1. The capacity of a cell (Battery) is measured in

   (A) Amperes
   (B) Ampere - hours
   (C) Watts
   (D) Watt - hours
   (E) Answer not known

2. Select the incorrect statement about the Fuel cells.

   (A) Fuel Cells have few moving parts and hence less maintenance
   (B) The emission levels of fuel cells are low
   (C) Fuel cells are modular
   (D) The noise levels of fuel cells are high
   (E) Answer not known

3. For proper operation of a fuel cell, the operating point is set in ————— of the VI characteristics.

   (A) high load region
   (B) low load region
   (C) middle, near flat region
   (D) any region, irrespective of load
   (E) Answer not known

4. Vent plug in a battery is used for

   (A) Cooling the battery
   (B) Preventing corrosion
   (C) To passout gases produced during chemical reaction
   (D) To breath oxygen from the atmosphere
   (E) Answer not known

5. DC to DC convertor as shown in fig. a battery of 25V is connected and the input current is 4A. At the output side, a voltmeter shows 50V across the load end the output current is 1.8A. Find the power lost in the converter due to losses.
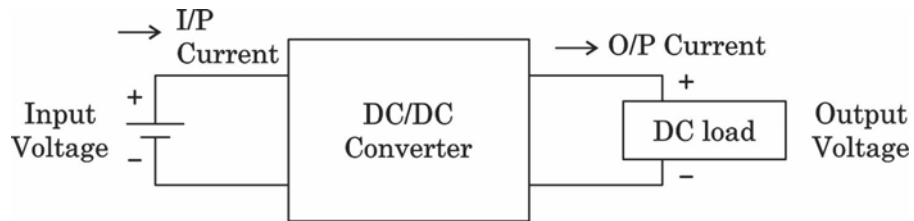
(A) 25 W   (B) 10 W

(C) 20 W   (D) 15 W

(E) Answer not known

6. Variable speed wind Turbines are designed to Achieve

(A) Minimum Aero Dynamic Efficiency

(B) Maximum Torque

(C) Maximum Aerodynamic Efficiency

(D) Minimum Torque

(E) Answer not known

7. Wind Turbines with a high number of blades have

(A) Low tip speed ratio

(B) High starting torque

(C) Low tip speed ratio but a high starting torque

(D) Neither (A) nor (B)

(E) Answer not known

8.	Wind Speed is measure by

	(A)	Odometers					(B)	Anemometers

	(C)	Ammeter					(D)	Weather Vanes

	(E)	Answer not known

9.	Power in wind is

	(A)	Directly proportional to cube of wind velocity

	(B)	Inversely proportional to cube of wind velocity

	(C)	Directly proportional to square of wind velocity

	(D)	Directly proportional to wind velocity

	(E)	Answer not known

10.	A micro Hydro scheme has following data : Gross Power = 15 kW, Head = 25 meters Water discharge rate = 0.1 m³/s.

	Assume Density of fresh water = 996 kg/m² g = 9.81 m/s². The overall efficiency of micro hydro scheme is

	(A)	0.55						(B)	0.51

	(C)	0.70						(D)	0.61

	(E)	Answer not known

11.	The wind speed (14 km/h or 4 m/s) at which the turbine output begins is called

	(A)	Rated Speed				(B)	Cut-Out speed

	(C)	Cut-in Speed				(D)	Average Speed

	(E)	Answer not known

12. The following data are given for a wind turbine: Blade length = 52 m; wind velocity = 12 m/sec; Air density = 1.23 kg/m³; Power coefficient = 0.4. The power generated by the wind turbine is

   (A) 3.5 MW   (B) 6.3 MW
   (C) 8.8 MW   (D) 10 MW
   (E) Answer not known

13. A solar cell is an electrical device that converts the energy of light directly into electricity by the

   (A) Photovoltaic effect   (B) Chemical effect
   (C) Atmospheric effect   (D) Physical effect
   (E) Answer not known

14. A typical open circuit voltage of a solar cell is

   (A) 12 V   (B) 6 V
   (C) 3 V   (D) 0.5 V
   (E) Answer not known

15. The output of solar cell is of the order of

   (A) 1 W   (B) 5 W
   (C) 10 W   (D) 20 W
   (E) Answer not known

16. A solar PV module having total area of 1.646 m², and gives a current of 8.08 A and voltage of 29.72%. The short circuit current of the module is 8.48A and Open Circuit Voltage is 37.34 V. Find the fill factor of the Solar Cell.

   (A) 75.83% (B) 70.63%

   (C) 83.45% (D) 55.63%

   (E) Answer not known

17. Energy Conservation means

   (A) Reducing energy consumption by reducing the output

   (B) Increasing the output by consuming more energy

   (C) Reducing the energy consumption without compromising the quantity or quality of production

   (D) Reducing the energy consumption by reducing the production

   (E) Answer not known

18. In Photo Voltaic system arrange the following from smallest to the largest unit.

   (i) Module

   (ii) Array

   (iii) Solar Cell

   (iv) Array field

   Choose the correct answer from the following options given below:

   (A) (ii), (iv), (i), (iii)

   (B) (ii), (iv), (iii), (i)

   (C) (iii), (ii), (iv), (i)

   (D) (iii), (i), (ii), (iv)

   (E) Answer not known

19. Solar Radiation received on the Earth's surface without change in direction is called

    (A) Total Radiation   (B) Direct Beam Radiation
    (C) Diffuse Radiation   (D) Atmosphere Radiation
    (E) Answer not known

20. At solar noon, the hour angle is

    (A) Zero degrees   (B) -90°
    (C) $+90^\circ$ (D) $+180^\circ$
    (E) Answer not known

21. Delay Flipflop is

    (A) JK   (B) D
    (C) T   (D) SR
    (E) Answer not known

22. Simplify the following expression using Boolean algebra.

    $A\overline{B}C(BD+CDE)+A\overline{C}$

    (A) $A(\overline{B}DE+\overline{C})$ (B) $A(B\overline{D}E+C)$
    (C) $A(B\overline{D}\,\overline{E}+\overline{C})$ (D) $A(\overline{B}DE+C)$
    (E) Answer not known

23. $Y(A,B,C,D)=\sum m(0, 2, 5, 7, 8, 10, 13, 15)$

    for the above function the sum of products expression is

    (A) $A \oplus B$ (B) $B \oplus D$
    (C) $B \odot D$ (D) $A \odot B$
    (E) Answer not known

24. How many full adders are required to construct an M bit parallel adder?

(A) $m/2$ (B) $m-1$

(C) m (D) $m+1$

(E) Answer not known

25. A 4 Bit modulo-16 Ripple counter uses J-K flip flop. If the propagation delay of each flip flop is 50 Nano-seconds, the maximum clock frequency that can be used is equal to

(A) 20 MHz (B) 10 MHz

(C) 8 MHz (D) 5 MHz

(E) Answer not known

26. Which of the following is <u>not true</u> about logic gates?

(A) It is a digital circuit that has one or more inputs but only one output

(B) It follows a logical relationship between input and output signals

(C) There is no logical relationship between input and output signals

(D) It is an electronic device that implements a boolean function

(E) Answer not known

27. The output of a logic gate is 1 when all its inputs are at logic 0 the gate is

(A) NOR Gate (B) AND Gate

(C) OR Gate (D) XOR Gate

(E) Answer not known

28. A colpitts oscillator uses

   (A) Tapped coil   (B) Inductive feedback
   (C) Tapped capacitance   (D) No tuned LC circuit
   (E) Answer not known

29. Calculate the duty cycle of the output of an astable multivibrator using timer 555. Assume $R_1 = 25\,k\Omega$, $R_2 = 50\,k\Omega$, $C = 0.1\,\mu F$
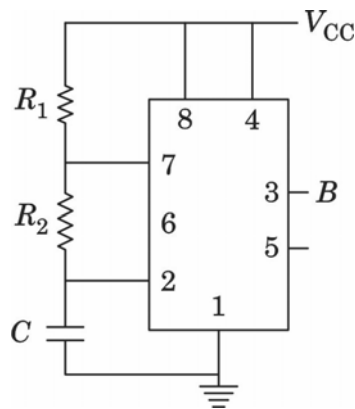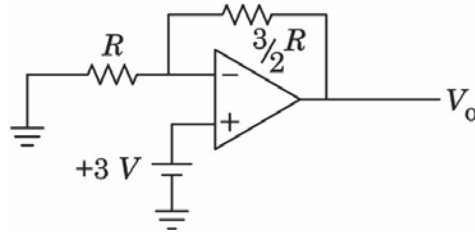

