

# ELECTRICAL ENGINEERING

## PAPER-I

1. Consider the following statements:  
When all the elements in one row of the Routh's tabulation are zero then this condition indicates
  1. one pair of real roots with opposite sign in s-plane
  2. one pair of conjugate roots on the imaginary axis in s-plane
  3. conjugate roots forming a quadrate in s-plane
 Which of the statements given above is/are correct?
  - a. 1 only
  - b. 2 only
  - c. 3 only
  - d. 1, 2 and 3
2. 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 I
  - c. Type II
  - d. Type III
3. Which one of the following is correct?  
If the open-loop transfer function has one pole in the right half of s-plane, the closed loop system will be stable if the Nyquist plot of GH
  - a. does not encircle the  $(-1 + j0)$  point
  - b. encircles the  $(-1 + j0)$  point once in the counter-clockwise direction
  - c. encircles the  $(-1 + j0)$  point once in the clockwise direction
  - d. encircles the origin once in the counter-clockwise direction
4. Which one of the following is correct?  
The value of the system gain at any point on a root locus can be obtained as a
  - a. product of lengths of vectors from the poles to that point
  - b. product of lengths of vectors from mm the zeroes to that point
  - c. ratio of product of lengths of vectors from poles to that point to the product of length of vectors from zeros to that point
  - d. product of lengths of vectors from all poles to zeros
5. Which one of the following is correct?  
The slope of the asymptotic Bode magnitude plot is integer multiple of
  - a.  $\pm 40$  db/decade
  - b.  $\pm 12$  db/decade
  - c.  $\pm 6$  db/decade
  - d.  $\pm 3$  db/decade
6. What is the range of K for Which the open loop transfer function  $G(s) = \frac{K}{s^2(s+a)}$  represents an unstable closed loop system?
  - a.  $K > 0$  only
  - b.  $K = 0$  only
  - c.  $K < 0$  only
  - d.  $-\infty < K < \infty$
7. The characteristic polynomial of a discrete time system is given by  $z^2 + z + a$ . For what value of 'a' is the system stable?
  - a. 2
  - b. 0.5
  - c. 1.5
  - d. -0.5
8. Isocline method is used for which one of the following?
  - a. Design of nonlinear system
  - b. Construction of root loci of nonlinear system
  - c. Construction of phase trajectories of nonlinear systems
  - d. Stability analysis of non-linear system

9. To detect the position error in a position control system, which of the following may be used?

1. Potentiometers
2. Synchros
3. LVDT

Select the correct answer using the code given below:

- a. 1 and 2 only
- b. 1 and 3 only
- c. 2 and 3 only
- d. 1, 2 and 3

10. Single step response of a typical stepper motor is quite oscillatory. Brakes are used to reduce or eliminate oscillations. Which one of the following statements is not correct regarding use of brakes?

- a. It provides memory or position information when motor is switched off.
- b. reduces deceleration time.
- c. It reduces length of motor load.
- d. It reduces pullout torque.

11. Synchro machines are used for which one of the following?

- a. Converting 1-phase supply to 3-phase supply
- b. Stepping up low frequency signal to high frequency
- c. Detection of positional error in a.c. servo system
- d. Detection of positional error in d.c. servo system

12. A, B, C and D represent the transmission parameters of a two-port network. When is the network reciprocal?

- a.  $AB - CD = 1$
- b.  $AD - BC = 1$
- c.  $AB - CD = 0$
- d.  $AD - BC = 0$

13. Match List I with List II and select the correct answer using the code given below the lists;

List-I

(Network parameter)

- A.  $h_{11}$
- B.  $h_{12}$

C.  $h_{22}$

D.  $h_{21}$

List-II

(Dimension)

1. Impedance
2. Admittance
3. Current ratio
4. Voltage ratio

Code:

	A	B	C	D
a.	2	4	1	3
b.	2	3	1	4
c.	1	3	2	4
d.	1	4	2	3

14. Which one of the following is correct? The impedance function

$$z(s) = \frac{(s^3 + 1)(s^2 + 3)}{s(s^2 + 2)}$$
 is an

- a. LC driving point function
- b. RL driving point function
- c. RC driving point function
- d. PLC driving point function

