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Question Booklet No.

QUESTION BOOKLET

INSTRUMENTATION & CONTROL ENGINEERING

Roll No. | | | | | |

(Enter your Roll number in the above space)

Booklet Series

A

Time Allowed : 2 Hours **Maximum Marks : 100**

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1. A capacitor is made with a polymeric dielectric ($\varepsilon_r = 2{\cdot}26$) breakdown strength of 50 kV/cm. The permittivity of free space is 8·85 pF/m. If the rectangular plate of the capacitor have a width of 20 cm and a length of 40 cm, then the maximum electric charge in the capacitor is

[A] 2 μC

[B] 4 μC

[C] 8 μC

[D] 10 μC

2. The magnetic flux density at the centre of a 1·5 m long solenoid having 2500 turns and current 3 A is

[A] 2π Wb

[B] 2π mWb

[C] π Wb

[D] π mWb

3. Two long parallel conductors of negligible thickness are placed at 1 m apart in vacuum and carry a current of 1 A in the same direction. The force experienced between them per meter length will be

[A] 2π N

[B] $4\pi \times 10^{-7}$ N

[C] 4×10^{-7} N

[D] 2×10^{-7} N

4. A solar-cell has short-circuit current of 80 mA and a current of 70 mA for a terminal voltage of 0·6 V with a given load. Thevenin equivalent resistance of the cell is

[A] 8 Ω

[B] 60 Ω

[C] 120 Ω

[D] 80 Ω

5. A 4 kVA, 400/200 V single-phase transformer has a resistance of 0·03 p.u. and reactance of 0·06 p.u. What are its resistance and reactance referred to HV side?

[A] 0·3 Ω and 0·6 Ω

[B] 0·9 Ω and 2·4 Ω

[C] 0·08 Ω and 0·24 Ω

[D] 1·2 Ω and 2·4 Ω

6. The eddy current loss in an AC electric motor is 642 W at 25 Hz. Its loss at 60 Hz with flux density to be 62% if its rated value will be

[A] 2·84 kW

[B] 1·42 kW

[C] 642 W

[D] 321 W

7. The RMS value of the voltage $u(t) = 3 + 4\cos(3t)$ is

[A] $\sqrt{17}$ V

[B] 5 V

[C] 7 V

[D] $3 + 2\sqrt{2}$ V

8. Let $L(f(t)) = \frac{\omega}{s^2 + \omega^2}$, then the value of $\lim_{t \to 0} f(t)$

[A] cannot be determined

[B] is zero

[C] is in cosine and sine terms

[D] is in DC and cosine terms

9. An ideal filter has an impulse response of

[A] finite duration

[B] finite duration between 0 and infinity

[C] infinite duration between $-Q$ and $+Q$

[D] infinite duration between $-\infty$ and $+\infty$

10. Linear convolution of two real sequences with P and Q points can be converted to a circular convolution by appending extra zeros to every sequence until its length is

[A] $P + Q$

[B] $P + Q + 1$

[C] $P + Q - 1$

[D] $P - Q - 1$

11. The range of values of a, for which the system with impulse response $h(n) = a^n u(n)$ is stable, is

[A] $|a| > 1$

[B] $|a| < 1$

[C] $a > 0$

[D] $a < 0$

12. Anti-aliasing filter is a low-pass filter with cut-off frequency of

[A] signal bandwidth

[B] ½ × signal bandwidth

[C] 2 × signal bandwidth

[D] 4 × signal bandwidth

13. A system with input $x(t)$ and output $y(t)$ is defined by the input-output relation $y(t) = \int_{-\infty}^{-2t} x(\tau)\, d\tau$. The system will be