   (A) 60%   (B) 75%
   (C) 50%   (D) 100%
   (E) Answer not known

30. In a two stage op-amp amplifier, if the input voltage of the first stage is 8 V and output of the second stage is 40 V, then the overall gain of the amplifier is

   (A) 320   (B) 25
   (C) 5   (D) 32
   (E) Answer not known

31. For the given ideal Op-Amp the output voltage is

(A) 15 V (B) 9 V

(C) 4.5 V (D) 7.5 V

(E) Answer not known

32. The class B push-pull amplifier with $R_L = 16 \, \Omega$ and $V_{CC} = 12 \, V$. If the input AC signal produces a peak voltage output of $V_m = 6 \, V$ across the load resistor R_L, the input power will be

(A) 2.865 watts (B) 6 watts

(C) 7.125 watts (D) 28 watts

(E) Answer not known

33. In operational amplifier the Common Mode Rejection Ratio (CMRR) is the ratio of

(A) Differential gain A_D and common mode gain A_{CM}

(B) Differential gain A_D and common mode voltage V_{CM}

(C) Common mode gain A_{CM} and differential voltage V_D

(D) Common mode gain A_{CM} and common mode voltage V_{CM}

(E) Answer not known

34. Which one of the following is not an application of precision diode?

   (A) Rectifier   (B) Clipper
   (C) Schmitt Trigger   (D) Clamper
   (E) Answer not known

35. In Op-amp $\mu A\,741$, the μA represents the identifying initials used by the manufacturer

   (A) Motorola   (B) Fair child
   (C) National semiconductor   (D) Texas instruments
   (E) Answer not known

36. A transistor has collector current of 840 μA and $\beta = 105$. The value of base current is

   (A) 8 μA (B) 0.8 μA
   (C) 8 $m A$ (D) 0.8 $m A$
   (E) Answer not known

37. In a bridge rectifier circuit, the peak voltage is 5 V and diode cut voltage is 0.7 V. The peak inverse voltage on the diode is

   (A) 4.3 V   (B) 3.6 V
   (C) 9.3 V   (D) 8.6 V
   (E) Answer not known

38. Choose the right matches:

    (1) Lower input current noise   –   Bipolar

    (2) Lower input voltage noise   –   CMOS

    (3) Higher voltage gain   –   CMOS

    (4) High CMRR   –   Bipolar

    (A) (2) and (3) are correct   (B) (3) and (4) are correct

    (C) (1) and (2) are correct   (D) (1) and (3) are correct

    (E) Answer not known

39. The number of depletion layers in a NPN transistor is

    (A) Three   (B) Two

    (C) One   (D) Four

    (E) Answer not known

40. In a N-P-N transistor, the leakage current is due to

    (A) Flow of minority carriers from collector to emitter

    (B) Flow of holes from base to emitter

    (C) Flow of electrons from collector to base

    (D) Flow of holes from collector to base

    (E) Answer not known

41. Find the step angle of a variable reluctance stepper motor with 12 teeth in the stator and 8 rotor teeth

    (A) 15°/step   (B) 4°/step

    (C) 24°/step   (D) 20°/step

    (E) Answer not known

42. The maximum output torque of a permanent magnet synchronous motors is

(A) 150 percent of the rated torque

(B) 100 percent of the rated torque

(C) 50 percent of the rated torque

(D) 25 percent of the rated torque

(E) Answer not known

43. The short pitch angle (electrical) to eliminate 5th harmonics in phase voltage of an alternator is

(A) 5° (B) 18°

(C) 36° (D) 72°

(E) Answer not known

44. If the input to the prime mover of an alternator is kept constant and the excitation is increased, the power factor is

(A) Leading (B) Lagging

(C) Not changing (D) Unity

(E) Answer not known

45. During hunting of synchronous motor

(A) Negative phase sequence currents are generated

(B) Harmonics are developed in the armature circuit

(C) Damper bar develops torque

(D) Field excitation increases
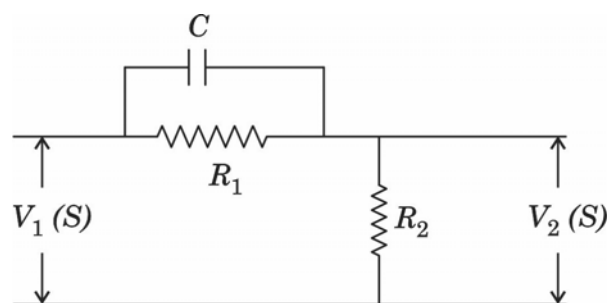
(E) Answer not known

46. A 4 pole, 3 phase 50 Hz, star connected alternator has 60 slots, with 4 conductors per slot. Coils are short pitched by 3 slots. If the phase spread is 60°, find the line voltage induced for a flux per pole of 0.943 WB distributed sinusoidally in space. All the turns per phase are in series,

   (A) 13185 V (B) 15000 V

   (C) 440 V (D) 1250 V

   (E) Answer not known

47. A 4 pole, 50 Hz single phase induction motor has a slip of 5%, the speed of the motor will be

   (A) 1500 r.p.m. (B) 1425 r.p.m.

   (C) 1200 r.p.m. (D) 1000 r.p.m.

   (E) Answer not known

48. A 400 V, 10 KW, 4 Pole, 50 HZ Y connected induction motor has full load slip of 5%. The output torque of the machine at full load is

   (A) 10 Nm (B) 77 Nm

   (C) 123 Nm (D) 67.05 Nm

   (E) Answer not known

49. A 500 KVA transformer has constant losses of 500 W and copper losses at full load are 2000 W. Then at what load, is the efficiency maximum?

   (A) 250 KVA (B) 500 KVA

   (C) 1000 KVA (D) 125 KVA

   (E) Answer not known

50. The main purpose of performing open-circuit test on a transformer is to measure its

(A) Cu Loss   (B) Core loss

(C) Total loss   (D) Insulation resistance

(E) Answer not known

51. When the rotor of a 3 phase induction motor is blocked, the slip is?

(A) Zero   (B) 0.5

(C) 0.1   (D) 1

(E) Answer not known

52. The saving in Cu achieved by converting a 2–winding transformer into an auto transformer is determined by

(A) Size of transformer core

(B) Load on the secondary

(C) Voltage transformation ratio

(D) Magnetic quality of core material

(E) Answer not known

53. A 100 KVA, 1100/400 V, 50 Hz 1ϕ transformer has 100 turns on the secondary winding. The number of turns in its primary will be

(A) 550   (B) 275

(C) 2750   (D) 5500

(E) Answer not known

54. The relation between synchronous speed, stator supply frequency and stator number of poles of a 3ϕ IM is given by

(A) $Ns = \dfrac{P}{120 f}$

(B) $f = \dfrac{120 \, Ns}{P}$

(C) $f = \dfrac{P \, Ns}{120}$

(D) $Ns = \dfrac{120 \, P}{f}$

(E) Answer not known

55. The DC motor which can provide zero speed regulation at full load without any controller is

(A) Cumulative compound

(B) Differential compound

(C) Series

(D) Shunt

(E) Answer not known

56. The direction of rotation of a DC compound motor can be reversed by interchanging ——————— connections.

(A) Armature

(B) Series field

(C) Shunt field

(D) Armature and Series field both

(E) Answer not known

57. To overcome the problems arising from the circulating current flow through the brush contacts in the lap wound armatures, ——————— are used.