15. Which one of the following passive components has the most precise and accurate standard?

- a. Resistance
- b. Inductance
- c. Capacitance
- d. Conductance

16. Which of the following is/are primary standard(s) for voltage maintained by National Standards Laboratories?

1. Zener diode with 1.5 V output at 20°C
2. Nickel cadmium rechargeable cell of 1.25 V output at 20 °C

Select the correct answer using the code given below:

- a. 1 only
- b. 2 only
- c. Both 1 and 2
- d. Neither 1 nor 2

17. What is the prefix tera equivalent to?

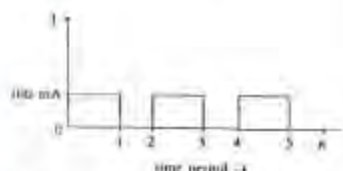
- a.  $10^3$
- b.  $10^6$



- c.  $10^8$
- d.  $10^{12}$

18. The errors introduced by an instrument fall in which category?
- a. Systematic errors
  - b. Random errors
  - c. Gross errors
  - d. Environmental errors

19.



A waveform shown in the figure above, is fed to a d.c. ammeter. What is the reading shown by the meter?

- a. Zero
  - b. 50 m-A
  - c. 75mA
  - d. 100 mA
20. Which one of the following instruments is commonly used to measure primary current of a transformer connected to mains?
- a. Electrostatic meter
  - b. Current transformer
  - c. Moving coil type meter
  - d. Moving iron meter
21. What is clamp-on ammeter used for?
- a. Low a.c. current
  - b. High a.c. current
  - c. Low d.c. current
  - d. High d.c. current
22. Which one of the following is used for the measurement of 3-phase power factor?
- a. Power factor meter
  - b. Crosse coil power factor meter
  - c. Phase-angle watt hour meter
  - d. Polarised-vane power factor meter
23. What is the 'swamping' resistance which is connected in series with the working coil of a voltmeter to drastically reduce the error in measurement caused due to variation in temperature, made of?
- a. Constantan

- b. Eureka
- c. Manganin
- d. Nichrome

24. How can a milli-ammeter be used as a voltmeter?
- a. By connecting a low resistance in parallel with the instrument
  - b. By connecting a high resistance in parallel with the instrument
  - c. By connecting a low resistance in series with the instrument
  - d. By connecting a high resistance in series with the instrument
25. The principle of Hall effect is made use of in the construction of which one of the following?
- a. Ammeter
  - b. Voltmeter
  - c. Gaussmeter
  - d. Galvanometer
26. What is the radiation resistance of a dipole antenna  $\lambda/20$  long approximately equal to?
- a.  $2 \Omega$
  - b.  $40 \Omega$
  - c.  $0.6 \Omega$
  - d.  $20 \Omega$
27. According to maximum power transfer theorem, when is the maximum power absorbed by one network from another network?
- a. The impedance of one of the networks is half that of the other
  - b. The impedance of one is the complex conjugate of the other
  - c. The impedance of one is equal to that of the other
  - d. Only the resistive parts of both are equal
28. Consider the following statements for transmission lines:
1. When a transmission line is terminated by its characteristic impedance the line will not have any reflected wave.
  2. For a finite line terminated by its characteristic impedance the velocity and current at all points on the line are exactly same.

3. For a lossless half wave transmission line the input impedance is not equal to load impedance.

Which of the statements given above are correct?

- a. 1 and 2 only
- b. 2 and 3 only
- c. 1 and 3 only
- d. 1, 2 and 3

29. Which of the following is a vector quantity?

- a. Standing wave ratio only
- b. Reflection coefficient only
- c. Gain
- d. Standing wave ratio and reflection coefficient

30. What causes electromagnetic wave polarization?

- a. Refraction
- b. Reflection
- c. Longitudinal nature of electromagnetic wave
- d. Transverse nature of electromagnetic wave

31. A plane wave traveling in air is incident on a conducting medium. Which one of the following is correct?

The magnetic field intensity

- a. becomes approximately half
- b. gets approximately doubled
- c. remains unchanged
- d. cannot be determined

32. Consider the following three equations:

$$1. \nabla \cdot \vec{E} = -\frac{\partial \bar{B}}{\partial t}$$

$$2. \nabla \cdot \vec{H} = \vec{J} + \frac{\partial \bar{D}}{\partial t}$$

$$3. \nabla \cdot \vec{B} = 0$$

Which of the above appear in Maxwell's equations?

