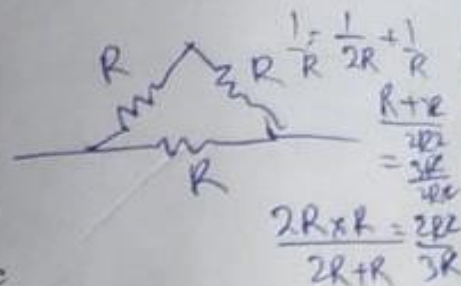


1. Three resistances each of $R \Omega$ are connected to form a triangle. The resistance between any two terminals will be

(A) $R \Omega$
(C) $3R \Omega$

(B) $3/2 R \Omega$
(D) $2/3 R \Omega$



2. An electric circuit with 10 branches and 7 nodes will have

(A) 3 loop equations
(C) 7 loop equations

(B) 4 loop equations
(D) 10 loop equations

$$b = n - l + 1$$

$$10 = 7 - l + 1$$

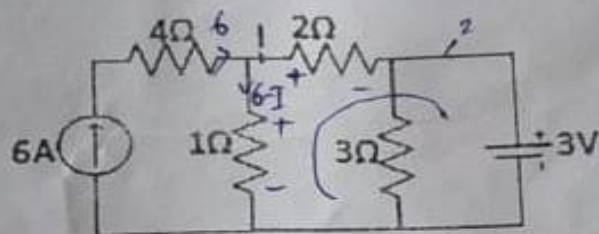
$$l = 8 - 7 = 1$$

$$b = l + n - 1$$

$$10 = l + 7 - 1$$

$$l = 4$$

3. For the circuit shown in the figure below I is



(A) 0 A
(C) 2 A

(B) 1 A
(D) 3 A

$$\frac{4}{5} + \frac{2}{1} = \frac{14}{5} \times 3 = \frac{42}{5}$$

$$3 + 2I - 1(6 - I) = \frac{42}{5}$$

$$3 + 2I - 6 + I = 8.4$$

$$-3 + 3I = 8.4$$

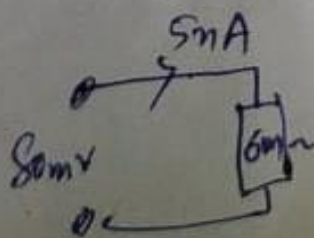
$$3I = 11.4$$

$$I = 3.8$$

4. A human nerve cell has an open circuit voltage of 80 mV and it can deliver a current of 5 nA through a 6 M ohm load. What is the maximum power available from the cell?

(A) 0.16 nW
(C) 1.6 W

(B) 16 mW
(D) 16 pW



$$V = 80 \text{ mV}$$

$$I = 6 \text{ nA}$$

$$P = V_i$$

$$80 \times 10^{-3} \times 5 \times 10^{-9}$$

$$400 \times 10^{-12}$$

$$P = I^2 R$$

$$= 25 \times 10^{-18} \times 6 \times 10^6$$

$$= 150$$

$$P = I^2 R$$

$$= \frac{V^2}{R}$$

$$= \frac{80^2}{6}$$

5. Which of the following theorems is applicable for both linear and nonlinear circuits?

(A) Superposition

(B) Thevenin's

(C) Norton's

(D) None of these

6. A two-port network is described by the relation:

$$I_1 = 5 V_1 + 3 V_2$$

$$I_2 = 2 V_1 - 7 V_2$$

The value of Z_{12} is

(A) 3

(B) -3

(C) 3/41

(D) 2/31

$$\begin{bmatrix} Y_{11} & Y_{12} \\ Y_{21} & Y_{22} \end{bmatrix} = \begin{bmatrix} 5 & 3 \\ 2 & -7 \end{bmatrix}$$

$$Z_{12} = \frac{V_1}{I_2}$$

$$Y_{21} = \frac{I_2}{V_1}$$

$$\left[\frac{1}{2} \right]$$

$$Z_{12} = \frac{V_1}{I_2} \Big|_{I_1=0}$$

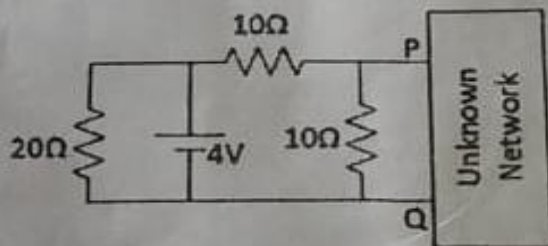
$$Z = \frac{V}{I} = Y = \frac{I}{V}$$

$$Z_{12} = \frac{V_1}{I_2} \Big|_{I_1=0}$$

$$Y_{21} = \frac{I_2}{V_1}$$

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7. In the given figure, the Thevenin's equivalent pair (voltage, impedance), as seen at the terminals P-Q is given by



$$\frac{30 \times 10}{30 + 10} = \frac{300}{40} = 7.5$$

(A) (2 V, 5Ω)