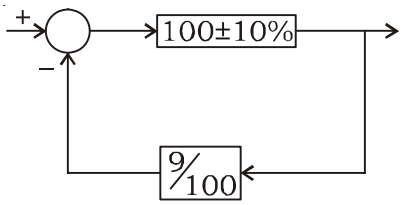
[A] causal, time-invariant and unstable

[B] causal, time-invariant and stable

[C] non-causal, time-invariant and unstable

[D] non-causal, time-variant and unstable

14. As shown in the figure, a negative feedback system has an amplifier of gain 100 with ±10% tolerance in the forward path and an attenuator of value 9/100 in the feedback path. The overall system gain is approximately



[A] 10 ± 1%

[B] 10 ± 2%

[C] 10 ± 5%

[D] 10 ± 10%

15. A synchro has a

[A] 3-phase winding on rotor and a single-phase winding on stator

[B] 3-phase winding on stator and a commutator winding on rotor

[C] 3-phase winding on stator and a single-phase winding on rotor

[D] single-phase winding on stator and a commutator winding on rotor

16. The transfer functions of two compensators are given below :

$$C_1 = \frac{10(s+1)}{(s+10)}, C_2 = \frac{(s+10)}{10(s+1)}$$

Which one of the following statements is ***correct***?

[A] C_1 is a lead compensator and C_2 is a lag compensator

[B] C_1 is a lag compensator and C_2 is a lead compensator

[C] both C_1 and C_2 are lead compensators

[D] both C_1 and C_2 are lag compensators

17. A differential amplifier has a differential gain of 20 *K*. CMRR = 80 dB. The common mode gain is given by

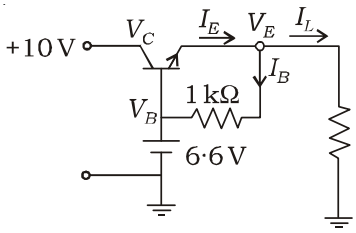
[A] 1

[B] 2

[C] ½

[D] 0

18. The three-terminal linear voltage regulator is connected to a 10 Ω load resistor as shown in the figure. If V_{in} is 10 V, what is the power dissipated in the transistor?



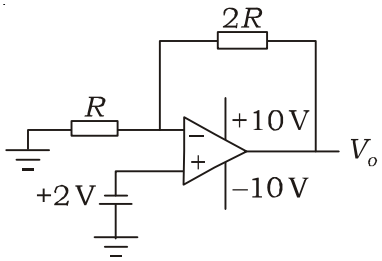
[A] 0·6 W

[B] 2·4 W

[C] 4·2 W

[D] 5·4 W

19. Given that the op-amp is ideal, the output voltage V_o is



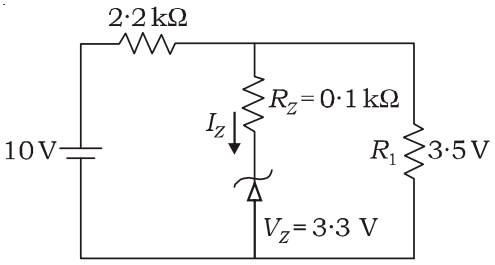
[A] 4 V

[B] 6 V

[C] 7·5 V

[D] 12·12 V

20. The current through the Zener diode in the figure is



[A] 33 mA

[B] 3·3 mA

[C] 2 mA

[D] 0 mA

21. The increasing order of speed of data access for the following devices is

(i) Cache Memory
(ii) CDROM
(iii) Dynamic RAM
(iv) Processor Registers
(v) Magnetic Tape

[A] *(v), (ii), (iii), (iv), (i)*

[B] *(v), (ii), (iii), (i), (iv)*

[C] *(ii), (i), (iii), (iv), (v)*

[D] *(v), (ii), (i), (iii), (iv)*

22. The 8085 assembly language instruction, that stores the content of H and L registers into the memory locations 2050 H and 2051 H respectively, is

[A] SPHL 2050 H

[B] SPHL 2051 H

[C] SHLD 2050 H

[D] STAX 2050 H

23. A digital-to-analog converter with a full-scale output voltage of 3·5 V has a resolution close to 14 mV. Its bit size is

