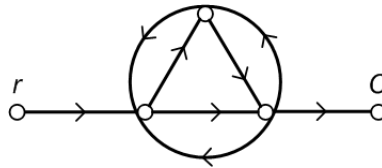**APSPDCL 2014**

1. The signal flow graph shown in figure has

(A) 2 forward paths and 5 loops

(B) 2 forward paths and 4 loops

(C) 1 forward path and 5 loops
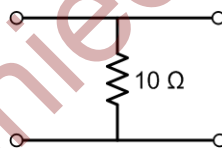
(D) 1forward path and 4 loops

2. Which of the following is true for the Fourier coefficients of an odd formulae?

(A) $a_o = 0$ $a_n = 0$ $b_n \neq 0$

(B) $a_o \neq 0$ $a_n \neq 0$ $b_n = 0$

(C) $a_o \neq 0$ $a_n = 0$ $b_n \neq 0$

(D) $a_o = 0$ $a_n \neq 0$ $b_n \neq 0$

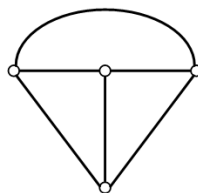3. Which of the following pairs of h-parameter has the same dimensions?

(A) h_{11} and h_{12} (B) h_{12} and h_{21} (C) h_{11} and h_{22} (D) h_{12} and h_{22}

4. For the single-element two-port network in figure, y_{11} is

(A) 10 Ω (B) 0.1 Ω (C) 0 (D) non existent

5. The reduced incidents matrix of the graph shown in figure is the order

(A) 4 × 6 (B) 6 × 4 (C) 3 × 6 (D) 4 × 5

6. Which of the following functions is not an even function?

(A) t^2 (B) t^4 (C) sin t (D) cos t

7. The ADC having highest conversion speed is

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(A) Dual-slope ADC   (B) Successive approximation ADC

(C) Flash ADC   (D) Servo ADC
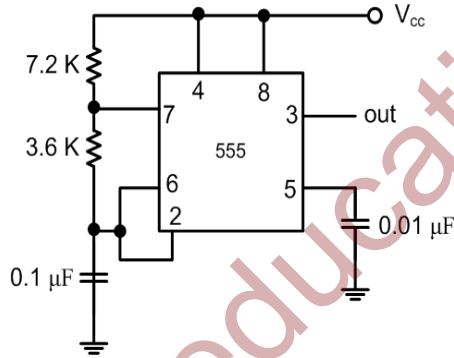
8. Indentify the 1-bit comparator circuit

(A)   (B)   (C)   (D)

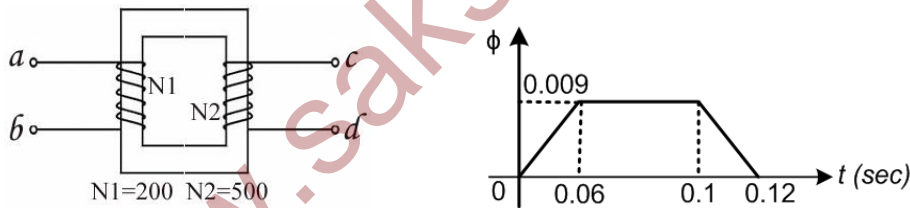9. For the T flip-flop Q_{n+1} is given by

(A) $T\bar{Q}_n + \bar{T}Q_n$ (B) $TQ_n + \bar{Q}_n$ (C) $\overline{T}\overline{Q}_n$ (D) $T\bar{Q}_n$