(A) Dampers

(B) High resistance copper conductors

(C) Interpoles

(D) Equaliser rings

(E) Answer not known

58. The current drawn by a 120 V dc motor of armature resistance 0.5 Ω and back emf 110 V is

(A)   10 A   (B) 20 A
(C)   5 A   (D) 2 A
(E)   Answer not known

59. The critical resistance of the dc generator is the resistance of

(A)   Armature winding   (B) Field winding
(C)   Load   (D) Brushes
(E)   Answer not known

60. The number of parallel paths in the armature winding of a four pole wave connected DC machine having 22 coil side is

(A)   04   (B) 02
(C)   22   (D) 01
(E)   Answer not known

61. Fig below shows a compensating network

The above network is called

(A)   Phase lag network   (B) Phase lead – lag network
(C)   Phase lead network   (D) Phase correcting network
(E)   Answer not known

62. A phase lead compensation network

   (A) Decreases the system bandwidth
   (B) Speeds up the dynamic response
   (C) Is applied when error constants are specified
   (D) Reduces the steady – state error
   (E) Answer not known

63. Consider the fourth – order system with the characteristic equation

   $S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$

   Determine the state of the system

   (A) Stable   (B) Unstable
   (C) Quasi – stable   (D) Indeterminate
   (E) Answer not known

64. The main difficulty in using the array method of Routh–Hurwitz stability criterion is that

   (A) It is difficult to compute various entries of the table
   (B) When one of the pivoting elements becomes zero, it has to be assumed to be a small number
   (C) It is not very accurate
   (D) It is not predicting the system stability
   (E) Answer not known

65. In Nyquist plot, encirclement of origin in a counter clock wise direction is given by

P = Number of Poles, N = Number of Zeros

(A)   P + Z
(B) P + 2Z
(C)   2P + Z
(D) P – Z
(E)   Answer not known

66. If the poles of the system lie on the right half of S plane, the system will be

(A)   Stable
(B) Conditionally stable
(C)   Marginally stable
(D) Unstable
(E)   Answer not known

67. Characteristics equation for a second order system is
$a_2 S^2 + a_1 S + a_0 = 0$. The Routh array can be represented as

(A)
$$\begin{array}{c|cc} S^2 & a_2 & a_0 \\ S & a_1 & 0 \\ S^0 & a_0 & 0 \end{array}$$

(B)
$$\begin{array}{c|cc} S^2 & a_2 & a_0 \\ S & a_1 & 0 \\ S^0 & 0 & 0 \end{array}$$

(C)
$$\begin{array}{c|cc} S^2 & a_2 & a_0 \\ S & a_1 & 0 \\ S^0 & 0 & a_0 \end{array}$$

(D)
$$\begin{array}{c|cc} S^2 & a_0 & a_2 \\ S & 0 & a_1 \\ S^0 & 0 & a_0 \end{array}$$

(E)   Answer not known

68. A unity feedback system has $G(S) = \dfrac{80}{S(S+40)}$. The steady state error to unit ramp input will be

(A) 2.5
(B) 0.5
(C) 1.5
(D) 4
(E) Answer not known

69. Corner frequency of the factor $\dfrac{1}{1+j2w}$ is

(A) 0.4
(B) 0.2
(C) 0.5
(D) 1
(E) Answer not known

70. The open loop transfer function of a feedback system is

$$G(S)H(S) = \dfrac{K}{S(S+4)(S^2+4S+20)}$$

Find the centroid of the given system.

(A) –2
(B) –3
(C) –4
(D) –1
(E) Answer not known

71. The Laplace transform of a error $e(t)$ if a system is $\dfrac{S(S+3)}{S(S+10)}$. The steady state error of the system is

(A) 3.6
(B) 1.8
(C) 2
(D) 2.4
(E) Answer not known

72. The transfer function $\dfrac{V_0(S)}{V_i(S)}$ of the operation amplifier circuit is
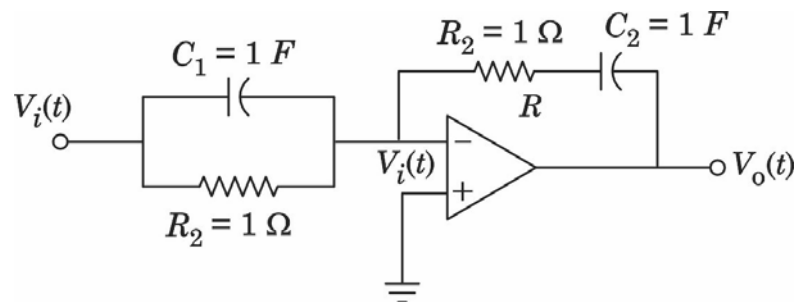
(A) $\dfrac{(S+1)^2}{S}$

(B) $-\dfrac{(S+1)^2}{S}$

(C) $-\dfrac{S+1}{S}$

(D) $\dfrac{1}{S}$

(E) Answer not known

73. The transfer function of a system is given as $\dfrac{25}{S^2+2S+25}$. The system is

(A) A critically damped system
(B) An unstable system
(C) An over damped system
(D) An under damped system
(E) Answer not known

74. The inverted pendulum is called open loop unstable because

(A) The pendulum is unstable without applying any input
(B) The input and output are not compared with each other and it is always unstable
(C) The system does not stabilize in spite of the input
(D) Torque on the pendulum
(E) Answer not known

75. Delay time is the time required for the response to reach —————— of final value in first attempt.

(A) 25% (B) 50%

(C) 75% (D) 90%

(E) Answer not known

76. The transfer function of a linear control system is given by $G(S)=\dfrac{100(S+15)}{S(S+4)(S+10)}$. In its bode diagram, the value of gain for $w=0.1$ rad/sec is

(A) 20 dB (B) 40 dB

(C) 60 dB (D) 80 dB

(E) Answer not known

77. Choose the right matches of the transfer function and systems

(1) Gain limited integrator $\quad-\quad -\dfrac{1}{RCs}$

(2) Summing amplifier $\quad-\quad RCs$

(3) Bandwidth limited differenciator $\quad-\quad -RCs$

(4) Non inverting amplifier $\quad-\quad \dfrac{1}{RCs}$

(A) (1) and (3) are correct (B) (1) and (2) are correct

(C) (2) and (3) are correct (D) (3) and (4) are correct

(E) Answer not known

78. A unity feedback system having $G(S) = \dfrac{16}{S(S+8)}$ is _____ system.

(A) Critically damped   (B) Over damped

(C) Under damped   (D) Undamped

(E) Answer not known

79. Choose the incorrect force-current analogy of the following

(1) Displacement and inductance

(2) Velocity and voltage

(3) Mass and capacitance

(A) (1) only   (B) (1) and (2) only

(C) (3) only   (D) (2) and (3) only

(E) Answer not known

80. Reduce the block diagram of given fig, to the basic feedback loop and determine its $G(S)$ and $H(S)$. Find the transfer function $C(S)/R(S)$
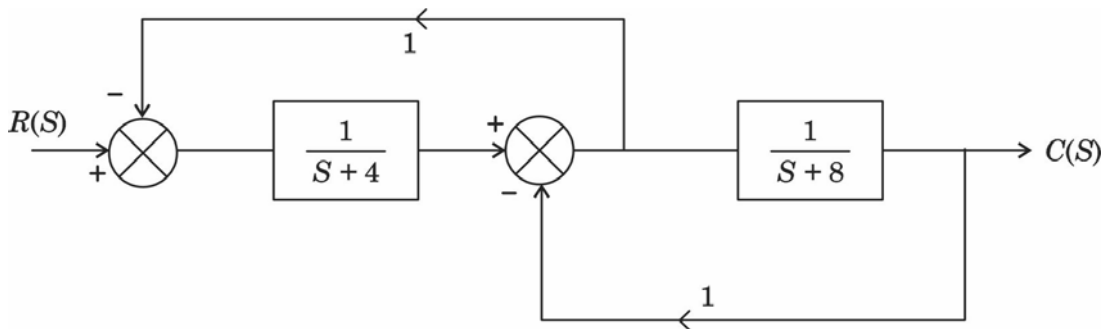
(A) $1/\left(S^2 + 12S + 44\right)$ (B) $1/\left(S^2 + 12S + 22\right)$

(C) $1/\left(S^2 + 14S + 22\right)$ (D) $1/\left(S^2 + 14S + 44\right)$

(E) Answer not known

81. The threshold of an instrument is normally defined

    (A) As the smallest measurable input change (non-zero value) which can be detected
    (B) As the smallest measurable input which can be detected
    (C) In terms of linearity of scale
    (D) As a function of drift
    (E) Answer not known

82. Identify correct relationship for the following equation

    $$\overline{\hspace{3cm}} = I$$

    where $I = $ Current, $J = $ Current density vector $\hat{n} = $ normal component of J $A = $ Area.