[A] 4

[B] 8

[C] 16

[D] 32

24. The output voltage waveform of a 3-phase square-wave inverter contains

[A] only even harmonics

[B] both odd and even harmonics

[C] only odd harmonics

[D] only triple harmonics

25. If a 1 mA peak high frequency sinusoidal with zero DC shift is applied directly to a PMMC movement of 1 mA rating, the deflection will correspond to

[A] 0 mA

[B] 0·5 mA

[C] 1 mA

[D] 0·707 mA

26. In a balanced 3-phase system, power is measured by two-wattmeter method and the ratio of two-wattmeter readings is 2 : 1. The power factor of the system is

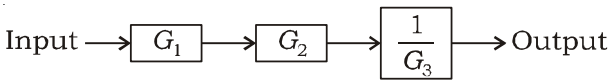
[A] 0·866 leading

[B] 0·866 lagging

[C] 0·9

[D] 1·0

27. The measurement system shown in the figure uses three sub-systems in cascade whose gains are specified as G_1, G_2 and G_3. The relative small errors associated with each respective sub-system are ε_1, ε_2 and ε_3. The error associated with the output is



[A] $\varepsilon_1 + \varepsilon_2 + 1/\varepsilon_3$

[B] $\varepsilon_1 \cdot \varepsilon_2 / \varepsilon_3$

[C] $\varepsilon_1 + \varepsilon_2 - \varepsilon_3$

[D] $\varepsilon_1 + \varepsilon_2 + \varepsilon_3$

28. The two inputs of a CRO are fed with two stationary periodic signals. In the *X*-*Y* mode, the screen shows a figure which changes from ellipse to circle and back to ellipse with its major axis changing orientation slowly and repeatedly. Which of the following inferences can be made from this?

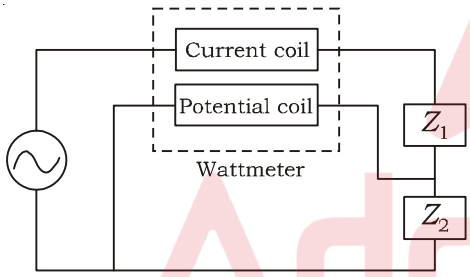
[A] The signals are not sinusoidal

[B] The amplitudes of the signals are very close but not equal

[C] The signals are sinusoidal with their frequencies, very close but not equal

[D] There is a constant but small phase difference between the signals

29. A wattmeter is connected as shown in the figure. The wattmeter reads



[A] zero always

[B] total power consumed by Z_1 and Z_2

[C] power consumed by Z_1

[D] power consumed by Z_2

30. An astable multivibrator uses a resistance of 100 kΩ and capacitance of 0·01 μF. The frequency of square wave generated by it is

[A] 824 Hz

[B] 583 Hz

[C] 100 Hz

[D] 693 Hz

31. A 0–10 V A/D converter has a resolution of 0·025%. Find the r.m.s. value quantization error.

[A] 176 μV

[B] 705 μV

[C] 352 μV

[D] 804 μV

32. When using a DC signal conditioning system with a carrier of 3 kHz, the data frequency should be limited to

[A] 1 kHz

[B] 3 kHz

[C] 0·6 kHz

[D] 0·5 kHz

33. Wavelength of light with shift of 40 fringes when movable mirror of Michelson interferometer moves a distance of 0·1 mm is

[A] 400 Å

[B] 500 Å

[C] 4000 Å

[D] 5000 Å

34. Find the time spent by a photon in a cavity before it is absorbed/emitted in a GaAs optical cavity (length 200 mm and reflectivity 0·33). Absorption loss in cavity is 10 cm^{-1}.