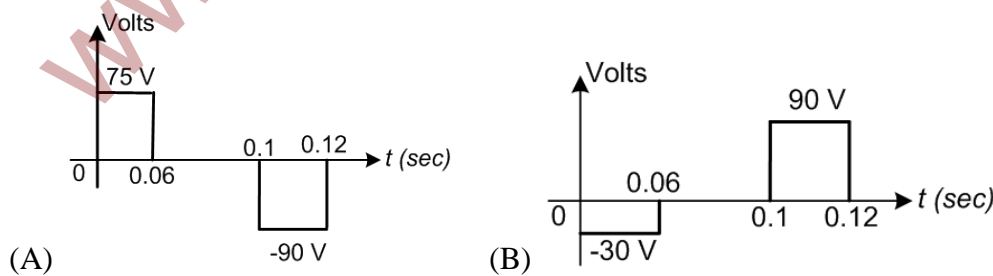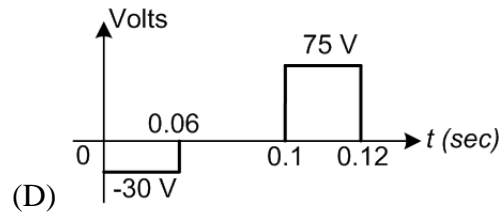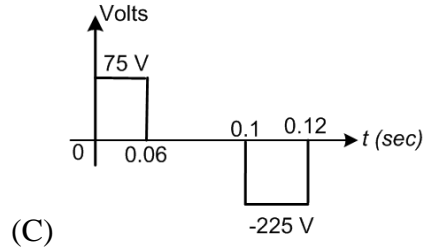10. For the timer circuit shown, find the output frequency

(A) 100 kHz   (B) 1000 Hz   (C) 150 Hz   (D) 2000 Hz

11. The core of a two winding transformer is subjected to magnetic flux variation shown below:
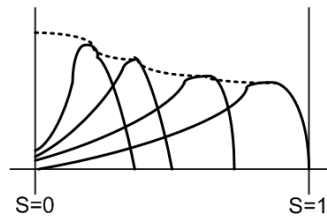

The waveform of secondary induced emf would be

(A)   (B)

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(C)

(D)

12. The following characteristic of 3-phase induction motor refers to a speed control method. Identify the correct option.

(A) V / f control

(B) Variable V, f = f$_{rated}$

(C) Variable f, V = V$_{rated}$

(D) Cascade connection

13. Ten thyristors are used in a string to withstand a dc voltage of 15 kV. The worst case steady state voltage across the thyristor is 1800 V. The derating factor is

(A) 33.3%   (B) 15.5%   (C) 23.3%   (D) 15%

14. In multiple pulse equal pulse width modulation with carrier frequency 15KHz and required output frequency 500Hz, the number of pluses per half cycle in inverter output is

(A) 5   (B) 10   (C) 12   (D) 15

15. The effective input resistance seen by the source in the following circuit is

(A) 10 Ω   (B) 50 Ω   (C) 20 Ω   (D) 5 Ω
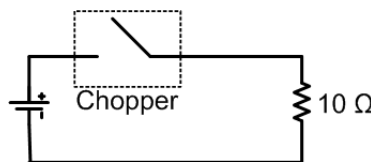
16. The performance criterion taken to assess the power quality is (are)

(A) Power factor   (B) Harmonics   (C) Profile of voltage   (D) All of the above

17. In Gauss Seidal method of power flow problem, the no. of iterations may be reduced if the correction in voltage at each bus is multiplied by

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(A) Gauss constant   (B) Acceleration factor

(C) Deccelaration Constant   (D) Blocking factor

18. At slack bus, which one of the following combination of variables are specified

    (A) | V |, delta   (B) P, Q   (C) P, | V | (D) Q, | V |

19. Which one of the following statement is normally correct for a Z bus matrix?

    (A) Null matrix   (B) Sparse matrix   (C) Full matrix   (D) Unity matrix

20. Effect of water hammer is reduce by using

    (A) Spill ways   (B) Dam   (C) An anvil   (D) Surge tank

21. In a nuclear reactor, chain reaction is controlled by introducing

    (A) Cadmium rods   (B) Iron rods   (C) Graphite rods   (D) Brass rods

22. For remote operation , CB must be equipped with a

    (A) Time delay trip   (B) Shunt trip   (C) Inverse time trip   (D) None of the above