- a. 1, 2 and 3
- b. 1 and 3 only
- c. 2 and 3 only
- d. 1 and 3 only

33. Which one of the following modes has the highest cut off wavelength in a rectangular wave guide?

- a.  $TE_{10}$
- b.  $TE_{01}$
- c.  $TM_{01}$
- d.  $TM_{11}$

34. A long straight wire carries a current  $I = 10$  A. At what distance is the magnetic field  $H = 1$   $AM^{-1}$ ?

- a. 1.19 m
- b. 1.39 m
- c. 1.59 m
- d. 1.79 m

35. The magnetic vector potential  $\vec{A}$  obeys which equations?

- 1.  $\vec{B} = \nabla \times \vec{A}$
- 2.  $\nabla^2 \vec{A} = -\mu_0 \vec{J}$
- 3.  $\vec{A} = \int \frac{\mu_0 I d\vec{l}}{4\pi R}$

Select the correct answer using the code given below:

- a. 1 and 2 only
- b. 2 and 3 only
- c. 1 and 3 only
- d. 1, 2 and 3

36. The force on a charge moving with velocity  $v$  under the influence of electric and magnetic fields is given by which one of the following?

- a.  $q(\vec{E} + \vec{B} \times \vec{v})$
- b.  $q(\vec{E} + \vec{v} \times \vec{H})$
- c.  $q(\vec{H} + \vec{v} \times \vec{E})$
- d.  $q(\vec{E} + \vec{v} \times \vec{B})$

37. Which one of the following is the correct statement?

Equi-potential lines and field lines

- a. are parallel
- b. are anti-parallel
- c. are orthogonal
- d. bear no definite relationship

38. Consider the following statements for an electrostatic field:



1. Its curl is zero
2. It is negative of gradient of scalar potential  $\phi$
3. It is conservative

Which of the statements given below are correct?

- a. 1 and 2 only
- b. 2 and 3 only
- c. 1 and 3 only
- d. 1, 2 and 3

39. The input-output relationship of a system is given by

$$r(t) = \frac{d^2 c(t)}{dt^2} + 3 \frac{dc(t)}{dt} + 2c(t)$$

where  $r(t)$  and  $c(t)$  are input and output respectively. The transfer function of the system is equal to

- a.  $\frac{1}{(s^2 + s + 2)}$
- b.  $\frac{1}{(s^2 + 3s + 2)}$
- c.  $\frac{2}{(s^2 + 3s + 2)}$
- d.  $\frac{1}{(s^2 + 5s + 3)}$

40. Consider the function:

$$F(s) = \frac{\omega}{s^2 + \omega^2}$$

where  $F(s)$  = Laplace transform of  $f(t)$ .

The final value of  $f(t)$  is equal to

- a. infinite
- b. zero
- c. finite constant
- d. a value in between  $-1$  and  $+1$

41. Given the Laplace transform of  $f(t) = F(s)$  the Laplace transform of  $[f(t)e^{-at}]$  is equal to:

- a.  $F(s + a)$
- b.  $\frac{F(s)}{(s + a)}$
- c.  $e^{-as}F(s)$
- d.  $e^{-as}F(s)$

42. The impulse response of a second-order under-damped system starting from rest is given by

$$c(t) = 125. e^{-0.4t} \sin 8t, t \geq 0.$$

The natural frequency and the damping factor of the system are respectively

- a. 10 and 0.6
- b. 10 and 0.8
- c. 8 and 0.6
- d. 8 and 0.8

43. Given a unity feedback system with

$$G(s) = \frac{K}{s(s+4)}$$

the value of  $K$  for damping ratio of 0.5 is:

- a. 1
- b. 4
- c. 16
- d. 64

44. For type 2 system, the steady-state error due to ramp input is equal to:

- a. zero
- b. finite constant
- c. infinite
- d. indeterminate

45. The type number of the control system with

$$G(s)H(s) = \frac{K(s+2)}{s(s^2 + 2s + 3)}$$

- a. one
- b. two
- c. three
- d. four

46. A discrete-time system is stable if all the poles of the Z-transfer function of the system lie

- a. outside the circle of unit radius on the Z-plane
- b. within a circle of unit radius on the Z-plane
- c. to the left of imaginary axis on the Z-plane
- d. to the right of imaginary axis on the Z-plane