[A] 0·31 ps

[B] 0·41 ps

[C] 0·51 ps

[D] 0·61 ps

35. In the crystal frequency of 22 MHz, how much is the maximum delay that can be generated?

[A] 3978·7 s

[B] 0·021 ms

[C] 11·63 s

[D] 2·97 ms

36. A superheterodyne receiver with an intermediate frequency of 450 kHz is tuned to a signal at 1200 kHz. The image frequency is

[A] 750 kHz

[B] 900 kHz

[C] 1650 kHz

[D] 2100 kHz

37. An AM broadcast radio transmitter radiates 10 kW when modulating percentage is 60. What is the power of carrier?

[A] 7·69 kW

[B] 8·47 kW

[C] 9·17 kW

[D] 9 kW

38. In a coil, the current changes from 4 A to 2 A in 0·05 sec. If the induced e.m.f. is 8 volts, then the self-inductance of the coil is

[A] 0·5 H

[B] 0·35 H

[C] 0·2 H

[D] 2 mH

39. Electron of mass m and charge q is travelling with a speed v along a circular path of radius r at right angles to a uniform magnetic field of intensity B. If the speed of the electron is doubled and the magnetic field is halved, the resulting path would have a radius

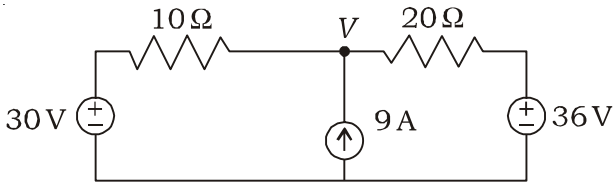
[A] $2r$

[B] $4r$

[C] $r/4$

[D] $r/2$

40. The node voltage V in the circuit is



[A] 6 V

[B] 30 V

[C] 36 V

[D] 92 V

41. The voltage regulation of a transformer has 2% resistance and 5% reactance. At full load, 0·8 pf lagging is

[A] 4·6%

[B] –4·6%

[C] –1·4%

[D] 6·4%

42. A 3-phase 6-pole 50 Hz induction motor is running at 5% slip. What is the speed of the motor?

[A] 850 r.p.m.

[B] 900 r.p.m.

[C] 950 r.p.m.

[D] 1000 r.p.m.

43. Calculate the minimum sampling rate to avoid aliasing when a continuous-time signal is given by $x(t) = 5 \cos 400\pi t$.

[A] 100 Hz

[B] 250 Hz

[C] 400 Hz

[D] 20 Hz

44. The low frequency and high frequency asymptotes of Bode magnitude plot are respectively –60 db/decade and –40 db/decade. What is the type of the system?

[A] Type-0

[B] Type-1

[C] Type-2

[D] Type-3

45. For a tachometer, if $\theta(t)$ is the rotor displacement in radians, $e(t)$ is the output voltage and K_t is the tachometer constant in V/rad/sec, then the transfer function $\frac{E(s)}{Q(s)}$ will be

[A] $K_t s^2$

[B] $\frac{K_t}{s}$

[C] $K_t s$

[D] K_t

46. Two *p-n* junction diodes are connected back to back to make a transistor. Which one of the following is ***correct***?