23. At the lower-half power frequency, the impedance of an R-L-C series circuit is $(5-j5)$ ohms. The impedance of the circuit at its resonance frequency is

    (A) $5\sqrt{2}\,\Omega$ (B) 25 Ω (C) 10 Ω (D) 5 Ω

24. A circuit with R = 2 Ω and L = 1 H is excited by a step voltage of 10 V at t = 0.The current at t = 10 sec may be taken as

    (A) 5A   (B) 3.16A   (C) 0.5A   (D) 0A

25. Which of the following quantities is dimensionally different from the other three?

    (A) $\frac{L}{R}$ (B) RC   (C) $\frac{\omega L}{R}$ (D) $\frac{2\pi}{\omega}$

26. The sides of power triangle are x, y, and z as shown. With the usual notation x, y, z represent respectively

    (A) P, Q, S   (B) S, Q, P   (C) Q, P, S   (D) S, P, Q

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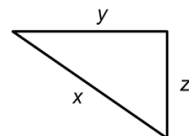
27. The transfer function $V_2(s) / V_1(s)$ is

(A) $\dfrac{1}{s+1}$

(B) $\dfrac{1}{s}$

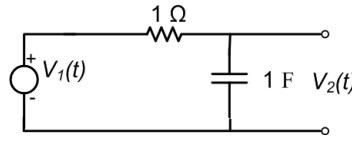(C) $\dfrac{s+1}{s}$

(D) $\dfrac{s}{s+1}$

28. Find the differential mode gain of the amplifier shown in fig. if $h_{ie} = 2.8$ k and $h_{fe} = 100$
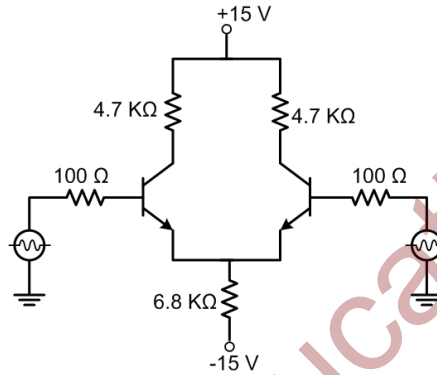
(A) 162

(B) 254

(C) 197

(D) 210

29. For an op amp having a slew rate of $3V/\mu$ sec, what is the maximum closed loop voltage gain that can be used when the input signal varies by 0.4 V in 12 μsec

(A) 120

(B) 90

(C) 300

(D) 100

30. The circuit shown below is equivalent of
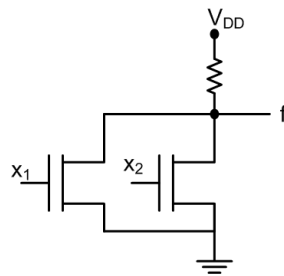
(A)

(B)

(C)

(D)

31. A network has the given truth table. f is given by

x_1	x_2	$f(x_1,x_2)$

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0	0	1
0	1	1
1	0	0
1	1	1

(A) $x_1 + x_2 + \bar{x}_2$　　(B) $\bar{x}_1 + \bar{x}_2 + x_1 x_2$　　　(C) $\bar{x}_1 + x_1 x_2$　　　(D) $x_1 x_2 + \bar{x}_2 \, x_1$

32. The turns ratio of autotransformer is $(N_{ac}/N_{bc}) = 1.5$

Considering equal loads and for the same heating in the windings, the ratio of equivalent resistance of auto transformer to that of two winding transformer (rating V_1/V_2) is

(A) $\frac{1}{2}$　　　　　　　(B) $\frac{1}{3}$　　　　　　　(C) $\frac{1}{6}$　　　　　　　(D) $\frac{1}{9}$

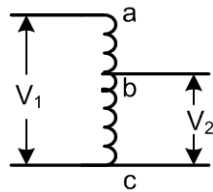33. Match the parts in list-I with that of machines in list-II.