47. The Nyquist plot of a system passes through  $(-1, j0)$  point in the  $G(j\omega)H(j\omega)$  plane, the phase-margin of the system is:

- a. infinite  
b. greater than zero but not infinite  
c. zero  
d. less than zero

48. If the poles of a system lie on the imaginary axis, the system will be:

- a. Stable  
b. Conditionally stable  
c. Marginally stable  
d. Unstable

49. The transfer function of a P-I controller is

- a.  $K_p + K_i s$   
b.  $K_p + (K/s)$   
c.  $(K_p/s) + K_i s$   
d.  $K_p s + (K_i/s)$

50. Given the matrix

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$$

the eigenvalues of A are

- a. -1, -2, -3  
b. -1, 2, -3  
c. 0, 0, -6  
d. -6, -11, -6

51. The state-variable description of a linear autonomous System is  $\dot{X} = AX$  where X is a two-dimensional state vector and A is a matrix given by  $A = \begin{bmatrix} 0 & 2 \\ 2 & 0 \end{bmatrix}$

The poles of the system are located at:

- a. -2 and +2  
b. -2j and +2j  
c. -2 and -2  
d. +2 and +2

52. The information contained in a signal is preserved in the sampled version if

- a.  $\omega_s = \omega_m$   
b.  $\omega_s = 0.5\omega_m$   
c.  $\omega_s = 0.1\omega_m$   
d.  $\omega_s = 2\omega_m$

(Where  $\omega_s$  is the sampling frequency and  $\omega_m$  is the maximum frequency contained in the signal.)

53. For a tachometer if  $\theta(t)$  is the rotor displacement,  $e(t)$  is the output voltage and  $K_t$  is the tachometer constant, then the transfer function is defined as

- a.  $K_t s^2$   
b.  $K_t s$   
c.  $K_t/s$   
d.  $K_t$

54. A tachometer is added to a servo-mechanism because

- a. It is easily adjustable  
b. It can adjust damping  
c. It converts velocity of the shaft to a proportional d.c. voltage  
d. It reduces steady-state error

55. Assertion (A): Ferrites are useful at very high frequencies.

Reason (R): Ferrites have high permeability and high resistivity.

- a. Both A and R are individually true and R is the correct explanation of A  
b. Both A and R are individually true but R is not the correct explanation of A  
c. A is true but R is false  
d. A is false but R is true

56. Assertion (A): A precision instrument is always accurate.

Reason (R): A precision instrument is one where the degree of reproducibility of the measurements is very good.

- a. Both A and R are individually true and R is the correct explanation of A  
b. Both A and R are individually true but R is not the correct explanation of A  
c. A is true but R is false  
d. A is false but R is true

57. Assertion (A): A PMMC instrument is used for reading both d.c. and a.c. signals.

Reason (R): The deflecting torque in a PMMC instrument is directly proportional to the current in the moving coil.