[A] The current gain of such a transistor will be high

[B] The current gain of such a transistor will be moderate

[C] It cannot be used as a transistor due to large base width

[D] It can be used only for pnp transistor

47. Class AB operation is often used in power (large signal) amplifiers in order to

[A] get maximum efficiency

[B] overcome a cross-over distortion

[C] remove even harmonics

[D] reduce collector dissipation

48. An op-amp has a slew rate of 5 V/μs. The largest sine wave output voltage possible at a frequency of 1 MHz is

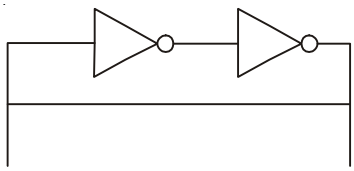
[A] 10π volts

[B] 5 volts

[C] $\frac{5}{\pi}$ volts

[D] $\frac{5}{2\pi}$ volts

49. The digital circuit using two inverters as shown in the figure below acts as



[A] a bistable multivibrator

[B] an astable multivibrator

[C] a monostable multivibrator

[D] an oscillator

50. D flip-flop can be made from a J-K flip-flop by making

[A] J = K

[B] J = K = 1

[C] J = 0, K = 1

[D] $J = \bar{K}$

51. The value of LSB of an 8-bit DAC for 0–12·8 V range is

[A] 1·6 V

[B] 50 mV

[C] 0·625 V

[D] 1·28 V

52. The decimal equivalent of hexadecimal number of 2A0F is

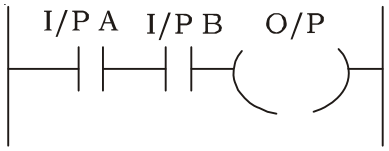
[A] 17670

[B] 17607

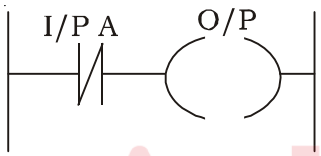
[C] 17067

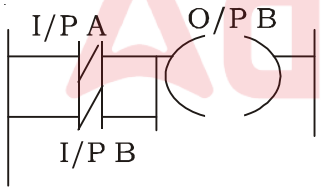
[D] 10767

53. Show a ladder diagram of NOR gate :

[A] 

[B] 

[C] 

[D] 

54. To reduce the effect of noise level, 100 sets of data are averaged. The averaged data set will have a noise level reduced by a factor of

[A] 10

[B] $10\sqrt{2}$

[C] $50\sqrt{2}$

[D] 100

55. Which one of the following is a current sensitive instrument?

[A] Permanent magnet moving coil instrument

[B] Cathode ray oscilloscope

[C] Electrostatic instrument

[D] FET input electronic voltmeter

56. In a digital voltmeter, the oscillator frequency is 400 kHz. The ramp voltage falls from 8 V to 0 V in 20 ms. What is the number of pulses counted by the counter?

[A] 8000

[B] 4000

[C] 3200

[D] 1600

57. If the bandwidth of an oscilloscope is 10 MHz, what is the fastest rise time a square wave can have to be accurately reproduced by the instrument?

[A] 10 ns

[B] 35 ns

[C] 28 ns

[D] 100 ns

58. A coil having 250 turns is connected to a 50 V DC source. If the coil resistance is 10 Ω, the m.m.f. (magnetomotive force) developed in AT would be

[A] 500

[B] 2500

[C] 1250

[D] 250

59. The flowmeter which cannot measure bidirectional flow is

[A] ultrasonic flowmeter

[B] turbine flowmeter

[C] electromagnetic flowmeter

[D] Coriolis mass flowmeter

60. Which transducer measures changes in acceleration, pressure, strain and temperature?

[A] Photoelectric transducer

[B] Capacitive transducer

[C] Piezoelectric transducer

[D] Inductive transducer

61. Calculate the Hall voltage when the electric field is 5 V/m and height of the semiconductor is 2 cm.

[A] 10 V

[B] 1 V

[C] 0·1 V

[D] 0·01 V

62. In a 10-bit PCM system, a message signal having maximum frequency of 4 kHz is to be transmitted. If the bit rate of this PCM system is 60 kbits/sec, then the appropriate sampling frequency is

[A] 6 kHz

[B] 7 kHz

[C] 8 kHz

[D] 9 kHz

63. An analog voltage in the range of 0 to 8 V is divided in eight equal intervals for conversion to 3-bit digital output. The maximum quantization error is

[A] 0 V

[B] 0·5 V

[C] 1 V

[D] 2 V

64. The value of current limiting resistor for a stack of 4 LEDs connected in series will be _____ if the LEDs are 3 V, 3 mA and DC source is 15 V.

[A] 10 Ω

[B] 100 Ω

[C] 1 kΩ

[D] 10 kΩ

65. A 4-bit synchronous counter uses flip-flops with propagation delay time of 50 ns each. The maximum possible time required for change of state will be

[A] 50 ns

[B] 100 ns

[C] 150 ns

[D] 200 ns

66. An 8-bit D/A converter has a resolution of 10 mV per LSB. What is the output voltage when the digital input code is 10000001?