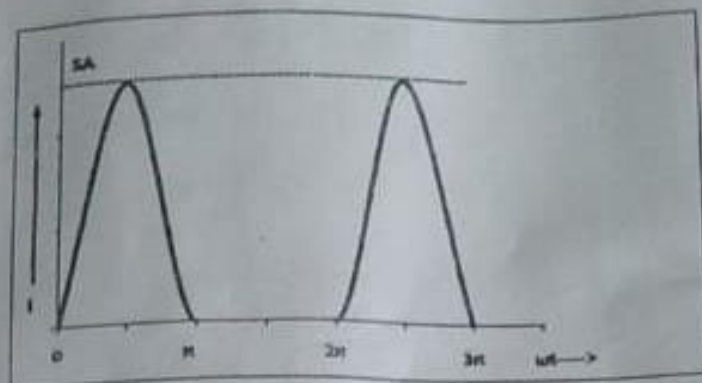
(B) (2 V, 7.5Ω)

(C) (4 V, 5Ω)

(D) (4 V, 7.5Ω)

8.

The current through a resistor has a waveform as shown in figure. The reading shown by a moving coil ammeter will be



(A) $5/\sqrt{2}$ A

(B) $2.5/\sqrt{2}$ A

(C) $5/\pi$ A

(D) 0 A

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9.

Pure inductive circuit

(A) Consume some power on average.

(B) Does not consume power.

(C) Takes power from line during some part of the cycle and then returns back other part of cycle.

(D) None of these.

$$160 < 100 \times 500 < -200$$

$$800 \times \sin 100 = n\pi$$

10. For an ac circuit, if $v(t) = 160 \sin(\omega t + 100)$ and $i(t) = 5 \sin(\omega t - 200)$, then reactive power absorbed by the circuit is

(A) 100 VARs

(B) 200 VARs

(C) 300 VARs

(D) 400 VARs

$$P = VI \cos \phi$$

$$P = \frac{V^2}{R} \cos \phi$$

$$P = \frac{5 \times 160}{80} \cos \phi$$

$$= 25 \times 160$$

$$= 4000$$

$$V_i \cos \phi$$

$$400 \times \sin$$

11. In an ac circuit of voltage $V = (a + jb)$ and current $I = (c + jd)$, then the power is given by

(A) $ac + ad$

☒ (B) $ac + bd$

(C) $bc - ad$

(D) $bc + ad$

$(a + jb)(c + jd)$
 $ac + jbd$

12. When sinusoidal voltage is applied across R-L parallel circuit so that $R = XL$ the phase angle will be

(A) 45° lag.

(B) 45° leading.

☒ (C) 90° lag.

(D) 90° leading.

13. Q-factor of R-L-C circuit possessing resonant frequency of 10 Hz and bandwidth 5 Hz is

(A) 0.5

(B) 2

(C) 2.5

☒ (D) 50

$Q_0 = BW \times f$

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14. A lossy capacitor is represented by an ideal capacitor C with a high resistance R in parallel. What is the Q of the circuit at frequency ω ?

(A) ωCR

☒ (B) $1/(\omega CR)$

(C) $\omega C/R$

(D) $R/(\omega C)$

15. The power delivered to a 3-phase load can be measured by the use of 2 watt meters only when the

- (A) Load is balanced.
(B) Load is unbalanced.
(C) 3-phase load is connected to the source through 3- wires.
(D) 3-phase load is connected to the source through 4- wires.

16. The complex exponential Fourier coefficient of a real valued time signal has

- (A) Odd symmetry (B) even symmetry
(C) Conjugate symmetry (D) no symmetry

17. The transfer function $T(s) = s^2 / (s^2 + as + b)$ belongs to an active

- (A) Low pass filter (B) high pass filter
(C) Band pass filter (D) band-reject filter

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18. What is the Laplace transform of a function $8(t-2)$?