- a. Both A and R are individually true and R is the correct explanation of A



- b. Both A and R are individually true but R is not the correct explanation of A  
 c. A is true but R is false  
 d. A is false but R is true
58. Assertion (A): Piezoelectric transducers can be used for measurement of both static and dynamic phenomena.  
 Reason (R): Piezoelectric transducers have very good high frequency response.  
 a. Both A and R are individually true and R is the correct explanation of A  
 b. Both A and R are individually true but R is not the correct explanation of A  
 c. A is true but R is false  
 d. A is false but R is true
59. Assertion (A): Sampled-data system requires hold circuit.  
 Reason (R): Hold circuit converts the signal to analog form.  
 a. Both A and R are individually true and R is the correct explanation of A  
 b. Both A and R are individually true but R is not the correct explanation of A  
 c. A is true but R is false  
 d. A is false but R is true
60. Assertion (A): Capacitive transducers can be used for measurement of both static and dynamic phenomena.  
 Reason (R): capacitive transducers are extremely sensitive.  
 a. Both A and R are individually true and R is the correct explanation of A  
 b. Both A and R are individually true but R is not the correct explanation of A  
 c. A is true but R is false  
 d. A is false but R is true
61. Two coils are coupled in such a way that the mutual inductance between them is 16 mH. If the inductances of the coils are 20 mH and 80 mH respectively, the coefficient of coupling is:  
 a. 0.01  
 b. 0.4  
 c. 0.1  
 d. 0.0025
62. For a transmission line load matching over a range of frequencies, it is best to use a  
 a. Balun transformer  
 b. Single stub of adjustable position  
 c. Double stub  
 d. Broad band directional coupler
63. The capacitance of an insulated conducting sphere of radius R in vacuum is:  
 a.  $2\pi\epsilon_0 R$   
 b.  $4\pi\epsilon_0 R$   
 c.  $4\pi\epsilon_0 R^2$   
 d.  $4\pi\epsilon_0 / R$
64. Two materials having temperature coefficient of 0.004 and 0.004 respectively are joined in series. The overall temperature coefficient is approximately:  
 a. 0.08  
 b. 0.04  
 c. 0.001  
 d. 0.0001
65. A  $10 \mu F$  capacitor is fed from an a.c. voltage source containing a fundamental and a third harmonic of strength one-third of fundamental. The third harmonic current flowing through the capacitor expressed as percentage of the fundamental under steady-state condition will be:  
 a. 150%  
 b. 100%  
 c. 50%  
 d. 33%
66. In a two element series network, the voltage and current respectively are given as,  $v(t) = 50 \sin(314 t) + 50 \sin(942 t)$  V  
 $i(t) = 10 \sin(314 t + 60^\circ) + 8 \sin(942 t + 45^\circ)$  A, then the power factor of the network is approximately:  
 a. 0.9  
 b. 0.6  
 c. 0.3  
 d. 0.1
67. The network function,  $F(s) = \frac{(s+2)}{(s+1)(s+3)}$  represents an:  
 a. RL impedance only  
 b. RC impedance only  
 c. RL admittance and RC impedance

68. In a CRO astigmatism is:
- A source of generating fast electrons
  - A medium for absorbing secondary emission electrons
  - An additional focus control
  - A time-delay control in the vertical deflection system

69. In an electrometer, the movable plate is 11 cm in diameter. When 12 kV is applied between the movable plate and the fixed plate, the force is 0.006 N. The change in capacitance for 1.5 mm movement of the movable plate is:

- $0.44 \times 10^{-12} \text{ F}$
- $0.37 \times 10^{-6} \text{ F}$
- $0.125 \times 10^{-12} \text{ F}$
- $12.5 \times 10^{-12} \text{ F}$

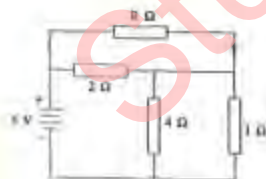
70. Continuous recording of a signal is not possible in a

- Magnetic tape recorder
- Strip chart recorder
- X Y recorder
- Galvanometric recorder

71. The successive approximation A/D output for a 4-bit converter to a 8.217 Volt input (if the reference is 5 V) will be:

- 1101
- 0110
- 1010
- 1001

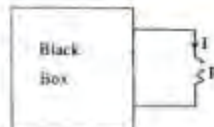
72.



In the circuit shown above, when is the power absorbed by the  $1\Omega$  resistor maximum?

- $R = 0$
- $R = 2\Omega$
- $R = 4\Omega$
- $R = \infty$

73.



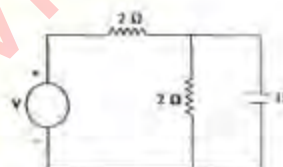
For circuit shown above, the black box contains resistors and independent sources only. The current  $I$  is 3 A and 1.5 A for  $R = 0$  and  $2\Omega$ , respectively. For  $R = 1\Omega$ , what is the current  $I$ ?

- 1A
- 2A
- 3A
- 4A

74. What is the Laplace transform of a function  $\delta(t-2)$ ?

- 2
- 0
- $e^{-2s}$
- $2s$

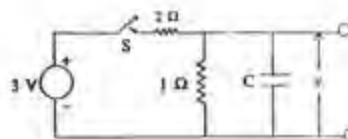
75.



What is the time constant of the circuit above?