l - Shaped ring　　　　　1- synchronous machine

m- compoles　　　　　2- 3-ph induction motor

n- damper bars　　　　3- single phase induction motor

k- slip rings　　　　　4- DC machines

(A) l-3　m-4　n-1　k-2　　(B) l-4　m-1　n-2　k-3

(C) l-1　m-2　n-3　k-4　　(D) l-2　m-3　n-4　k-1

34. Given the distribution of conductors in ac machine as shown in following figure, the following windings are possible

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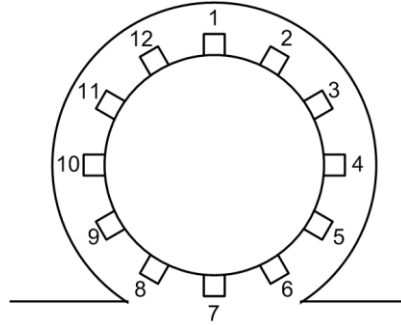
(A) 4-pole lap winding or 2- pole wave winding (B) 2-pole lap winding or 4- pole wave winding

(C) 4-pole lap winding or 4- pole wave winding (D) 2-pole lap winding or 2- pole wave winding

35. The technique used to improve input power factor in ac to dc converters (controlled rectifiers) with itself communicating switches.

   (A) Firing angle control   (B) AC applied voltage control

   (C) Symmetrical angle control   (D) Dual control

36. The applied voltage of a separately excited dc motor is suddenly changed by 1% in a short duration. Its armature resistance drop is 5%. Assuming speed cannot change in such short duration, the change in armature current will be

   (A) 5%   (B) 10%   (C) 15%   (D) 20%

37. The characteristic shown below is related a mode of dc shunt machine. Pick up correct circuit for the characteristic.
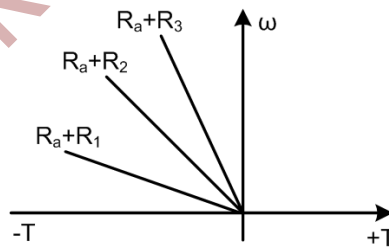
38. The shape of the disc of an induction disc relay is

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(A) circular   (B) spiral   (C) elliptical   (D) triangular

39. A zinc oxide non linear resistor block is rated at 4 kV. The number of blocks required for surge arrestor of 132 kV, 50 Hz system will be

    (A) 33   (B) 34   (C) 30   (D) 28

40. The transient stability limit of a power system can be increased by introducing

    (A) shunt capacitance   (B) shunt inductance   (C) series capacitance   (D) series inductance

41. Equal area criteria is applicable for

    (A) two machine system   (B) single machine system

    (C) multi machine system   (D) none of the above

42. The impedance value of the generator is 0.2 pu on a base value of 11 kV, 50 MVA. The impedance value for a base value of 22 kV, 150 MVA is

    (A) 0.3 pu   (B) 0.2 pu   (C) 0.15 pu   (D) 2.4 pu

43. The power system is subjected to a fault which makes the zero sequence component of current = zero. The nature of fault is

    (A) double line to ground fault   (B) double line fault

    (C) line to ground fault   (D) 3-phase to ground fault

44. Find the value of a^{729} where 'a' is an operator

    (A) 1.0   (B) a   (C) a^2 (D) 625

45. If the star point of an alternator is grounded through an impedance Z_a the zero sequence net impedance is

    (A) $Z_o - Z_n$ (B) $Z_o + Z_n$ (C) $Z_o + 3Z_n$ (D) $Z_o - 3Z_n$

46. The operator 'a' rotates the vector in anticlockwise direction by

    (A) 90 degrees   (B) 120 degrees   (C) 180 degrees   (D) -120 degrees

47. The current in the RLC series circuit shown in figure,

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200 cos (1000 t)
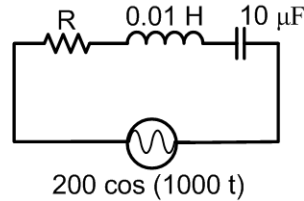
(A) is in phase with the applied voltage