- (A) 2 (B) 0
(C) e^{-2s} (D) $2s$

$$\frac{1}{s-2} \int_0^{\infty} e^{st} 8(t-2) dt$$
$$8 \left[\frac{e^{st}}{s} \right]_0^{\infty} - e^0 (0)$$

19. What is the inverse Fourier transform of $u(\omega)$

- (A) $\frac{1}{2} \delta(t) + 1/\pi t$ (B) $\frac{1}{2} \delta(t)$
(C) $2 \delta(t) + 1/\pi t$ (D) $2 \delta(t) + \text{sgn}(t)$

20. A negative feedback closed loop system is supplied to an input of 5V. The system has a forward gain of 1 and a feedback gain of 1. What is the output voltage?

(A) 1.0 V

(B) 1.5 V

(C) 2.0 V

(D) 2.5 V



$$V_i = 5$$

$$A_f = 1$$

$$A_{fb} = 1$$

$$V_o = A_f \times V_i$$

$$= 5$$

$$\frac{1}{2} \times 5$$

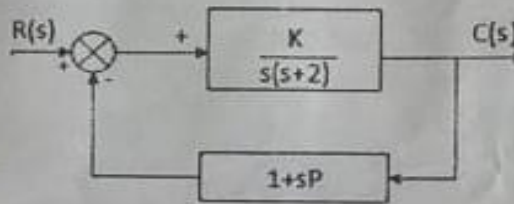
21. The block diagram of a closed control system is given in the figure. The values of K and P such that the system has a damping ratio of 0.7 and an undamped natural frequency of 5 rad/sec, are respectively equal to

(A) 20 and 0.3

(B) 20 and 0.2

(C) 25 and 0.3

(D) 25 and 0.2



$$1 + Kps + K = 0 \Rightarrow 1 + \frac{K}{s(s+2)}(1+sp) = 0$$

$$\frac{K}{s^2+2s} + \frac{K(1+sp)}{s(s+2)} = 0$$

$$\frac{K}{s^2+2s} + \frac{K(1+sp)}{s^2+2s} = 0$$

$$\frac{K(1+sp+1)}{s^2+2s} = 0$$

$$\frac{K(2+sp)}{s^2+2s} = 0$$

$$\frac{K}{s(s+2)} + \frac{K(1+sp)}{s(s+2)} = 0$$

$$\frac{K(1+sp+1)}{s(s+2)} = 0$$

$$\frac{K(2+sp)}{s(s+2)} = 0$$

$$\frac{K}{1+K(1+sp)} = 0$$

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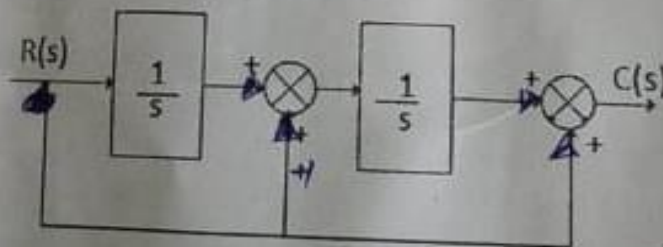
22. For the block diagram shown in figure, the transfer function $C(s)/R(s)$ is equal to

(A) $(s^2 + 1)/s^2$

(B) $(s^2 + s + 1)/s^2$

(C) $(s^2 + s + 1)/s$

(D) $1/(s^2 + s + 1)$



$$\left(\frac{1}{s} + 1\right) \left(\frac{1}{s} + 1\right)$$

$$\frac{1}{s^2} + \frac{1}{s}$$

$$\frac{1}{s^2}(1-0) + 1(1-0)$$

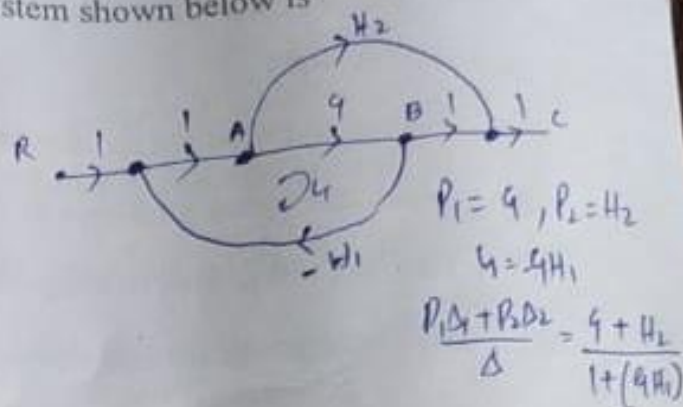
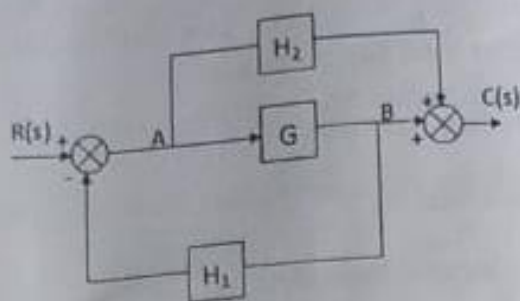
$$\frac{1}{s^2} + 1$$