    (A) $\oint_{l} J^2 \cdot dI$

    (B) $\iint_{A} J \cdot \hat{n} \, dA$

    (C) $\iint_{A} J^2 \cdot dA$

    (D) $\iint_{A} \frac{J}{\hat{n}} dA$

    (E) Answer not known

83. The following equation is given by ——————— law.

$$dH = \frac{I \cdot dL \cdot \sin\theta}{4\pi r^2}$$

I = Current

H = Magnetic field
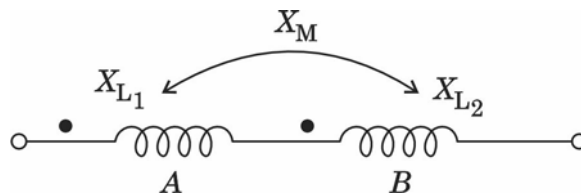
θ = Angle

dL = Short Length wire

Area = $4\pi r^2$

(A) Ampere's   (B) Biot - Savart

(C) Faraday's   (D) Gauss

(E) Answer not known

84. The equivalent inductance of two coils A and B connected as in the given figure is given by

(A) $X_{L1} + X_{L2} - 2X_M$ (B) $X_{L1} + X_{L2} + X_M$

(C) $X_{L1} + X_{L2} - X_M$ (D) $X_{L1} + X_{L2} + 2X_M$

(E) Answer not known

85. Identify the statement that is not true of ferro magnetic materials

(A) They have a large χ_m

(B) They have a fixed value of u_r

(C) Energy loss is proportional to the area of the hysteresis loop

(D) They lose their non linearity property above the curie temperature

(E) Answer not known

86. The conductance of electric circuit is analogous in magnetic circuit by

(A) Flux   (B) Reluctance

(C) Permeance   (D) Relative permeability

(E) Answer not known

87. A current of 2A is flowing through an inductor of 100 mH. Find the energy stored in the inductor.

(A) 0.2 J   (B) 0.25 J

(C) 0.3 J   (D) 0.35 J

(E) Answer not known

88. To find, $\nabla \cdot (\nabla \times A) = ?$

(A) 1   (B) ∇A

(C) O (D) $\nabla^2 A$

(E) Answer not known

89. Calculate the capacitance of a parallel plate capacitor, having a mica dielectric $\Sigma_r = 6$, a plate area $6.45 \times 10^{-3} \, m^2$ and a separation of $2.54 \times 10^{-4} \, m$

(A) 1.349 nF

(B) 1.5 pF

(C) 1.349 pF

(D) 1.5 F

(E) Answer not known

90. Point charges $Q_1 = 1 \, nC$ and $Q_2 = 2 \, nC$ are at a distance apart. Which of the following statement are incorrect?

(A) The force on Q_1 is repulsive

(B) The force on Q_2 is the same in magnitude as that on Q_1

(C) As the distance between them decreases, the force on Q_1 increases linearly

(D) The force on Q_2 is along the line joining them

(E) Answer not known

91. Verify whether the vector field $\vec{E} = YZ \, \vec{a}_x + XZ \, \vec{a}_y + XY \, \vec{a}_z$ is both solenoidal and irrotational?

Assertion [A] : Solenoidal and irrotational.

Reason [R] : $\nabla \cdot \vec{E} = 0$ and $\nabla \times \vec{E} = 0$.

(A) [A] is true but [R] is false

(B) Both [A] and [R] are true; and [R] is the correct explanation

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true, but [R] is not the correct explanation

(E) Answer not known

92. The electric flux and field intensity inside a conducting sphere is

    (A) Maximux   (B) Minimum

    (C) Zero   (D) Uniform

    (E) Answer not known

93. Find the electric field when the velocity of the field is 10 m/s and the flux density is 6 units

    (A) 50 units   (B) 60 units

    (C) 40 units   (D) 70 units

    (E) Answer not known

94. Which of the following statements is correct for divergence of electric and magnetic flux densities?

    (A) It is zero for electric flux density

    (B) It is zero for magnetic flux density

    (C) Both are zero

    (D) These are zero for static densities

    (E) Answer not known

95. Find the law, which may be obtained using gauss law as a reference?

    (A) Faraday's law   (B) Ampere's law

    (C) Coulomb's law   (D) Ohm's law

    (E) Answer not known

96. Which of the following relationship exists between electric flux density and electric field intensity?

    (A) Linear   (B) Inversely linear

    (C) Non-linear   (D) Inversely non-linear

    (E) Answer not known

97. Which of the following is a mathematically incorrect expression?

    (A) Grad DN   (B) Div Curl

    (C) Grad Curl   (D) Crul Grad

    (E) Answer not known

98. Electric flux density in a charge free region is given by

$$\overline{D} = 10x\ \overline{a}x + 5y\ \overline{a}y + K\,Z^2\ \overline{a}_2\ \mu C/m^2$$

find the constant K.

    (A) -20 (B) -25

    (C) -15 (D) 10

    (E) Answer not known

99. In xy-plane, $Q_1 = 100$ μC at (2, 3, 0) m experiences a repulsive force of 7.5 N because of Q_2 at (10, 6, 0) m.

Find Q_2

    (A) 608 μC (B) 668 μC

    (C) 688 μC (D) 638 μC

    (E) Answer not known

100. The divergence of the given field

$\overline{F} = 30\,\overline{a}x + 2xy\,\overline{a}y + 5xz^2\,\overline{a}z$ at $(1, 1, -0.2)$ is

(A) 0   (B) 1

(C) 2   (D) 3

(E) Answer not known

101. In pulse code modulation (PCM) system, if the code word length is increased by 2 bits, signal to quantization noise ratio improves by a factor

(A) 2   (B) 8

(C) 16   (D) $\dfrac{8}{6}$

(E) Answer not known

102. Any signal $x(t)$ can be represented as

(A) $x_e(t) + x_o(t)$ (B) $x_e(t) - x_o(t)$

(C) $\dfrac{x_e(t)}{x_o(t)}$ (D) $x_e(t) \times x_0(t)$

(E) Answer not known

103. A delta modulation system require to maintain a minimum (SNR) of 60 dB. The minimum sampling rate for $m(t) = 10\cos(200\pi t)$ to avoid slope over load distortion is

(A) 10^4 samples/s   (B) 10^6 samples/s

(C) 10^8 samples/s   (D) 10^{10} samples/s

(E) Answer not known

104. The numbers of layers in ISO/OSI model and TCP/IP model are

    (A) 5 and 7   (B) 7 and 5

    (C) 7 and 7   (D) 5 and 5

    (E) Answer not known

105. Carson's rule in the frequency modulation

    (A) $2\Delta f\left(1+\dfrac{1}{\beta}\right)$ (B) $2\Delta f\left(\beta+1\right)$

    (C) $2\Delta f\left(\dfrac{1}{\beta}\right)$ (D) $\Delta f\left(1+\dfrac{1}{\beta}\right)$

    (E) Answer not known

106. A special PCM system uses 16 channels of data, one whose purpose is identification and synchronization. The sampling rate is 3.5 kHz. The word length is 6 bits. Find

    (i)   The no. of bits per frame

    (ii) The serial data rate

    (A) 69, 300 kHz   (B) 96, 336 kHz

    (C) 75, 400 kHz   (D) 100, 500 kHz

    (E) Answer not known

107. Let the signal $x(t)$ have the fourier transform $x(w)$. Consider the signal $y(t) = \dfrac{d}{dt}\left[x(t-t_d)\right]$ where t_d is an arbitrary delay. The magnitude of the fourier transform of $y(t)$ is given by the expression.