(B) leads the applied voltage

(C) lags the applied voltage

(D) may lead or lag the applied voltage depending on the value of R

48. The Norton's resistance between terminals a-b of the circuit is

(A) $240/7\Omega$ (B) 36Ω (C) 150Ω (D) 24Ω

49. A saw-tooth wave form has a period of T and a maximum value of Y_m. The rms value of the wave is

(A) $Y_m/2$ (B) $Y_m/\sqrt{3}$ (C) Y_m/π (D) $2Y_m/\pi$

50. Read the statements P and Q and pick up correct option.
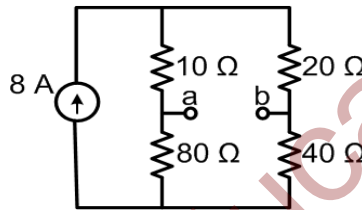
P: An inductor acts like a short circuit to dc

Q: The current through a capacitor cannot change abruptly

(A) both the statements are correct   (B) neither the statements are correct

(C) only statement P is correct   (D) only statement Q is correct

51. Tesla and lux are respectively the units of

(A) magnetic flux and illumination

(B) magnetic flux and luminous flux

(C) magnetic flux density and illumination

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(D) magnetic flux density and luminous flux

52. The Hay's bridge is used for measuring

   (A) the inductance of high Q-coils   (B) the inductance of low Q-coils

   (C) the frequency of the source   (D) the capacitance

53. In the two wattmeter method of 3-phase power measurement of balanced load one of the wattmeter reads negative. It may be concluded that the p.f. of the load is

   (A) 0   (B) 0.5   (C) <0.5   (D) >0.5

54. Normally which of the following has a negative temperature coefficient?

   (A) platinum   (B) thermistors   (C) copper   (D) nickle

55. Pick up the odd man out

   (A) moving iron meter   (B) moving coil meter

   (C) dynamo meter wattmeter   (D) watt-hour meter

56. A compensator has the transfer function of the form $\frac{K(s+3.618)}{(s+0.576)}$. The compensator is

   (A) lead compensator   (B) lag compensator

   (C) lag or lead compensator depending on the value of K   (D) lag-lead compensator

57. Principle of argument is the basis for

   (A) compensation using bode plots   (B) compensation using pole-placement

   (C) nyquist criterion   (D) R-H criterion

58. Read the statements P and Q and pick up correct option.

   P: the gain margin is determined from the gain cross over frequency

   Q: the phase margin is determined from the phase cross over frequency

   (A) only statement P is correct   (B) only statement Q is correct

   (C) neither of the statement is correct   (D) both the statements are correct

   59. The variation of pull in torque (i) and stator current (ii) with respect to brush lead (iii) for a repulsion motor would be

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(A)

(B)

(C)

(D)
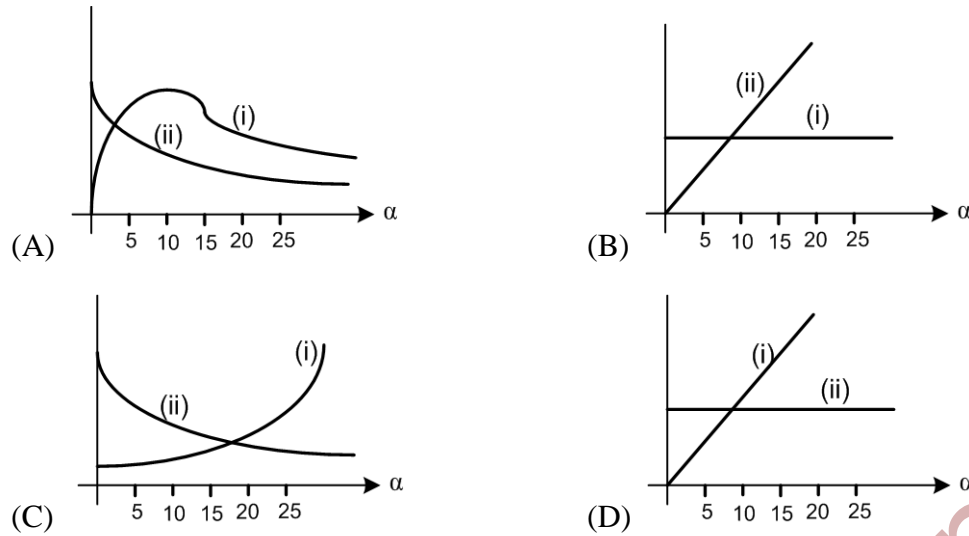
60. Symmetrical duplex wave windings are not possible in dc machines if