$$\frac{1+s^2}{s^2} = \frac{s^2+1}{s^2}$$

$$\left(\frac{\frac{1}{s^2}(1-0) + 1}{1-(0)} \right)$$

$$\frac{1}{s^2} + 1 =$$

23. The transfer function $C(s)/R(s)$ for the system shown below is



- (A) $(G + H_1) / (1 + GH_2)$ (B) $(G + H_2) / (1 + GH_1)$
 (C) $H_2 / (1 + GH_1)$ (D) $GH_2 / (1 + GH_1)$

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24. Indicate type one system out of the transfer functions given below

- (A) $s(s+4)/(s+1)(s+8)$
 (B) $(s+2)/s(s+6)$
 (C) $(s+3)(s+5)/s^2(s+4)(s+8)$
 (D) $s/(s+4)(s+5)$

25. The Type number of the control system with $G(s)H(s) = K(s+2)/s(s^2+2s+3)$

is

- (A) one (B) two
 (C) three (D) four

26. Which one of the following statements is INCORRECT with reference to pneumatic system?

- (A) Operating pressure is low compared to hydraulic system.
- (B) Leaks can create problems as well as fire hazards.
- (C) They are insensitive to temperature change.
- (D) High compressibility of air results in longer time delays.

27. For the second order prototype system, when the undamped natural frequency increase, the maximum overshoot of the output

- (A) stays the same
- (B) increase
- (C) Decrease
- (D) just double

28. Consider the network function:

$$H(s) = 2(s+3) / (s+2)(s+4)$$

$$Y(s) = X(s) \cdot H(s)$$

$$Y(s) = \frac{1}{s} \cdot \frac{2(s+3)}{(s+2)(s+4)}$$

What is the steady-state response due to a unity step input?

- (A) 4/3
- (B) 1/2
- (C) 3/4
- (D) 1

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✱

29. A system with zero initial conditions has the closed loop transfer function

$$T(s) = (s^2 + 4) / (s+1)(s+4)$$

The system output is zero at the frequency

- (A) 0.5 rad/sec
- (B) 1 rad/sec
- (C) 2 rad/sec
- (D) 4 rad/sec

$$\frac{s^2 + 4}{(s+1)(s+4)} = \frac{s^2 + 4}{s^2 + 5s + 4}$$

$$2\zeta\omega_n = 5$$

$$\zeta = \frac{5}{2\omega_n}$$

30. A cascade of 3 Linear Time Invariant system is causal and unstable. From this, we conclude that

- (A) each system in the cascade is individually causal and unstable.
- (B) at least one system is unstable and at least one system is causal.
- (C) at least one system is causal and all systems are unstable.
- (D) the majority are unstable and the majority are causal

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31.

A unity feedback system with open loop transfer function of $20/s(s+5)$ is excited by a unit step input. How much time will be required for the response to settle within 2 % of final desired value?

- (A) 0.25 sec
- (B) 1.60 sec
- (C) 2.40 sec
- (D) 4.00 sec

$y(s) = X(s) \cdot H(s)$
 $\frac{20}{s(s+5)} \cdot \frac{1}{s}$
 $H(s) = \frac{20}{s(s+5)}$

32.

Which one of the following open-loop transfer function has root locus parallel to imaginary axis

(A) $K/(s+1)$

(C) $K/(s+2)^2$

(B) $K(s+1)/(s+2)^2$

(D) $K(s+2)/(s+1)^2$

$\frac{K}{\omega^2 + 1} < K \omega^{-1}$



A

33. The Bode diagram approach is the most commonly used method for the analysis and synthesis of

- (A) non linear feedback control system only.
- (B) linear feedback control systems only.
- (C) open loop system only.
- (D) all of the above

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34. A 0 to 300V voltmeter has an error of $\pm 2\%$ of fsd. What is the range of readings if true voltage is 30 V?

$$0.2 \times \frac{2}{100} \times 300 = 6$$

- (A) 24 V - 36 V
- (B) 20 V - 40 V
- (C) 29.4 V - 30.6 V
- (D) 20 V - 30 V

35. Consider the following:

1. Human Errors
2. Improper application of instruments
3. Error due to worn parts of an instrument
4. Errors due to effects of environment.

Which of the above come under the type of systematic errors?