[A] 2 V

[B] 1·29 V

[C] 3 V

[D] 10 V

67. Which of the following Boolean algebraic expressions is ***incorrect***?

[A] $A + \bar{A}B = A + B$

[B] $A + AB = B$

[C] $(A + B)(A + C) = A + BC$

[D] $(A + \bar{B})(A + B) = A$

68. For a unit step input, a system with a closed loop transfer function $G(s) = \dfrac{20}{s^2 + 2s + 5}$ has a steady state error of

[A] 10

[B] 5

[C] 4

[D] 2

69. A first-order process has a static gain of 1, a time constant of 1 sec and transport delay of 0·1 sec. Its transfer function is

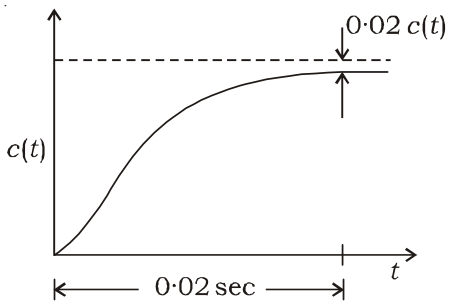
[A] $\dfrac{e^{-s}}{1 + 0{\cdot}1s}$

[B] $\dfrac{e^{-10s}}{1 + s}$

[C] $\dfrac{e^{-0.1s}}{1 + s}$

[D] $\dfrac{e^{-0.1s}}{1 + 0{\cdot}1s}$

70. The unit step response of a first-order system is shown below. The time constant of the system is



[A] 0·005 sec

[B] 2 sec

[C] 0·2 sec

[D] 0·5 sec

71. In $G(s)H(s)$ plane, the Nyquist plot from $\omega = -0$ to $\omega = +0$ is closed through an angle

[A] $n\pi$

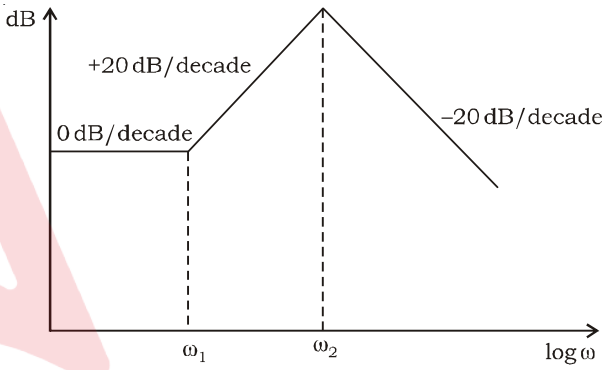
[B] $2n\pi$

[C] $n\pi/2$

[D] $-n\pi$

(where n is the number of open loop poles at the origin)

72. A Bode asymptotic plot of a transfer function is given below. The transfer function has



[A] 3 poles and 1 zero

[B] 1 pole and 2 zeros

[C] 2 poles and 1 zero

[D] 2 poles and 2 zeros

73. A p.d. of 1000 V is applied to two parallel plates 25 mm apart. A charged oil drop remains stationary when situated between the plates. If the mass of the drop is 5×10^{-15} kg, then find the charge on the drop (take g = 10 ms^{-2}).