(A) number of pole pairs is divisible by 2

(B) number of slots is multiple of 2

(C) number of pole pairs is odd number

(D) number of commutator segments is multiple of 2

61. One of the important precautions to be taken care of while conducting fields test on dc series M.G set is

(A) speed must be maintained constant

(B) applied voltage to motor to be maintained at rated value

(C) generator current to be maintained constant

(D) generator field current to be maintained constant

62. A 3-phase squirrel cage induction motor draws 10 kW from mains when loaded at a slip of 0.05. The stator losses and mechanical losses are 1 kW and 550 W respectively. Its efficiency is

(A) 60%   (B) 70%   (C) 80%   (D) 90%

63. During reverse current braking of 3-phase induction motor, under no load condition, energy dissipated in motor circuit is

(A) equal to kinetic energy stored

(B) twice the kinetic energy stored

(C) three times the kinetic energy stored

(D) four times the kinetic energy stored

64. A 440 V, 50 Hz slip ring induction motor has delta connected stator and star connected rotor. Its stator to rotor turns ratio is 5. The resistance to be inserted into rotor/phase to restrict the starting current to 8.8A is

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(A) 2ohms   (B) 1 ohm   (C) 1.2 ohm   (D) 2.2ohm

65. If α is a skew angle of rotor bars in a squirrel cage induction motor the skew factor is

(A) cos α/2   (B) $\dfrac{\sin \alpha/2}{\alpha/2}$ (C) $\dfrac{\cos \alpha/2}{\alpha/2}$ (D) sin α/2

66. When V- curve of synchronous motor is obtained experimentally, it is frequency observed that the lowest point on V- curve does not indicate unity power factor this is

(A) due to variation and supply frequency

(B) due to inaccurate readings in meters

(C) due to harmonics arise from deviation of counter emf from simple sine wave

(D) due to increase in field current

67. A generating station has max. Demand of 30 MW, a load factor of 60% and a plant capacity factor 50% the reserve capacity of the plant is

(A) 5 MW   (B) 4 MW   (C) 6 MW   (D) 10 MW

68. In a power plant a reserve generating capacity which is not service but in not operation is known as

(A) hot reserve   (B) cold reserve   (C) firm not reserve   (D) spinning reserve

69. A distribution transformer of rating 11 kV/400 V (3-phase) is usually a

(A) star- star transformer   (B) delta-delta transformer

(C) star-delta transformer   (D) delta-star transformer

70. The insulation resistance of a cable of length 10 km is 1.0 Mega ohm. Its resistance for 50 km length will be

(A) 0.2 MΩ   (B) 5.0 MΩ   (C) 0.02 MΩ   (D) 2.0 MΩ

71. If the potential across string of insulator units assembly is 38 kV, number of insulator discs are 4 and voltage across the lower most disc is 12 kV, then the string efficiency is

(A) 79.16%   (B) 70%   (C) 50%   (D) 100%

72. Guard ring is used for

(A) increasing the potential across each unit   (B) equalizing the potential across each unit

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(C) decreasing the potential across each unit   (D) both A and B

73. An over head line has span of 220 meters. The line conductor weighs 700 kg per 1000 m, the max allowed tension in the line is 1400 kg, then max. sag in line is