- (A) 1 and 2
- (B) 2 and 3
- (C) 3 and 4
- (D) 1 and 4

36. Which of the following techniques reduce the residual inductance of standard resistance?

- (A) Using high resistivity material.
- (B) Using material of low temperature coefficient of resistance.
- (C) Using proper shielding.
- (D) Making a bifilar winding on a card.



37. A 35 V dc supply is connected across a resistance of $600\ \Omega$ in series with an unknown resistance R . A voltmeter having a resistance of $1.2\text{ k}\Omega$ is connected across the $600\ \Omega$ resistance and reads 5V. The value of resistance R will be

- (A) $120\ \Omega$
- (B) $500\ \Omega$
- (C) $1.7\text{ k}\Omega$
- (D) $2.4\text{ k}\Omega$



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38. A moving coil of meter has 100 turns, and a length and depth of 10 mm and 20 mm respectively. It is positioned in a uniform radial flux density of 200 mT. The coil carries a current of 50 mA. The torque on the coil is

- (A) $200\ \mu\text{Nm}$
- (B) $100\ \mu\text{Nm}$
- (C) $2\ \mu\text{Nm}$
- (D) $1\ \mu\text{Nm}$

39. For the given frequency, the deflecting torque of an induction ammeter is directly proportional to.

(A) current^2

(B) current^3

(C) $\sqrt{\text{current}}$

(D) Current.

40. An ammeter has a current range of 0-5A, and its internal resistance is 0.2Ω . In order to change the range to 0-25 A, we need to add a resistance of

(A) 0.8Ω in series with the meter.

(B) 1.0Ω in series with the meter.

(C) 0.04Ω in parallel with the meter.

(D) 0.05Ω in parallel with the meter.

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41. Which one the following methods decrease the error due to connections in a dynamometer type wattmeter?

(A) Using bifilar compensating winding in place of current coil.

(B) Using non inductive pressure coil circuit.

(C) Using a capacitor across a part of high resistance of pressure coil circuit.

(D) Using a swamping resistance.

42. The power of the three-wire balanced system was measured by two wattmeter method, the reading of one of the wattmeter was found to be double that of the other. What is the pf of the system?

(A) 1.0

(B) 0.866

(C) 0.707

(D) 0.5

43. An energy meter connected to an immersion heater (resistive) operating on an ac 230 V, 50 Hz single phase source reads 2.3 units (kWh) in one hour. The heater is removed from the supply and now connected to 400 V peak-to-peak square wave source of 150 Hz. The power in kW dissipated by the heater will be

(A) 3.478

(B) 1.739

(C) 1.540

(D) 0.870

44. Which one of the following is measured by the loss of charge method?

(A) Low R

(B) High R

(C) Low L

(D) High L

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45. A DC potentiometer is designed to measure up to about 2 V with a slide wire of 800 mm. A standard cell of emf 1.18 V obtains balance at 600 mm. A test cell is seen to obtain balance at 680 mm. The emf of the test cell is

(A) 1.00 V

(B) 1.34 V

(C) 1.50 V

(D) 1.70 V

46. Maxwell inductance bridge is used for coils of Q value

- (A) less than 1
- (B) less than 10
- (C) greater than 1 and less than 10
- (D) more than 100

47. The strain gauge with a resistance of 250 ohm undergoes a change of 0.15 ohm. During a test the strain is 1.5×10^{-4} . What is the gauge factor?

- (A) 4.7
- (B) 4.0
- (C) 3.5
- (D) 2.0

48. The drawbacks of thermocouples are that

- (A) they are less accurate than RTDs and thermistors
- (B) they need compensating leads
- (C) reference junction compensation is required in thermocouples
- (D) all of the above

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49. In a LVDT, the two secondary voltages

- (A) are independent of the core positions
- (B) vary unequally depending on the core positions
- (C) vary equally depending on the core positions
- (D) are always in phase quadrature

50. The piezoelectric crystal voltage sensitivity is defined as

- (A) Field developed per unit force
- (B) Field developed per unit stress
- (C) Voltage developed per unit stress
- (D) Voltage developed per unit force

51. A barium titanate crystal has a thickness of 2 mm. Its voltage sensitivity is $12 \times 10^{-3} \text{ Vm/N}$. It is subjected to a pressure of 0.5 MN/m^2 . What is the voltage generated?

- (A) 3 V
- (B) 6 V
- (C) 5 V
- (D) 12 V

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52. Which of the following transducers can be used for measurement of pressures as high as 100,000 atmospheres?