- 0.5 s
- 1s
- 2s
- 4s

76.



In the network shown above, it is given that  $v = 1 \text{ V}$  and  $\frac{dv}{dt} = -10 \text{ V/s}$  at a time  $t$ , where  $t$  is the time after the switch  $S$  is closed. What is the value of  $C$ ?

- 0.05 F
- 0.1 F
- 0.15 F
- 0.2 F



77. A series R-L circuit is to be connected to an a.c. source  $v(t) = V_m \sin(\omega t + \phi)$  volt. Which one of the following is correct?

The transient current will be absent if the source is connected at a time  $t_0$  such that

- $\omega t_0 = 0$
- $\omega t_0 = \frac{\pi}{2}$
- $\omega t_0 = \tan^{-1} \frac{\omega L}{R}$
- $\omega t_0$  has any arbitrary value

78. A series R-L-C circuit is switched on to a step voltage  $V$  at  $t = 0$ . What are the initial and final values of the current in the circuit, respectively?

- $V/R, V/R$
- Zero, Infinity
- Zero, Zero
- Zero,  $V/R$

79.



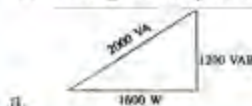
What does the function  $f(t)$  plotted in the above figure represent?

- Unit step function
- Unit impulse function
- Unit ramp function
- Unit Parabolic function

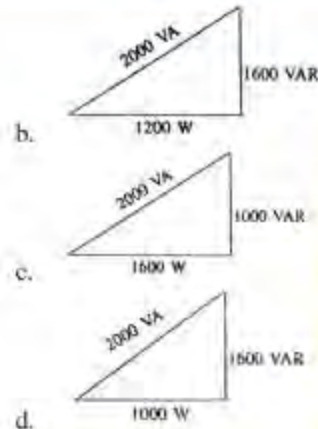
80. A lossy capacitor is represented by an ideal capacitor  $C$  with a high resistance  $R$  in parallel. What is the  $Q$  of the circuit at frequency  $\omega$ ?

- $\omega CR$
- $1/(\omega CR)$
- $\omega C/R$
- $R/(\omega C)$

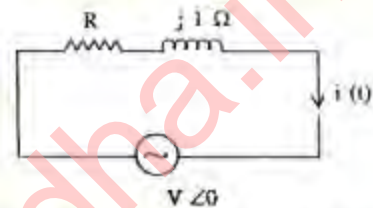
81. A voltage of  $V = 100 \angle 30^\circ$  is applied to an impedance  $Z = 3 + j4$ . Which one of the following is the power triangle?



82.



82.



For the network shown above, if the current  $i(t) = \sqrt{2} \sin(\omega t - 30^\circ)$ , then what is the value of  $R$ ?

- $1\Omega$
- $3\Omega$
- $\sqrt{3}\Omega$
- $3\sqrt{3}\Omega$

83. A control system has a transfer function  $\frac{K(1+0.5s)(1+2s+5s^2)}{s^2(1+s)(1+5s+10s^2)(1+100s+500s^2)}$ . What is the type of the system?

- 0
- I
- II
- III

84. Which one of the following is correct? Final value theorem is not applicable for the system when the input is:

- Step
- Ramp
- Parabolic
- Exponential

85. Which one of the following statements regarding steady state errors in control system is not correct?

- Steady state error analysis relies on the use of initial value theorem.

- b. Steady state error is a measure of system accuracy when a specific type of input is applied to a control system.
- c. The error constants do not give information regarding steady state error when inputs are other than step, ramp and parabolic.
- d. Steady state error does not provide information on how the error varies with time.

86. Which one of the following is the most likely reason for large overshoot in a control system?

- a. High gain in a system
- b. Presence of dead time delay in a system
- c. High positive correcting torque
- d. High retarding torque

87. In the time domain analysis of feedback control systems which one pair of the following is not correctly matched?

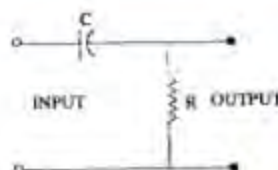
- a. Under damped:- Minimizes the effect of nonlinearities
- b. Dominant Poles:- Transients die out more rapidly
- c. Far away poles to the left half of s-plane:- Transients die out more rapidly
- d. A pole near to the left of dominant complex poles and near a zero:- Magnitude of transient is small

88. Which of the following transfer functions is/are minimum phase transfer function(s)?

1.  $\frac{1}{(s-1)}$
2.  $\frac{(s-1)}{(s+3)(s+4)}$
3.  $\frac{(s+2)}{(s+3)(s-4)}$

Select the correct answer using the code given below:

- a. 1 and 3
- b. 1 only
- c. 2 and 3
- d. None



The transfer function for the diagram shown above is given by which one of the following?