(A) 3.02m   (B) 2.85m   (C) 2.45m   (D) 1.2m

74. The receiving end voltage and current are numerically equal to the corresponding sending end values that is $|V_s| = |V_r|$ and $|I_s| = |I_r|$ then such a line is called

(A) an infinite line   (B) a natural line   (C) a tuned line   (D) a loss less conductor

75. When the total charge in a capacitor is doubled, the energy stored

(A) remains same   (B) is halved   (C) is doubled   (D) is quadrupled

76. The dependent source in the circuit shown in classified as
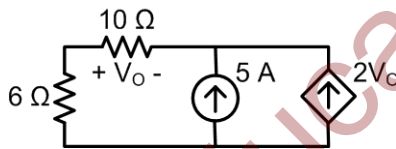
(A) VCCS   (B) VCVS   (C) CCCS   (D) CCVS

77. The equivalent resistance in ohms in the circuits shown as

(A) $\frac{1}{6}$ (B) 6   (C) $\frac{3}{4}$ (D) $\frac{4}{3}$

78. The current in the circuit is

(A) 9 A   (B) 7.75 A   (C) 10.25 A   (D) 4 A

79. A network has 12 branches and 8 independent loops the number of nodes in the network is

(A) 5   (B) 4   (C) 6   (D) 3

80. KVL is based on the principle of conservation of a change

(A) charge   (B) energy   (C) mass   (D) momentum

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81. The slope of the bode gain plot of the transfer function $\frac{Ks}{(s+1)(s+10)}$ between ω=1 and ω=10 is

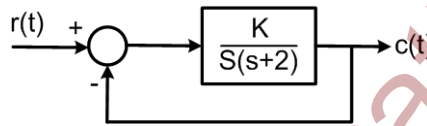   (A) zero slope   (B) -20 db/dec   (C) -40 db/dec   (D) 20 db/dec

82. A unity feedback system has forward path transfer function G(s)= $\frac{K}{s(s+4)(s+5)}$ the breakaway point lies between

    (A) -4 and -∞   (B) -4 and -5   (C) 0 and -5   (D) 0 and -4

83. If in force current analogy capacitance is analogous to

    (A) compliance of spring   (B) mass   (C) damping coefficient   (D) spring constant

84. The step response of the system for K=1 is

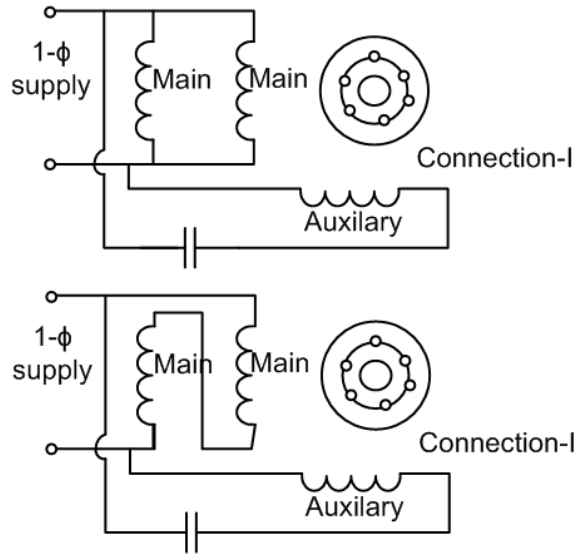   (A) over damped   (B) critically damped   (C) under damped   (D) un damped

85. The steady state error to a unit ramp input for a unity feedback system with transfer function $G(s) = 20 / s(s+2)(s^2+2s+2)$ is

    (A) 0   (B) 5   (C) 0.2   (D) ∞

86. The unit parabolic function may be regarded as the

    (A) the integral of the unit step   (B) the differential of the unit step

    (C) the differential of the unit ramp   (D) the integral of the unit ramp

87. The following are the 2 sets (I,II) of connections shown for a capacitor motor

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if T_1, T_2 are torques produced by connection I and II respectively the following is the correct option