- (A) Mcleod gauge
- (B) Pirani gauge
- (C) Bridgman gauge
- (D) Knudsen gauge

53. A flow meter that is independent of liquid density is

- (A) Rotameter
- (B) Electromagnetic flow-meter
- (C) Venturimeter
- (D) Orifice meter

54. Which one the following definition correctly represents a data acquisition system (DAS)?

- (A) DAS is a group of electronic devices that are connected to perform the measurement and quantization of electrical signals for digital processing.
- (B) DAS is a group of devices that are connected to store different signals.
- (C) DAS is a system to control a process.
- (D) DAS is a signal conditioner.

55. Consider the signal $V_m \sin 100t + 2 V_m \sin 200t$ to be sampled and stored in a data acquisition system. The same is to be extracted off-line later on. In order to extract the signal effectively, the original sampling frequency has to be

- (A) 100 rad/s
- (B) 200 rad/s
- (C) 210 rad/s
- (D) $\sqrt{(100^2 + 200^2)}$ rad/s

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56. A sample-and-hold (S/H) circuit, having a holding capacitor of 0.1 nF, is used at the input of ADC. The conversion time of ADC is $1\mu\text{s}$, and during this time, the capacitor should not lose more than 0.5% of the charge put across it during the sampling time. The maximum value of the input signal to the S/H circuit is 5 V. The leakage current of the S/H circuit should be less than

- (A) 2.5 mA
- (B) 0.25 mA
- (C) 25.0 μA
- (D) 2.5 μA

57. In hygrometers the principle of measurement is
- (A) change in resistance of salt with humidity
 - (B) change in microwave power using klystron
 - (C) change in thermal conductivity using thermistor
 - (D) none of the above

58. A temperature sensitive transducer is subjected to a sudden temperature change. It takes 10 seconds for the transducer to reach equilibrium condition (five time constants). The time taken by the transducer to read half of the temperature difference will be nearly

- (A) 1.38 seconds
- (B) 5 seconds
- (C) 8.62 seconds
- (D) 10 seconds

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59. Why is Strain Gauge Bridge sometimes excited with AC?

- (A) It has a stable performance with ac
- (B) Its sensitivity is more with ac
- (C) Power frequency pick-up can be avoided with ac
- (D) AC output can be easily amplified

60. A field effect transistor with an anti-parallel body diode blocks
- (A) Bidirectional voltage and passes unidirectional current.
 - (B) Bidirectional voltage and passes bidirectional current.
 - (C) Unidirectional voltage and passes unidirectional current.
 - (D) Unidirectional voltage and passes bidirectional current.
61. After firing an SCR, the gate pulse is removed. The current in SCR will
- (A) remain the same
 - (B) Immediately fall to zero
 - (C) rise up
 - (D) rise a little and then fall to zero
62. Which one of the following statements are correct?
- The turn off time of converter grade SCRs are normally in the range of
- (A) 1 to 2 μs
 - (B) 50 to 200 μs
 - (C) 500 to 1000 μs
 - (D) 1 to 2 ms
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63. An SCR is rated for 650 V PIV. What is voltage for which the device can be operated if the voltage safety factor is 2?
- (A) 325 V rms
 - (B) 230 V rms
 - (C) 459 V rms
 - (D) 650 V rms

64. The initial current through the inductor is zero, while the initial capacitor voltage is 100 V. The switch is closed at $t = 0$. The current i through the circuit is

- (A) $5 \cos(5 \times 10^3 t) \text{ A}$ (B) $5 \sin(10^4 t) \text{ A}$
 (C) $10 \cos(5 \times 10^3 t) \text{ A}$ (D) $10 \sin(10^4 t) \text{ A}$

65. In a GTO, a anode current begins to fall when the gate current

- (A) is negative peak at time $t = 0$
 (B) is negative peak at $t = \text{storage period } t_s$
 (C) just begins to become negative at $t = 0$
 (D) just begins to become positive at $t = 0$.

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66. The rms value of a half-wave rectified symmetrical square wave current of 2

is

$$\frac{2}{2} \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \sqrt{2}$$

- (A) $\sqrt{2} \text{ A}$ (B) 1 A
 (C) $1\sqrt{2} \text{ A}$ (D) $\sqrt{3} \text{ A}$

67. The TRIAC can be used only in

- (A) Inverter (B) Rectifier
 (C) Multi-quadrant chopper (D) Cycloconverter

68. The uncontrolled electronic switch employed in power electronic converters is
- (A) Thyristor (B) Bipolar junction transistor.
(C) Diode (D) MOSFET.