(A) $|x(w)| \cdot |w|$

(B) $|x(w)| \cdot w$

(C) $w^2 \cdot |x(w)|$

(D) $|w| \cdot |x(w)| \cdot e^{-jwt_d}$

(E) Answer not known

108. When bilinear transformation is applied to $H(s) = \dfrac{4}{(s+2)(s+5)}$ resulting digital filter has

(A) Poles at -0.5 and -0.2

(B) Poles at -2 and -5

(C) Poles at $-2/4$ and $-5/4$

(D) Zeros at 0 and 1

(E) Answer not known

109. The periodicity of the signal $x(n) = \cos\left(\dfrac{2\pi n}{5}\right) + \cos\dfrac{2n}{7}$ is

(A) 35

(B) 7

(C) 5

(D) Infinite

(E) Answer not known

110. The first five points of the eight point DFT of a real valued sequence are $\{0.25, 0.125 - j\,0.3018, 0, 0.125 - j0.0518, 0\}$ Determine the remaining 3 points.

(A) $\{0.125 + j\,0.0518, 0, 0.125 + j0.3018\}$

(B) $\{0.125 - j0.0518, 0, 0.125 + j0.3018\}$

(C) $\{0.125 + j\,0.0518, 0, 0.125 - j0.318\}$

(D) $\{1, 0, j\}$

(E) Answer not known

111. Match List I with List II with reference to a 8085 microprocessor and select the correct answer using the codes given in the lists:

List I (Instruction)   List II (Type of Addressing)
(a) MOVA, M   1. Direct addressing
(b) LXIH, E400H   2. Register Addressing
(c) LDA FICDH   3. Implicit Addressing
(d) CMC   4. Register Indirect Addressing
                     5. Immediate Addressing

	(a)	(b)	(c)	(d)
(A)	5	4	1	3
(B)	4	5	3	1
(C)	5	4	2	3
(D)	4	5	1	3

(E) Answer not known

112. Number of address lines necessary to connect 8k memory chip is

(A) 10   (B) 11

(C) 12   (D) 13

(E) Answer not known

113. In 8279, keyboard or Display interface the pins used to scan both the keyboard and displays are

(A) OUT B3 – OUT B0   (B) RL 7 – RL 0

(C) DB 7 – DB 0   (D) SL 3 – SL 0

(E) Answer not known

114. The internal data bus width of 8279 is

(A) 8 bits   (B) 12 bits

(C) 16 bits   (D) 32 bits

(E) Answer not known

115. In RS 232 signal levels are not compatible with

(A) DTL   (B) TTL

(C) RTL   (D) CMOS

(E) Answer not known

116. Memory read cycle in 8085 requires ——————— T states

(A) 4   (B) 3

(C) 2   (D) 1

(E) Answer not known

117. A memory mapped I/O device has an address of OOFOH. Which of the following 8085 instruction outputs the content of the accumulator to the I/O Device?

(A)   LXI H,OOFOH
        MOV M, A

(B)   LXI H,OOFOH
        OUT M

(C)   LXIH, OOFOH
        OUT FOH

(D)   LXIH, OOFOH
        MOVA, M

(E)   Answer not known

118. Which of the following instructions are 2-Byte instructions?

(A)   B Z   (B) BNC
(C)   GOTO   (D) BRA
(E)   Answer not known

119. Suppose registers 'A' and 'B' contain 50H and 40H respectively. After execution of MOVA, B instruction, find the contents of Registers A and B

(A)   40 H, 40H   (B) 50 H, 40 H
(C)   50 H, 50 H   (D) 60 H, 40 H
(E)   Answer not known

120. How are the status of the carry, auxiliary carry and parity flags affected after execution of these instructions?

    MOV A, # 9C

    ADD A, # 64 H

    (A)   CY = 0, AC = 0, P = 0
    (B)   CY = 1, AC = 1, P = 0
    (C)   CY = 0, AC = 1, P = 0
    (D)   CY = 1, AC = 1, P = 1
    (E)   Answer not known

121. A DC shunt motor takes a current of 80A on a 480V supply and runs at 960 RPM the armature resistance is 0.25 Ω and the field resistance is 120 Ω. A chopper is used to control the speed of the motor at 400 RPM having constant torque. The on -period of the chopper is 3 ms. The field is supplied directly from 480V supply. Determine the frequency of the chopper

    (A)   95.12 Hz   (B) 102.48 Hz
    (C)   146.44 Hz   (D) 130.05 Hz
    (E)   Answer not known

122. The supply voltage of a Dc chopper is 220 V it delivers a load of 88 V. If the chopper is operating with 1 kHz frequency, the non-conduction period of the switch is

    (A)   200 μ s   (B) 400 μ s
    (C)   600 μ s   (D) 1000 μ s
    (E)   Answer not known

123. A 3φ wound rotor induction motor is connected by a chopper controlled resistance in its rotor circuit. A resistance of $2\,\Omega$ is connected in the rotor circuit and a resistance of $4\,\Omega$ is additionally connected during off period of the chopper (off period 4 ms). The total resistance across the diode bridge for the chopper frequency of 200 Hz is

(A) $\dfrac{26}{5}$

(B) $\dfrac{24}{5}$

(C) $\dfrac{18}{5}$

(D) $\dfrac{16}{5}$

(E) Answer not known

124. Stator voltage control results in good efficiency for one of the loads given below

T = Torque

w = Speed

(A) $T\,\alpha\,w^2$

(B) T = Constant

(C) $T\,\alpha\,w$

(D) $T\,\alpha\dfrac{1}{w}$

(E) Answer not known

125. The power developed by the motor is the machine works under braking opposing the motion, then it is called as

(A) Forward braking

(B) Forward motoring

(C) Reverse braking

(D) Reverse motoring

(E) Answer not known

126. Single-phase half bridge-inverter has a resistive load of $R = 3\Omega$ and the d.c. input voltage $E_{dc} = 50 \, V$. Calculate the RMS output voltage at fundamental frequency E_1 and output power P_0.

(A) 15.76 V, 253 W   (B) 22.5 V, 253 W

(C) 22.5 V, 208.33 W   (D) 15.76 W, 208.33 W

(E) Answer not known

127. Assertion [A] :   On line UPS provides zero transition time.

    Reason [R] :   Time required to normal to backup mode and vice versa is zero.

(A) [A] is true [R] is false

(B) Both [A] and [R] are true, and [R] is the correct explanation

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true, and [R] is not the correct explanation

(E) Answer not known

128. There is an inherent short circuit protection in

(A) Voltage source inverter   (B) Current source inverter

(C) AC voltage controller   (D) Cyclo converter

(E) Answer not known

129. The converter which produces a lower average output voltage than the dc i/p voltage is known as

(A) Cuk converter   (B) Buck-Boost converter

(C) Boost converter   (D) Buck converter

(E) Answer not known

130. If T is the chopper circuit's time period and α is its duty cycle, the chopping frequency is

(A) T_{ON}/α (B) T_{OFF}/α

(C) α/T_{ON} (D) α/T_{OFF}

(E) Answer not known

131. What is the maximum output voltage of a 3ϕ bridge rectifier supplied with line voltage of 440 V?

(A) 528 V   (B) 396 V

(C) 594 V   (D) 616 V

(E) Answer not known

132. A single phase ac voltage controller feeds power to a resistive load of 3Ω from 230 V, 50 Hz source. Calculate the maximum values of average thyristor current for firing angle $\alpha = 0$.

(A) 34.512 A   (B) 24.403 A

(C) 17.262 A   (D) 38.621 A

(E) Answer not known

133. A single phase transformer, with secondary voltage of 230 V, 50 Hz, delivers power to load R = 10Ω through a half wave controlled rectifier circuit, for a firing angle delay of 60º, determine average O/P current.

(A) 77.64 A   (B) 7.764 A

(C) 776.4 A   (D) 0.7764 A

(E) Answer not known

134. The fundamental current component of a full wave diode bridge rectifier is 3A and the displacement factor is 0.9. When the supply current is purely sinusoidal the input power factor of the circuit is

(A) zero
(B) 0.9 lagging
(C) 0.45 lagging
(D) 0.707 lagging
(E) Answer not known

135. In 3-phase AC to DC converter which requires neutral point connection is

(A) 3-phase semi converter
(B) 3-phase full converter
(C) 3-phase half-wave converter
(D) 3-phase full converter with diodes
(E) Answer not known

136. SCRs with peak forward voltage rating of 1000 V and average on state current of 40 A are used in single phase mid point converter. Find the maximum voltage of the converter. Use Factor of Safety (FOS) = 2.5.