[A] $5{\cdot}25 \times 10^{-18}$ C

[B] $2{\cdot}25 \times 10^{-18}$ C

[C] $1{\cdot}25 \times 10^{-18}$ C

[D] $4{\cdot}5 \times 10^{-18}$ C

74. The total inductance of two coils connected in series commutatively is 1·6 H and connected differentially is 0·4 H. The self-inductance of one coil is 0·6 H. The mutual inductance is

[A] 0·9 H

[B] 0·1 H

[C] 0·3 H

[D] 0·6 H

75. A conductor of length 0·5 m is placed in a magnetic field of strength 0·5 Wb/m^2. The force experienced by the conductor when a current of 50 A flows through it is

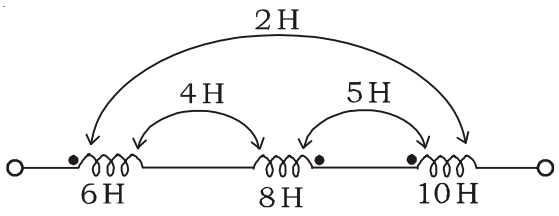
[A] 12·5 N

[B] 24·5 N

[C] 10 N

[D] 50 N

76. For the three coupled coils shown in the figure below, the total inductance is



[A] 8 H

[B] 5 H

[C] 10 H

[D] 2 H

77. A circular iron ring of mean diameter 25 cm and cross-sectional area 9 cm^2 is wound with a coil of 100 turns and carries a current of 1·5 A. The relative permeability of iron is 2000. The amount of flux produced in the ring is

[A] 4·3 mWb

[B] 0·431 mWb

[C] 1·4 mWb

[D] 2·431 mWb

78. A transformer is working at its full load and its efficiency is also maximum. Its iron losses are 1000 W. Then, its copper loss at half of the full load will be

[A] 250 W

[B] 300 W

[C] 400 W

[D] 1000 W

79. A 3-phase SCIM has a starting torque of 150% and a maximum torque of 300% (with respect to the rated torque). Neglect stator resistance and rotational losses. The value of the slip of maximum torque is

[A] 13·48%

[B] 16·42%

[C] 18·92%

[D] 26·78%

80. N point Radix-2 FFT algorithm requires _____ complex multiplications.

[A] $(N/2)\log_2 N$

[B] $N\log_2 N$

[C] N

[D] N^2

81. The Region of Convergence (ROC) of the Z-transform of a causal unit step discrete-time sequence is

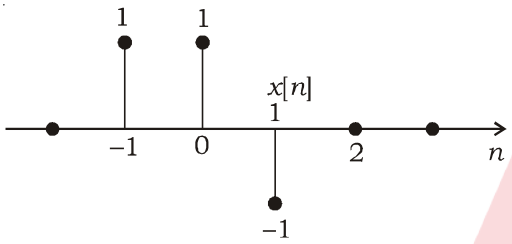
[A] $|Z| < 1$

[B] $|Z| \leq 1$

[C] $|Z| > 1$

[D] $|Z| \geq 1$

82. The signal $x[n]$ shown in the figure below is convolved with itself to get $y[n]$. The value of $y[1]$ is



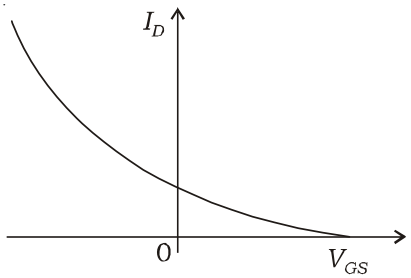
[A] −2

[B] 1

[C] 2

[D] 0

83. The variation of drain current with gate-to-source voltage ($I_D - V_{GS}$ characteristic) of a MOSFET is shown below. The MOSFET is



[A] an n-channel depletion mode device

[B] an n-channel enhancement mode device

[C] a p-channel depletion mode device

[D] a p-channel enhancement mode device

84. An amplifier has an open-loop gain of 100, an input impedance of 1 kohm and an output impedance of 100 ohm. A feedback network with a feedback factor of 0·99 is connected to the amplifier in a voltage series feedback mode. The new input and output impedances respectively are

[A] 10 ohm and 1 ohm

[B] 10 ohm and 1 kohm

[C] 100 kohm and 1 ohm

[D] 100 kohm and 1 kohm

85. The instrumentation amplifier used to amplify small signals has

[A] low input impedance

[B] low CMRR

[C] high CMRR

[D] high output impedance

86. If the confidence level is 0·95, then the values lying outside the confidence intervals are

[A] 1 in 5

[B] 1 in 20

[C] 1 in 100

[D] 1 in 1000

87. In a Kelvin's double bridge, two sets of readings are taken when measuring a low resistance, one being the current in one direction and the other with the direction of current reversed. This is done to