69. A single-phase full-wave half-controlled bridge converter feeds an inductive load. The two SCRs in the converter are connected to a common DC bus. The converter has to have a freewheeling diode
- (A) because the converter inherently does not provide for free-wheeling.
(B) because the converter does not provide for freewheeling for high values of triggering angles.
(C) or else the freewheeling action of the converter will cause shorting of the AC triggering angles.
(D) or else if a gate pulse to one of the SCRs is missed, it will subsequently cause a high load current in the other SCR.

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70. A fully controlled line commutated converter functions as an inverter when firing angle (α) is in the range.
- (A) 0° - 90°
(B) 90° - 180°
(C) 90° - 180° only when there is a suitable dc source in the load.
(D) 90° - 180° only when it supplies a back emf load.

- In a 3-phase semi converter, for firing angle less than or equal to 60° , freewheeling diode conducts for
- (A) 90° (B) 60°
(C) 30° (D) 0°

72. A dc motor operated from a type A chopper is switched to type B chopper. How does the motor operate when type A and B are in operation respectively?

- (A) Plugging and motoring.
(B) Motoring and plugging.
(C) Regenerative braking and motoring.
(D) Motoring and regenerative braking.

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73. Two P-N junction diodes are connected back to back to make a transistor. One of the following is correct?

- (A) the current gain of such a transistor is high
(B) the current gain of such a transistor is moderate
(C) it cannot be used as a transistor due to large base width
(D) it can be used only for PNP transistor

74. When a transistor is used in switching mode then what is the turn-on time?

- (A) sum of delay time and rise time
(B) sum of rise time and storage time
(C) sum of delay time and storage time
(D) sum of rise time and fall time

75. An amplifier has a power gain of 200. What is its gain in dB? ($\log_{10} 2 \approx 0.30$)

(A) 14 dB (B) 17 dB

(C) 20 dB (D) 23 dB

$$d = 200$$

$$20 \log 200$$

$$20 \log (100 \cdot 2)$$

$$200 \cdot (10^3)^2$$

$$20 \times 2 \log 2$$

$$80 \times 0.3$$

$$24$$

76. The current gain of a BJT is

(A) $g_m r_o$

(B) g_m / r_o

(C) $g_m r_x$

(D) g_m / r_x

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77. In the circuit as shown $\beta = 99$, $V_{BE} = 0.6$ V, then what are the values of V_C and I_C corresponding to the operating point?

$$10 - 2.7kI_C - 200k$$

$$10 - 2.7(\beta I_B) - 200I_B - 0.6 = 0$$

$$10 - 2.7 \times 99 I_B - 200I_B - 0.6 = 0$$

$$10 - 467.3 I_B - 0.6 = 0$$

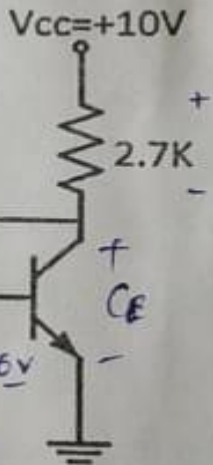
$$I_B =$$

$$200 \times 10^3 \times I_B - 0.6 = 0$$

$$I_B = \frac{0.6 \times 10^{-3}}{200}$$

$$I_B = 0.003 \times 10^3$$

$$I_C = \frac{0.003 \times 10^3}{99}$$



$$10 - 200 I_B - 0.6 = 0$$

$$-200 I_B = 0.6 - 10$$

$$I_B = \frac{9.4}{200} = 0.047$$

$$I_C = \frac{0.0015}{0.047} = 0.035$$

(A) 4.6 V and 1.98 mA.

(B) 4.7 V and 2.00 mA.

(C) 5.4 V and 1.56 mA.

(D) 4.2 V and 2.1 mA.

78. N-channel FETs are superior to P-channel FETs because they have

- (A) Lower switching time.
- (B) Lower pinch-off voltage.
- (C) Higher input impedance.
- (D) Mobility of electrons in N-channel is greater than mobility of holes in P-channel.