(A) 500 V   (B) 400 V
(C) 600 V   (D) 200 V
(E) Answer not known

137. If the latching current in the circuit shown in fig is 4 mA, obtain the minimum width of the gating pulse required to properly turn-on the SCR.

(A) 2 μS
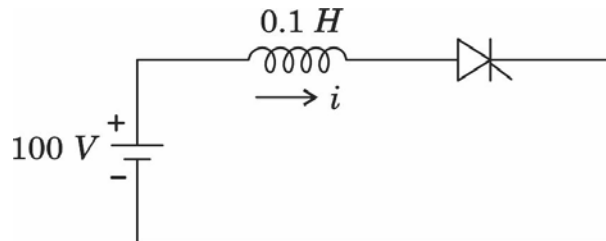
(B) 4 μS

(C) 4 mS

(D) 2 mS

(E) Answer not known

138. For the power semiconductor devices IGBT, MOSFET, Diode and Thyristor which one of the following statement is true?

(A) All the four are majority carrier devices

(B) All the four are minority carrier devices

(C) IGBT and MOSFET are majority carrier devices whereas diode and thyristor are minority carrier devices

(D) MOSFET is majority carrier devices where as IGBT, diode and thyristor are minority carrier devices

(E) Answer not known

139. RC snubber is used in parallel with the thyristor to

(A) reduce dV/dt across it

(B) reduce $\dfrac{di}{dt}$ through it

(C) limit current through thyristor

(D) ensure its conduction after gate signal is removed

(E) Answer not known

140. A triac is equivalent to two thyristors.

(A) in series
(B) in inverse series
(C) in parallel
(D) in inverse parallel
(E) Answer not known

141. An instrument which is used to measure the level of illumination is

(A) Power Analyser
(B) Synergy Meter
(C) Multimeter
(D) Lux meter
(E) Answer not known

142. A long-line is operating under no-load or light load condition, the receiving end voltage is greater than the sending end voltage. This is called as

(A) Skin-effect
(B) Ferranti-effect
(C) Hall-effect
(D) Corona-effect
(E) Answer not known

143. Which of the following properties are associated with SF_6 circuit breaker?

1. At atmospheric pressure its dielectric strength is 2 to 3 times of air.

2. Its molecules absorbs free electrons in the air path

3. Its arc time is few ms

4. Its heat capacity below $6000^\circ K$ is much larger than that of air

(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 1, 3 and 4
(D) 1, 2, 3 and 4
(E) Answer not known

144. A three phase circuit breaker is rated as 1500 A, 1000 MVA, 33 KV. It's breaking capacity is,

(A) $\sqrt{3} \times 1000$ MVA (B) 1000 MVA

(C) $\dfrac{1000}{\sqrt{3}}$ MVA (D) 3×1000 MVA

(E) Answer not known

145. Arcing on transmission lines is prevented by connecting a suitable

(A) Circuit breaker (B) Protective relay

(C) Inductor in the neutral (D) Capacitor in the neutral

(E) Answer not known

146. Buchholz relay provides protection against faults in

(A) Generators (B) Transformers

(C) Transmission lines (D) Motors

(E) Answer not known

147. The Nodal Admittance Matrix (Y_{bus}) of a power system is not

(A) Symmetric
(B) A square matrix
(C) A full matrix
(D) Generally having dominant diagonal elements
(E) Answer not known

148. The most common type of fault is

    (A)   Single-phase to ground   (B) Phase-to-Phase
    (C)   Two-phase to ground   (D) Three-phase to ground
    (E)   Answer not known

149. If the fault current is 1000 A, relay setting is 50% and CT ratio is 500 : 5. The plug setting multiplier is

    (A)   40 A   (B) 4 A
    (C)   5 A   (D) 10 A
    (E)   Answer not known

150. For a 15 bus power system with 3 voltage controlled bus, the size of Jacobian matrix is

    (A) 11×11 (B) 12×12
    (C) 24×24 (D) 28×28
    (E)   Answer not known

151. A 50 Hz, 4-pole turbo generator rated 100 MVA, 11 KV has a inertia constant of 8.0 MJ/MVA. Determine the stored energy in the rotor at synchronous speed.

    (A)   800 MJ   (B) 1600 MJ
    (C)   400 MJ   (D) 1000 MJ
    (E)   Answer not known

152. Two insulator discs of identical capacitance value C make up a string for a 22 KV, 50 Hz single phase overhead line insulator system. If the pin to earth capacitance is also C. Then the string efficiency is

(A) 50%   (B) 75%

(C) 90%   (D) 86%

(E) Answer not known

153. Match the items in List-1 and List 2. Select your answers using the codes given below.

    List 1   List 2
(a) Buchholz relay   1.   Feeder
(b) Translay Relay   2.   Transformer
(c) Negative sequence Relay   3.   Overhead transmission line
(d) Distance relay   4.   Generator

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

(E) Answer not known

154. The relation between insulation resistance and length of the cable is

(A) Directly proportional

(B) Inversely proportional

(C) Remain unchanged

(D) Exponential rise

(E) Answer not known

155. In the case of a HVDC system there is

    (A)   Charging current but no skin effect

    (B)   No charging current but skin effect

    (C)   Neither charging current nor skin effect

    (D)   Both charging current and skin effect

    (E)   Answer not known

156. The resultant weight per meter of the conductor and vertical sag are given by ——————— and ——————— respectively, where

w_c – weight of conductor/m

w_i – weight of ice/m

w_w – weight of wind/m

s – slant sag and θ = angle of resultant weight

    (A) $\sqrt{(w_c + w_i)^2 + w_w^2}$; $s\cos\theta$

    (B) $\sqrt{(w_c + w_w)^2 + w_i^2}$; $s\cos\theta$

    (C) $\sqrt{(w_c + w_i)^2 + w_w^2}$; $s\sin\theta$

    (D) $\sqrt{(w_c + w_w)^2 + w_i^2}$, $s\sin\theta$

    (E)   Answer not known

157. If a generator of 250 MVA rating has an inertia constant of 6 MJ/MVA, its inertia constant on 100 MVA

    (A) 15 MJ/MVA   (B) 10.5 MJ/MVA

    (C) 6 MJ/MVA   (D) 2.4 MJ/MVA

    (E) Answer not known

158. The per unit impedance of a circuit element is 0.30. If the base KV and base MVA are halved, then the new value of the per unit impedance of the circuit element will be

(A) 0.30

(B) 0.60

(C) 0.0030

(D) 0.0060

(E) Answer not known

159. A generating station has a maximum demand of 30 MW, a load factor of 60% and a plant capacity factor of 50%. The reserve capacity of the plant is

(A) 5 MW

(B) 4 MW

(C) 6 MW

(D) 10 MW

(E) Answer not known

160. A single phase transformer is rated at 2.5 KVA, 11/0.4 KV. If the leakage reactance is 0.96 Ω when referred to low-voltage side, then determine its leakage reactance in per unit.

(A) 0.021 p.u.

(B) 0.015 p.u.

(C) 0.018 p.u.

(D) 0.025 p.u.

(E) Answer not known

161. A 8 bit digital to analog converter has full scale output voltage of 5 V. Its resolution is

(A) 8 mV

(B) 19.5 mV

(C) 12 mV

(D) 10 mV

(E) Answer not known

162. The reference voltage of a dual slope ADC is 5 V. The integrator has a capacitor of 1 μF and resistance of 100 kΩ. The time taken to read an unknown voltage V_x is 0.2 sec. Find V_x

(A) 2.1 V

(B) 10 V

(C) 2.5 V

(D) 8 V

(E) Answer not known

163. The LEDs display require

(A) A voltage of 1.2 V and a current of 20 mA

(B) A voltage of 25 V and a current of 20 mA

(C) A voltage of 1.2 V and a current of 100 mA

(D) A voltage of 25 V and a current of 100 mA

(E) Answer not known

164. A high permeability nickel iron hydrogen annealed material is used as core in LVDT

(A) To produce high noise

(B) To produce high null voltage

(C) To have low sensitivity

(D) To produce low harmonics

(E) Answer not known

165. Which one of the following devices can measure pressure directly?

(A) LVDT

(B) Strain gauge

(C) Rotameter

(D) Bourden Tube

(E) Answer not known

166. In a LVDT, the two secondary voltages

   (A) Are independent of the core position
   (B) Vary unequally depending on the core position
   (C) Vary equally depending on the core position
   (D) Are always in phase quadrature
   (E) Answer not known

167. The gap of tape recorder is 7 μm. Determine the speed of the tape so as to have satisfactory response at 40000 Hz. Assume the wavelength of the recorded signal is 3 times greater than the gap of recorder.