[A] eliminate the effect of contact resistance

[B] eliminate the effect of resistance of leads

[C] correct the changes in battery voltage

[D] eliminate the effect of thermo-electric emfs

88. The measurement accuracies in current and resistance are ±2% and ±3% respectively. The accuracy in power is

[A] ±1%

[B] ±5%

[C] ±7%

[D] ±12%

89. The true value of Q of a coil is 245 and the measured value of Q is 244·5. The ratio of distributed capacitance to self-capacitance of the coil is

[A] $2{\cdot}04 \times 10^{-3}$

[B] 1·002

[C] 0·997

[D] 100

90. A $3\frac{1}{2}$ digital multi-meter has an accuracy specification 0·5% of the reading plus 5 counts. The value of unknown resistance is read as 50 ohm on a 200 ohm scale of the meter. The value of the resistance is

[A] 50 ± 0·25 ohm

[B] 50 ± 0·5 ohm

[C] 50 ± 0·75 ohm

[D] 50 ± 100 ohm

91. A capacitive transducer working on the principle of change of capacitance with change of displacement, exhibits non-linear characteristics. The response of these transducers can be made linear by

[A] using differential arrangement

[B] working them over a large displacement range

[C] The response cannot be made linear

[D] Response of capacitive transducer is already linear

92. A quartz piezoelectric crystal having a thickness of 2 mm and voltage sensitivity of 0·05 V-m/N is subjected to a pressure of 1·5 MN/m^2. If permittivity = $40{\cdot}6 \times 10^{-12}$ F/m, then the output voltage will be

[A] 100 V

[B] 150 V

[C] 165 V

[D] 0 V

93. The operation of the Pirani gauge is based on

[A] ionisation of gas at low pressure

[B] variation of volume with pressure

[C] variation of viscosity with pressure

[D] variation of thermal conductivity of gas with pressure

94. An accelerometer has a seismic mass of 1000 gram and a natural frequency of 1 kHz. With g, the acceleration due to gravity, the static sensitivity of the accelerometer (in nm/g) is

[A] 2·58

[B] 9·81

[C] $7{\cdot}28 \times 10^2$

[D] 6·28

95. The value of pH of a solution is 4. It indicates that the concentration of hydrogen ions is

[A] 10^{-4} g/litre and the solution is acidic

[B] 10^{-4} g/litre and the solution is alkaline

[C] 10^{-4} mg/litre and the solution is acidic

[D] 10^{-4} mg/litre and the solution is alkaline

96. A sinusoidal signal of frequency 1 kHz is used to produce an FM signal with a modulation index equal to 5. The bandwidth (where 98% of the power is contained) of the FM signal is

[A] 2 kHz

[B] 3 kHz

[C] 6 kHz

[D] 12 kHz

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

[A] 200 μm

[B] 20 μm

[C] 1 μm

[D] 50 nm

98. The resolving power of a spectrometer consisting of a collimator, a grating and a telescope can be increased by

[A] increasing the angular magnification of the telescope

[B] increasing the period of grating

[C] decreasing the period of grating

[D] decreasing the slit-width of collimator

99. Two-crossed length of He-Ne laser beam is 120 cm. Its coherence time in seconds is

[A] 4×10^{-1}

[B] 4×10^{-3}

[C] 4×10^{-5}

[D] 4×10^{-9}

100. A step index optical fiber, whose refractive indices of core and cladding are 1·44 and 1·40 respectively, is surrounded by air. Its numerical aperture is

[A] 0·12

[B] 0·75

[C] 0·06

[D] 0·34

SPACE FOR ROUGH WORK

★ ★ ★