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79. JEFT has main drawback of

- (A) having low input impedance
- (B) having high output impedance
- (C) being noisy
- (D) having small gain-bandwidth product

80. In a MOSFET, the transfer characteristics can be used to determine which of following device parameters

- (A) Threshold voltage and output resistance
- (B) Transconductance and output resistance
- (C) Threshold voltage and Transconductance
- (D) Transconductance and channel length modulation parameters

$$ab' + a'b$$

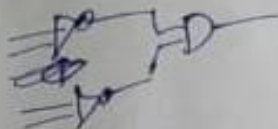
81. The output of an EX-OR gate with A and B as inputs will be

(A) $AB + \overline{AB}$ (B) $(A + B)(\overline{A} + \overline{B})$

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

$= AA' + AB' + \overline{A}B$

82. The AND function can be realized by using only n number of NOR gates. What is n equal to?



(A) 2

(B) 3

(C) 4

(D) 5

83. What are minimum number of 2-to-1 multiplexers required to generate a 2-input AND gate and a 2-input Ex-OR gate?

(A) 1 and 2

(B) 1 and 3

(C) 1 and 1.

(D) 2 and 2.

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84. In the toggle mode, a JK flip flop has

(A) $J = 0, K = 0$

(B) $J = 0, K = 1$

(C) $J = 1, K = 0$

(D) $J = 1, K = 1$

85. A ring counter consisting of five flip flops will have

(A) 5 states

(B) 10 states

(C) 32 states

(D) infinite states

The number of flip flops required in a decade counter is

(A) 2

(B) 3

(C) 4

(D) 10

87. Which of the following addressing technique is not used in 8085 microprocessor?

(A) Register

(B) Immediate

(C) Register indirect

(D) Relative

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88. In Intel 8085 A microprocessor ALE signals made high to

(A) Enable the data bus to be used as low order address bus.

(B) To latch data D_0 - D_1 from data bus.

(C) To disable data bus.

(D) To achieve all the functions listed above.

89. The capacity of a memory chip is 8192 bits, it has 2048 rows. The

organization of the chip is

$$\frac{8192}{2048} = \frac{2048 \times 4}{8192}$$

(A) Word organized.

(B) Byte organized.

(C) Nibble organized.

(D) Bit organized.

90. If two signals modulate the same carrier with different modulation depths of 0.3 and 0.9, the resulting modulation signal will

- (A) be overmodulated
- (B) have the resultant modulation limited to 1.0
- (C) have the resultant modulation index around 0.82
- (D) have the resultant modulation index around 0.95

91. Which one of the following signals can be applied to a delta modulator whose step size is 0.1 V and sampling frequency is 20 kHz so that no slope overload occurs?

- (A) $2\sin(1200\pi t)$
- (B) $1\sin(2600\pi t)$
- (C) $3\sin(1000\pi t)$
- (D) $4\sin(400\pi t)$

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92. The main advantage of pre-emphasis circuit in FM transmitter is

- (A) to increase the carrier power
- (B) to improve the signal to noise ratio at low audio frequencies
- (C) to increase the bandwidth of side band
- (D) to improve the signal to noise ratio at high audio frequencies

93. Voice is digitized using an ADC with a sampling period of 0.1 millisecond and 10 bits/sample. What is the bit rate in kbps generated by the system?

- (A) 100 kbps
- (B) 1000 kbps
- (C) 9.9 kbps
- (D) 10.1 kbps

The signal to quantization noise ratio in an n -bit PCM system

- (A) depends upon the sampling frequency employed.
- (B) is independent of the value of n .
- (C) increases with increasing value of n .
- (D) decreases with increasing value of n .

95. The most noise immune system is

- (A) SSB
- (B) PCM
- (C) PDM
- (D) PWM

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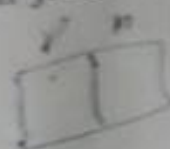
96. Power spectral density of a signal is

- (A) Complex, even and non-negative
- (B) Real, even and non-negative
- (C) Real, even and negative
- (D) Complex, odd and negative

97. A 3000 Hz bandwidth channel has a capacity of 30 kbps. The signal-to-noise ratio of the channel is

- (A) 20 dB
- (B) 25 dB
- (C) 30 dB
- (D) 40 dB

98. The doping concentration on the n-side of a p-n junction diode is enhanced. Which one of the following will get affected?



- (A) Width of the depletion region on n-side
- (B) Width of the depletion region on p-side ✓
- (C) Width of the depletion region on both sides
- (D) No change in width of depletion regions.

99. In a center tap full wave rectifier, 100 V is the peak voltage between the center tap and one of the secondary. What is the maximum voltage across the reverse biased diode?

- (A) 200 V
- (B) 141 V
- (C) 100 V
- (D) 86 V

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100. A low pass filter with a cut-off frequency of 30 Hz is cascaded with a high pass filter with a cut-off frequency of 20 Hz. The resultant system of filters will function as

- (A) an all-pass filter.
- (B) an all-stop filter
- (C) a band stop (band-reject) filter
- (D) a band-pass filter