- a.  $1/(1+sRC)$
- b.  $sRC/(1+sRC)$
- c.  $sRC/(1-sRC)$
- d.  $1+sRC$

90. The instrumentation amplifiers are used principally to amplify signals from which of the following?

- a. Transducers
- b. Active fillers
- c. Choppers
- d. D/A converters

91. Which of the following primary detector type transducers are employed for displacement measurement?

1. Thermistor
2. diaphragm
3. Thermocouple
4. Pivot Torque

Select the correct answer using the code given below:

- a. 1 and 2
- b. 2 and 4
- c. 3 and 4
- d. 1 and 4

92. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I

- A. Variable capacitance device
- B. Orifice meter
- C. Thermistors

List-II

1. Flow Measurement
2. Temperature measurement
3. Pressure transducer
4. Force and torque measurement

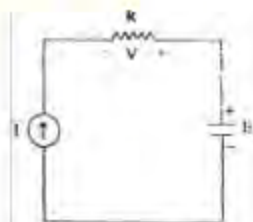
Code:



- a. A3, B1, C2  
b. A2, B4, C3  
c. A2, B1, C3  
d. A3, B4, C2
93. Which displacement transducer is used for accurate and linear measurement?  
a. LVDT  
b. Strain gauge  
c. Potentiometer  
d. Capacitive displacement transducer
94. Which amplifier is used in an electronic multimeter?  
a. Power amplifier  
b. Buffer amplifier  
c. Differential amplifier  
d. Wideband amplifier
95. For low resistance (from few micro ohms to one ohm) measurement, which bridge is used?  
a. Wheatstone bridge  
b. Kelvin bridge  
c. Guarded Wheatstone bridge  
d. Maxwell bridge
96. Which bridge is used to determine frequency?  
a. Anderson bridge  
b. De Sauty bridge  
c. Wien bridge  
d. Campbell bridge
97. The dielectric loss of a capacitor can be measured by which one of the following?  
a. Wien bridge  
b. Owen bridge  
c. Schering bridge  
d. Maxwell bridge
98. Inductance is measured by which one of the following?  
a. Wien bridge  
b. Schering bridge  
c. Maxwell bridge  
d. Owen bridge
99. Schering bridge can be used to measure which one of the following?  
a. Q of a coil  
b. Inductance and its Q-value

- c. Very small resistance  
d. Capacitance and its power factor

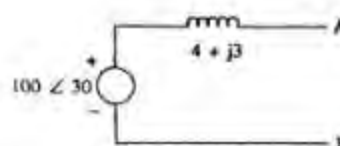
100. What is a differential transformer?  
a. Constant pressure transducer  
b. Variable pressure transducer  
c. Constant displacement transducer  
d. Variable inductance transducer
101. The imperfect capacitance which is shunted by a resistance can be measured by which one of the following?  
a. Carey Foster bridge  
b. Owen bridge  
c. Schering bridge  
d. Wien bridge
102. Due to which one of the following reasons bearings of PMMC instrument are made of Jewel?  
a. To avoid wear and tear of the moving system  
b. To provide a small support  
c. It can be easily replaced  
d. To make the system robust



For the circuit shown, what is the voltage V if the source voltage is reduced by 50%?