   (A) 2.8 m/sec   (B) 5.75 m/sec
   (C) 840 m/sec   (D) 8.4 m/sec
   (E) Answer not known

168. The inductance of a moving iron instrument is given by $L = \left(10 + 5\theta - \theta^2\right)$ MH where θ is the deflection in radian from zero position. The spring constant is 12×10^{-6} NM/RAD. The deflection for a current of 5 A is

   (A) 90°   (B) 94.8°
   (C) 96.8°   (D) 92°
   (E) Answer not known

169. In a wheat stone bridge $R_1 = 50\ \Omega$, $R_2 = 65\ \Omega$, $R_3 = 100\ \Omega$ and R_x is unknown resistance when the Galvanometer indicates zero. If R_3 is having ±5% tolerance on its nominal value, the range of R_x are
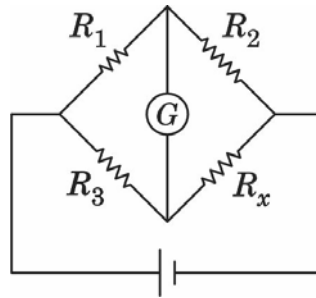
(A) 117, 143
(B) 120, 140
(C) 125.75, 134.75
(D) 123.5, 136.5
(E) Answer not known

170. The true ohm meter measures

(A) Average of the instantaneous values of current
(B) Average of square of instantaneous currents
(C) Instantaneous current
(D) Maximum value of current
(E) Answer not known

171. Which bridge is used for the precise measurement of unknown capacitance and dielectric loss of capacitor?

(A) Schering bridge
(B) Maxwell's bridge
(C) Wheatstone bridge
(D) Maxwell's double bridge
(E) Answer not known

172. Determine the value of R and L of the inductor connected in the bridge circuit shown in fig.
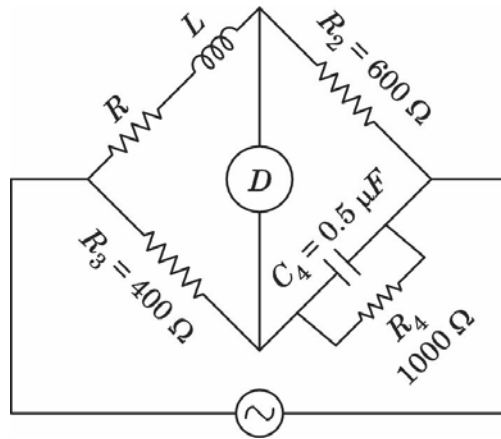
(A)   1000 Ω, 500 mH   (B) 666.6 Ω, 180 mH
(C)   240 Ω, 120 mH   (D) 120 Ω, 240 mH
(E)   Answer not known

173. The inductance of MI instrument is given by $L = \left(12 + 6\theta - \theta^2\right)$ μH, where θ is the deflection in radians from zero position. The spring constant is 12×10^6 NM/Radians. Calculate the deflection for a current of 8 A

(A)   14.47°   (B) 144.74°
(C)   15.54°   (D) 155.4°
(E)   Answer not known

174. The following readings are obtained for one month of 30 days. KVAhr meter = 83830, kwh meter = 291940, demand indicator = 1400 kw. Find out the average monthly load factor.

(A)   0.289   (B) 0.389
(C)   0.189   (D) 0.489
(E)   Answer not known

175. Phantom loading for testing of energy meter is used

(A) to isolate the current and potential circuits

(B) to improve accuracy

(C) for meters having low current rating

(D) to test meters having large current rating for which loads may not be available in laboratory and also reduces power losses during testing.

(E) Answer not known

176. A 250 μA ammeter has an internal resistance of 150 Ω. For extending its range to measure 1000 μA. The shunt resistance required is

(A) 25 Ω (B) 50 Ω

(C) 55 Ω (D) 30 Ω

(E) Answer not known

177. In a single phase induction type energy meter, the lag adjustment is done to ensure that

(A) Current coil flux lags the applied voltage by 90°

(B) Pressure coil flux lags the applied voltage by 90°

(C) Pressure coil flux is in phase with the applied voltage

(D) Current coil flux lags the pressure coil flux by 90°

(E) Answer not known

178. Three resistors $R_1 = 50\Omega \pm 5\%$ $R_2 = 60\Omega \pm 5\%$ and $R_3 = 70\Omega \pm 5\%$ are connected in series. The limiting error in ohm is

(A) $\pm 15\Omega$ (B) $\pm 9\Omega$

(C) $\pm 10\Omega$ (D) $\pm 12\Omega$

(E) Answer not known

179. PMMC instruments have

(A) Non uniform scale (B) High sensitivity

(C) Uniform scale (D) Both (B) and (C)

(E) Answer not known

180. A step input of 5 A is applied to an ammeter. The pointer swings to a voltage of 5.18 A and finally comes to rest at 5.02 A. Determine the percentage error in the instrument.

(A) 0.2 % (B) 0.3 %

(C) 0.4 % (D) 0.5 %

(E) Answer not known

181. A star connected network consists of three resistances 10 Ω, 10Ω and 5 Ω. Convert the star-connected network to equivalent delta-connected network.

(A) 40 Ω, 20 Ω, 20 Ω (B) 40 Ω, 15 Ω, 15 Ω

(C) 15 Ω, 40 Ω, 15 Ω (D) 10 Ω, 15 Ω, 15 Ω

(E) Answer not known

182. Which one of the following statements is incorrect with respect to Delta connected three phase circuit?

(A) Line currents are 120 ° apart from each other

(B) Line currents are 30 ° behind the respective phase currents

(C) The angle between the line currents and the corresponding line voltages is $45° + \phi$

(D) Line current is $\sqrt{3}$ times the phase currents

(E) Answer not known

183. A delta connected network with its wye-equivalent is shown in figure. The resistances R_1, R_2 and R_3 (in ohms) are respectively.
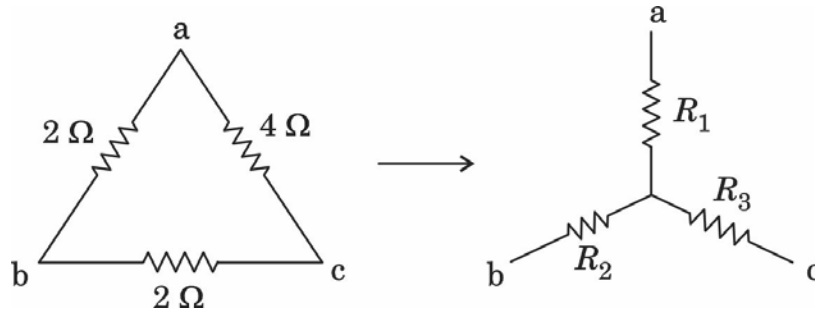
(A) 1, 1 and 0.5

(B) 0.5, 1 and 1

(C) 1, 0.5 and 1

(D) 0.5, 0.5 and 1

(E) Answer not known

184. Find the Z-parameters for the network shown in fig.
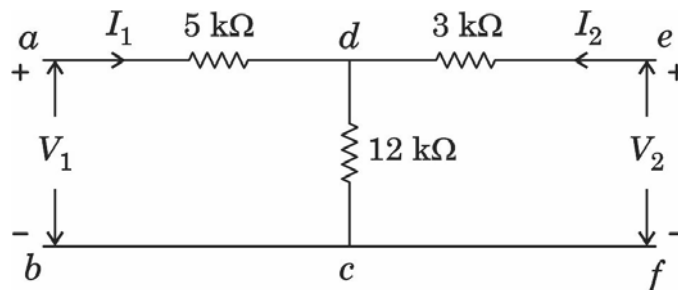
(A) $Z_{11} = 15\ K\Omega$, $Z_{12} = 17\ K\Omega$, $Z_{21} = 17\ K\Omega$, $Z_{22} = 12\ K\Omega$

