivity alone
    (C) temperature compensation alone
    (D) None of the above

114. The output of a strain gauge bridge using two active strain gauges used in Poisson's configuration is

    (A) $\dfrac{\upsilon\, G_f \varepsilon\, e_i}{4}$ (B) $\dfrac{\upsilon\, G_f \varepsilon\, e_i}{2}$
    (C) $\dfrac{(1+\upsilon)G_f \varepsilon\, e_i}{2}$ (D) $\dfrac{(1+\upsilon)G_f \varepsilon\, e_i}{4}$

where, υ = Poisson's ratio, G_f = Gauge factor, ε = strain and e_i = excitation voltage of bridge.

115. A Hall effect transducer is used for the measurement of

    (A) Displacement   (B) Current
    (C) Power   (D) All of the above

116. A solar cell is a

    (A) photo voltaic transducer   (B) photo emissive transducer
    (C) photo conductive transducer   (D) photo resistive transducer

117. In LVDT, the phase sensitive demodulation is used to

    (A) measure the displacement
    (B) know the direction of the displacement
    (C) improve the sensitivity
    (D) improve the linearity

118. Differential arrangement is used in capacitive transducer for improving

    (A) the resolution   (B) the linearity
    (C) the sensitivity   (D) All of the above

119. An LVDT is supplied with a sinusoidal voltage of amplitude 5V and frequency 1kHz. The output is connected to an AC voltmeter. The reading of the voltmeter is 1V for a displacement of 1mm from the null position. When the displacement is 1mm in the opposite direction from the null position, the reading of the voltmeter is

    (A) –1V   (B) –0.2V
    (C) 1V   (D) 5V

120. The bridge most suited for measurement of a four-terminal resistance in the range of 0.001Ω to 0.1Ω is

    (A) Wiens bridge   (B) Kelvin double bridge
    (C) Maxwell's bridge   (D) Schering bridge

121. LVDT works on the principle of

    (A) variable reluctance   (B) variable self-inductance
    (C) variable mutual inductance (D) eddy current

122. The most common type of transducer for shock and vibration measurement is

    (A) LVDT   (B) piezo-electric
    (C) dial gauge   (D) ring type load cell

123. Magnetostrictive transducer work on the principle of

    (A) change of magnetization with change of dimension
    (B) change of magnetization with change of temperature
    (C) change of magnetization with change of permeability
    (D) None of the above

124. Pulse excitation technique is used in RTD measuring circuit, mainly to reduce

    (A) lead wire resistance   (B) noise due to interference
    (C) self-heating effect   (D) number of measuring

125. Among the following RTDs, which one is highly linear and stable?

    (A) Copper RTD   (B) Platinum RTD
    (C) Platinum and Copper RTD   (D) Nickel RTD

126. The third wire of a RTD (in three lead configuration) for temperature measurement by RTD is used

    (A) to complete the bridge
    (B) to compensate the errors due to lead resistance
    (C) to balance the current flowing in the bridge
    (D) to balance the null voltage

127. A platinum resistance thermometer PT-1000 is used to measure temperature between 0 and 200 ºC. The temperature co-efficient for platinum is 0.0039083/ ºC.
The value of resistance at 150 ºC is

    (A) 1586.3Ω (B) 1468.5 Ω
    (C) 1035.5 Ω (D) 1842.5 Ω

128. The materials used in K- type thermocouple are

    (A) Chromel- Constantan   (B) Iron-Constantan
    (C) Chromel- Alumel   (D) Copper- Constantan

129. In a thermocouple if the measuring junction temperature is lower than the reference junction, the emf will be

    (A) zero   (B) of reverse polarity
    (C) of same polarity, but it increases   (D) it remains the same

130. At what temperature do the Fahrenheit and Celsius scale coincide?

    (A) 0   (B) 20
    (C) 40   (D) – 40

131. According to Stefan Boltzman law, the amount of radiant energy per unit area is proportional to

    (A) Absolute temperature
    (B) Square of the absolute temperature
    (C) Fourth power of the absolute temperature
    (D) None of the above

132. The thermistor exhibits

    (A) only positive temperature coefficient of resistance
    (B) only negative temperature coefficient of resistance
    (C) either positive or negative temperature coefficient of resistance
    (D) None of the above

133. The cause of error in the measurement of temperature using a thermistor are

    (A) self heating and nonlinear characteristics
    (B) only self-heating
    (C) only nonlinear characteristics
    (D) None of the above

134. Which of the following is the best method of measuring the temperature of hot bodies radiating energy in visible spectrum?

    (A) Thermocouple   (B) Thermopile
    (C) Optical pyrometer   (D) All of the above

135. Which of the following gauges can be used for the lowest vacuum measurement?

    (A) Mcleod gauge   (B) Pirani gauge
    (C) Ionisation gauge   (D) Thermocouple gauge

136. Which of the following type of Bourdon tube shape has a small tip travel and necessitates amplification?

    (A) C-type   (B) Spiral
    (C) Helical   (D) Twisted

137. Hot wire anemometer can be used for measuring

    (A) Flow velocity only   (B) Flow direction only
    (C) Temperature   (D) All of the above

138. In electromagnetic flow meter, the induced voltage is proportional to

    (A) flow rate   (B) square root of the flow rate
    (C) square of the flow rate   (D) logarithm of the flow rate

139. Which flow meter is used for measuring the flow rate in an open channel?

    (A) Orifice meter   (B) Ultrasonic flow meter
    (C) Weir   (D) Rotameter

140. A venturimeter is preferred to an orifice plate because

    (A) it is cheaper and easy to install
    (B) its coefficient of discharge is constant
    (C) energy or head loss is less
    (D) accurate measurements can be made

141. The controlling torque in a megger is provided by

    (A) Springs
    (B) Weights attached to the moving system
    (C) It does not need any controlling torque
    (D) None of the above

142. Heart sounds are measured using

(A) Endoscope
(B) Phonocardiograph
(C) Echocardiograph
(D) Angiocardiograph

143. EMG is an instrument used for measuring the electrical activity of

(A) GI tract
(B) Skin
(C) Eye
(D) Skeletal muscles

144. Which one of the following can be used as parallel to series converter?

(A) Decoder
(B) Digital counter
(C) Multiplexer
(D) Demultiplexer

145. 10011 is a signed binary number. What is its decimal equivalent?

(A) 19
(B) 13
(C) − 19
(D) − 13

146. How inversion is achieved using EX-OR gate?

(A) Giving input signal to the two input lines of the gate tied together
(B) Giving input to one input line and logic zero to the other line
(C) Giving input to one input line and logic one to the other line
(D) Inversion cannot be achieved using EX-OR gate

147. In hexadecimal arithmetic, the result of $(77)_{16} − (3B)_{16}$ is equal to

(A) $3D_{16}$
(B) $3C_{16}$
(C) 60_{16}
(D) 73_{16}

148. What is the number of selector lines required in a single input n-output demultiplexer?

(A) 2
(B) N
(C) (2)n
(D) $\log_2 (n)$

149. The depletion layer across a P+-N junction lies

(A) mostly in P+ -region
(B) mostly in N -region
(C) equally in both P+ and N -region
(D) entirely in P+ -region

150. The junction capacitance of a P-N junction depends on

(A) doping concentration only
(B) applied voltage only
(C) both doping concentration and applied voltage
(D) barrier potential only

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