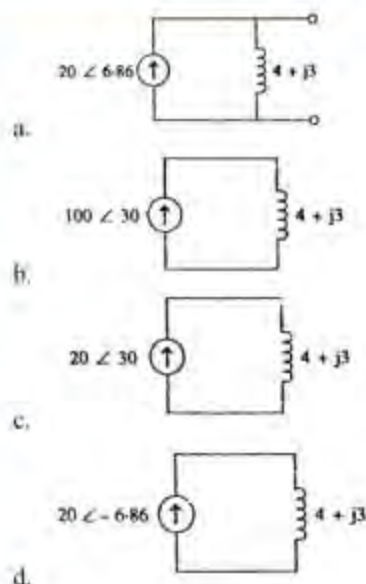
- a.  $IR + E$   
b.  $E - IR$   
c.  $2IR - (E/2)$   
d.  $(E/2) - IR$

104

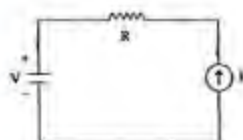


Voltage source is represented as shown in the figure given above.

What is the equivalent current source?



105.



For the network shown in the figure, what is the voltage across the current source I?

- $V - RI$
- $V + RI$
- Zero
- $RI - V$

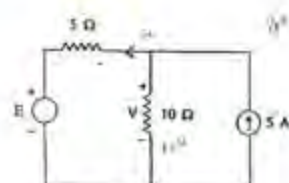
106.



What is the value of the current I in the circuit shown above?

- 20 A
- 25 A
- 30 A
- 36 A

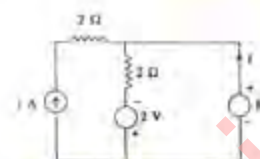
107.



If the voltage V across  $10 \Omega$  resistance is 10 V, what is the voltage E of the voltage source in the circuit shown above?

- 50 V
- 10 V
- +10 V
- +50 V

108.



In the circuit shown above, what is the value of the current I?

- 1 A
- 2 A
- 3 A
- 4 A

109. Why is the core of the transformer built up of lamination?

- To reduce eddy current loss
- For convenience of fabrication
- No specific advantage
- For increasing the permeability

110. Materials which lack permanent magnetic dipoles are known as:

- Paramagnetic
- Diamagnetic
- Ferromagnetic
- Ferrimagnetic

111. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I (Material)

- Silicon steel
- Ferrites
- Alnico

List-II (Application)

- High frequency transformers
- Permanent magnets
- Current transformers
- Power transformers

Code:



	A	B	C
a.	1	2	4
b.	4	3	2
c.	3	4	1
d.	4	1	2

112. Which one of the following is the correct statement?

The orientational polarizability in a polyatomic gas is proportional to

- temperature  $T$
- $1/T$
- $T^2$
- independent of  $T$

113. In the case of a dielectric subjected to an alternating electric field of frequency  $f$ , the dielectric loss is proportional to which one of the following?

- $f$
- $f^2$
- $1/f$
- $1/f^2$

114. The electronic Polaris ability of an inert gas atom is proportional to which one of the following?

- $R$
- $R^2$
- $R^3$
- $R^4$

(Where  $R$  is the radius of the atom)

115. Fermi level in a p-type semiconductor lies close to which one of the following?

- The top of the valence band
- The bottom of the valence band
- The top of the conduction band
- The bottom of the conduction band

116. Consider the following statements about semiconductors?

- The forbidden energy gap in semiconductors lies between the valence band and conduction band.
- The forbidden energy gap in germanium at 0 K is about 0.72 eV.
- Semiconductors have negative temperature coefficient of resistivity.

Which of the statements given above are correct?

- 1, 2 and 3
- 1 and 2 only
- 2 and 3 only
- 1 and 3 only

117. Which one of the following is the correct statement?

When a p-n junction is reverse-biased, then

- Holes and electrons move away from the junction
- Depletion region decreases
- Barrier breaks down
- Minority carriers are not affected

118. Consider the following statements about p-n junctions:

- p-n junction behaves as a capacitor when forward biased.
- p-n junction has p and n type semiconductors with depletion layer in between.
- p-n junction has a wider depletion layer as compared to a Zener diode.

Which of the statements given above are correct?

- 1, 2 and 3
- 1 and 2 only
- 2 and 3 only
- 1 and 3 only

119. Which one of the following is the correct statement?

The type of majority charge carriers in a semiconductor can be found by

- Hall effect
- Piezoelectric effect
- Photoelectric effect
- Meissner effect

120. Which one of the following is the correct statement?

During the process of magnetization of ferromagnetic material, the magnetic domains

- Only expand
- Rotate first and then expand
- Expand first and then rotate
- Neither rotate nor expand