(B) $Z_{11} = 17\ K\Omega$, $Z_{12} = 12\ K\Omega$, $Z_{21} = 12\ K\Omega$, $Z_{22} = 15\ K\Omega$

(C) $Z_{11} = 17\ K\Omega$, $Z_{12} = 15\ K\Omega$, $Z_{21} = 12\ K\Omega$, $Z_{22} = 15\ K\Omega$

(D) $Z_{11} = 15\ K\Omega, Z_{12} = 17\ K\Omega$, $Z_{21} = 17\ K\Omega, Z_{22} = 15\ K\Omega$

(E) Answer not known

400 - E.E.E
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185. The h parameters h_{11} and h_{12} are obtained by

   (A) Shorting output terminals
   (B) Shorting input terminal
   (C) Opening input terminal
   (D) Opening output terminal
   (E) Answer not known

186. If a two-port network is passive, then we have, with the usual notation, the following relationship

   (A) $h_{12} = h_{21}$ (B) $h_{12} = -h_{21}$
   (C) $h_{11} = h_{22}$ (D) $h_{11}.h_{22} - h_{12}.h_{21} = 1$
   (E) Answer not known

187. The voltage across R after t=0 and t=1 sec, will be
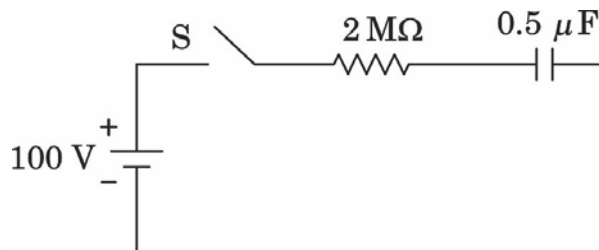
   (A) 100 V, 632 V   (B) 0 V, 63.2 V
   (C) 100 V, 36.8 V   (D) 0 V, 36.8 V
   (E) Answer not known

188. The time constant of a series RL circuit is

   (A) LR   (B) R/L
   (C) $e^{-R/L}$ (D) L/R
   (E) Answer not known

189. A series Rc circuit consists of R=10 Ω C=0.1 F. A constant voltage of 20 V is applied to the circuit at t=0. Determine the voltage across the resistor?
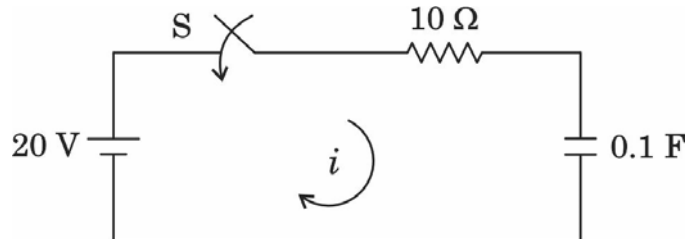
(A) 20 $(1-e^{-10t})$ volts

(B) 20 e^{-10t} volts

(C) 20 e^{-t} volts

(D) 20 $(1-e^{-t})$ volts

(E) Answer not known

190. Which one of the following statements is incorrect with respect to resonance. At resonance, in RLC series circuit?

(A) Current is maximum

(B) Impedance is maximum

(C) Current is in phase with the applied voltage

(D) Capacitive reactance is equal to inductive reactance

(E) Answer not known

191. The neutral points of source and load are shorted to form the reference node in a single phase equivalent circuit even if the neutral points are connected through impedance in the actual circuit. This is so because the neutral connection in a balanced circuit will

(A) Not carry any current

(B) Carry maximum current

(C) Carry minimum current

(D) Not carry zero current

(E) Answer not known

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192. For the circuit shown, find the Q-factor
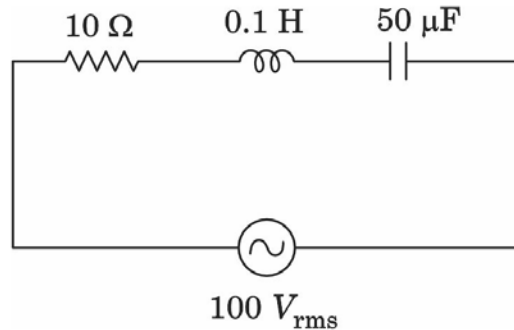
(A)   10   (B) 447

(C)   4.47   (D) 71

(E)   Answer not known

193. In a series RLC circuit operating below the resonant frequency, the current

(A)   I leads Vs   (B) I lags Vs

(C)   I is in phase with Vs   (D) Zero

(E)   Answer not known

194. A circuit with a resistor, inductor and capacitor in series is resonant of f_o Hz. If all the components values are now doubled, the new resonant frequency is

(A) $2f_o$ (B) Still f_o

(C) $f_o/4$ (D) $f_o/2$

(E)   Answer not known

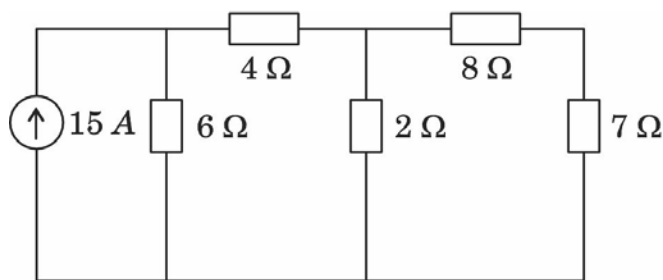195. When two resistances of equal values (R) connected in parallel, the effective resistance is

(A) R

(B) R/2

(C) 2R

(D) R^2

(E) Answer not known

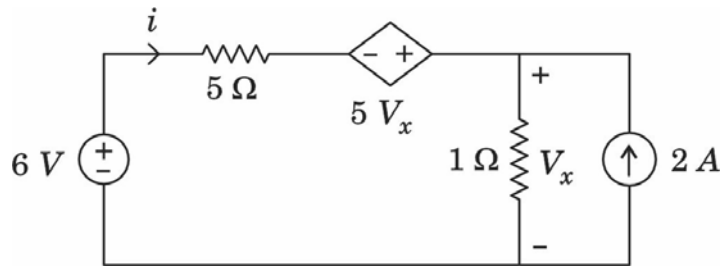196. Norton's current I_N flowing between terminals A and B of the following circuit is
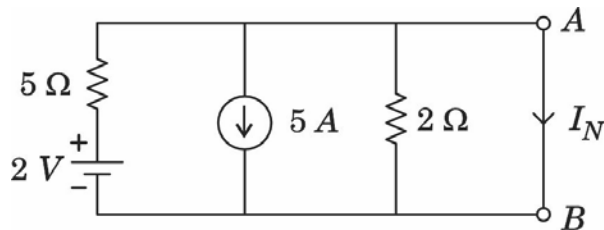
(A) – 4.6 A

(B) – 5.4 A

(C) 4.6 A

(D) 5.4 A

(E) Answer not known

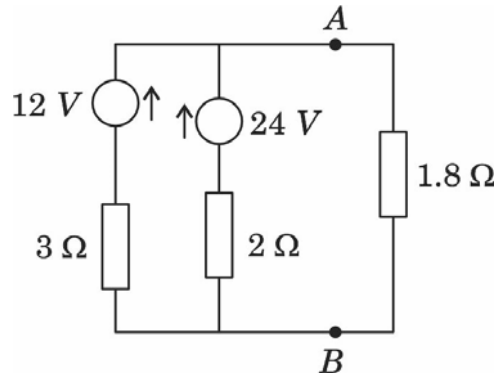197. Determine the current flowing in the 2Ω resistance in network shown in fig.

(A) 67.5 Ω

(B) 6.75 Ω

(C) 6 Ω

(D) 75 Ω

(E) Answer not known

198. Find i using superposition theorem.

(A) 10 A   (B) 14 A
(C) 16.5 A   (D) 18 A
(E) Answer not known

199. In the following circuit, the current flowing through 1.8 Ω resistor is

(A) 3.2 A   (B) 6.4 A
(C) 16 A   (D) 7.2 A
(E) Answer not known

200. Superposition theorem is not applicable for

(A) Voltage calculations
(B) Bilateral elements
(C) Power calculations
(D) Passive elements
(E) Answer not known