(A) $T_1 > T_2$ (B) $T_1 = T_2$ (C) $T_1 < T_2$ (D) $T_1 << T_2$

88. The memory which needs refreshing

(A) ROM   (B) EPROM   (C) SRAM   (D) DRAM

89. The device which is used as voltage variable resistor

(A) BJT   (B) JFET   (C) SCR   (D) PN diode

90. Different tests conducted on an alternator yielded the following field currents.

I_{f0} = Field current required to produce rated voltage on open circuit

I_{f1} = Field current required to produce rated voltage at full load zpf leading

I_{f2} = Field current required to produce rated voltage at full load upf

I_{f3} = Field current required to produce rated voltage at full load zpf lagging

the lowest among the above field currents would be

(A) I_{fo} (B) I_{f1} (C) I_{f2} (D) I_{f3}

91. A synchronous motor has X_s = 1.0 pu. It operates at V = 1.0 pu. The pu value of current when $\overline{E}$ = 0.5 pu $< 0^o$ will be

(A) (0+ j0.5)   (B) (0.5+j0)   (C) (0.5+j0.5)   (D) (1+j1)

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92. An isolated generator (not connected infinite bus) is excited to produce rated voltage on open circuit. Its field current is kept unaltered when load of 0.8 leading is increased identify the variation of terminal voltage with load current
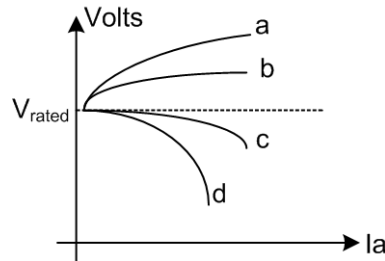
    (A) a   (B) b   (C) c   (D) d

93. The per phase induced emf of an alternator has an expression $e = 10 \sin\omega t + 2\cos(3\omega t + 90^o)$. The peak value of induced emf is

   (A) 10 V   (B) 11.5 V   (C) 12.0 V   (D) 13.2 V

94. A 3.3 kV/400 V, single phase transformer required 330 V to allow full load current at $\phi_{sc} = 75^o$. Its voltage regulation at full load, 0.707 lagging is

    (A) 4.33%   (B) 8.66%   (C) 16.2%   (D) 14.3%

95. The conductors of a 10 km long single phase two wire line are separated by distance of 1.5m. The diameter of each conductor is 1cm. If the conductors are of copper than inductance of the circuit is

    (A) 50 mH   (B) 45.3 mH   (C) 19.6 mH   (D) 23.8 mH

96. Given two speed times curves A and B the comparison of specific energy consumptions SEC_A, SEC_B is
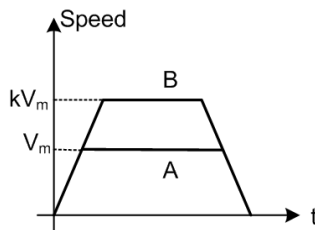
    (A) $SEC_A > SEC_B$ (B) $SEC_A < SEC_B$ (C) $SEC_A = \frac{1}{2} SEC_B$ (D) $SEC_A = SEC_B$

97. The unit of luminous flux is

    (A) lumens/m^2 (B) candela/m^2 (C) lumens   (D) steradians

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98. The tractive effort exerted by locomotive while hauling a train on a level track at 74.6 kmph is 36000 NW. The horse power output from locomotive is

   (A) 550   (B) 660   (C) 700   (D) 1000

99. The building measuring 30 m × 20 m is to be floodlit on front side with a brightness 25 lumens/sq.m. Coefficient of reflection of building surface is 0.25. Lamps of 500 W having lumens output of 8000 each is to be used. The number of lamps required is

   (A) 10   (B) 15   (C) 20   (D) 25

100.   In dielectric heating, if the distance between electrodes is equal to half the wavelength at a given frequency then

   (A)   the material will be uniformly heated   (B)   the material will not be uniformly heated

   (C)   maximum heat energy will be produced   (D)   both A and B are valid

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