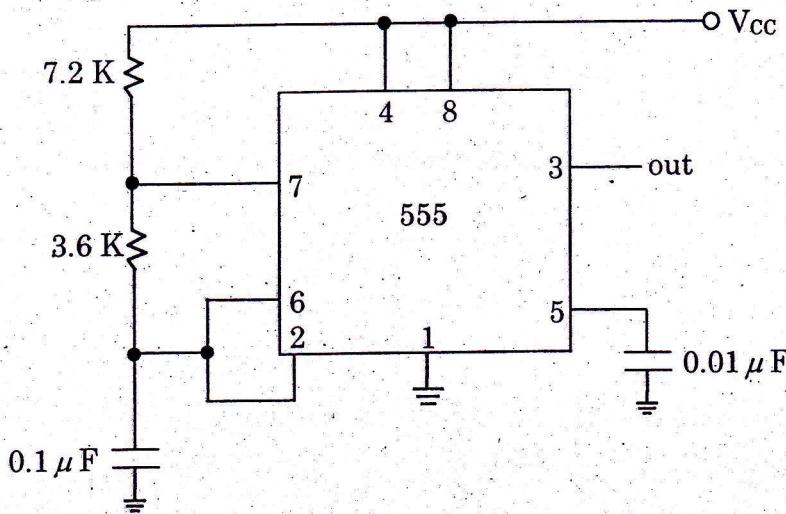
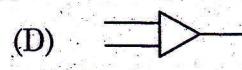
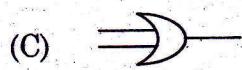
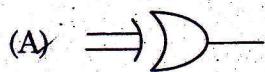


1. For the timer circuit shown, find the output frequency.



2. Identify the 1-bit comparator circuit



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

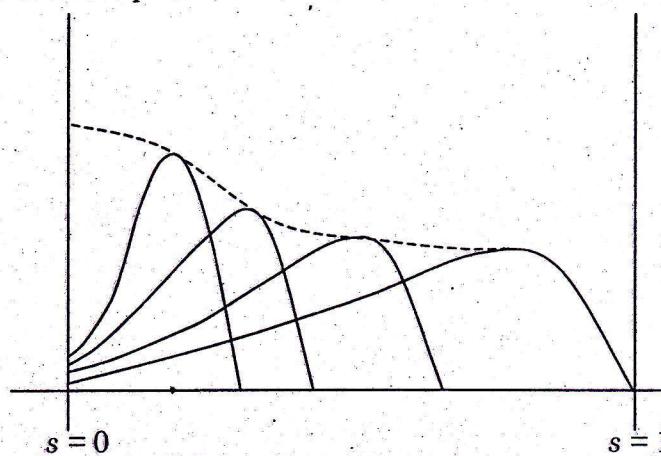
- (A) $T\bar{Q}_n + \bar{T}Q_n$ (B) $TQ_n + \bar{Q}_n$
 (C) $\bar{T}\bar{Q}_n$ (D) $T\bar{Q}_n$

4. The ADC having highest conversion speed is

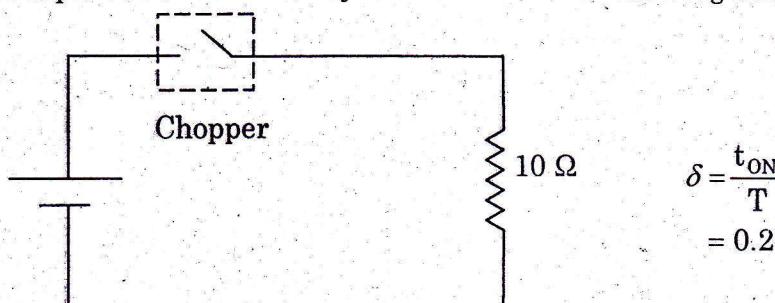
- (A) Dual-slope ADC
 - (B) Successive approximation ADC
 - (C) Flash ADC
 - (D) Servo ADC

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

6. The following characteristics of 3-phase induction motor refers to a speed control method.
Identify correct option.



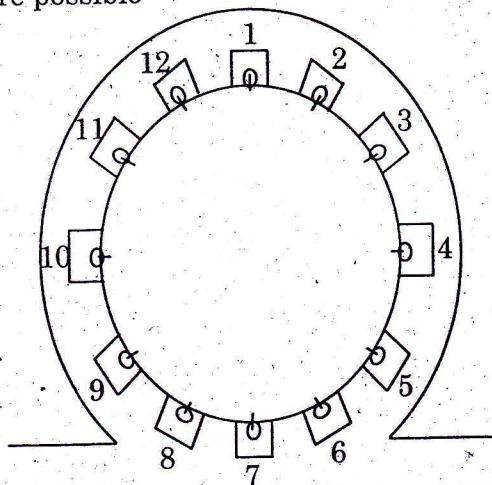
7. The effective input resistance seen by the source in the following circuit is



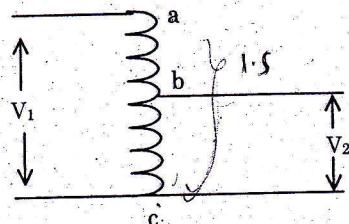
(A) 10Ω (B) 50Ω
 (C) 20Ω (D) 5Ω

8. 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

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



- (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
10. The turns ratio of autotransformer is $\frac{N_{ac}}{N_{bc}} = 1.5$



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) $\frac{1}{9}$

11. Match the parts in List-I with that of machines in List-II.

List-I

l - shaped ring

m - compoles

n - damper bars

k - slip rings

(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

List-II

1 - synchronous machine

2 - 3-ph induction motor

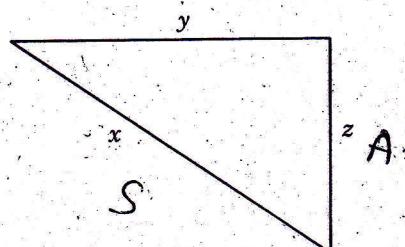
3 - single phase induction motor

4 - DC machine

12. A circuit with $R = 2\Omega$ and $L = 1 \text{ H}$ is excited by a step voltage of 10 V at $t = 0$. The current at $t = 10 \text{ s}$ may be taken as

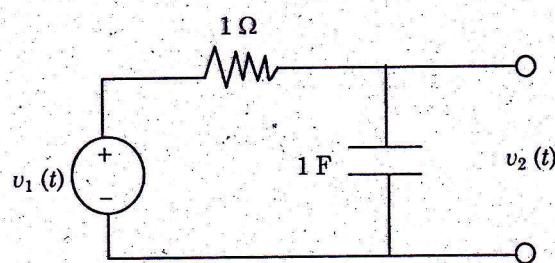
(A) 5 A (B) 3.16 A
(C) 0.5 A (D) 0 A

13. The sides of a 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

14. The transfer function $\frac{V_2(s)}{V_1(s)}$ is



(A) $\frac{1}{s+1}$ (B) $\frac{1}{s}$
(C) $\frac{s+1}{s}$ (D) $\frac{s}{s+1}$

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

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

16. 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) 25Ω
(C) 10Ω (D) 5Ω

17. 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) $Z_o - 3Z_n$
18. 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) Three phase to ground fault
19. Equal area criteria is applicable for
- (A) Two machine system (B) Single machine system
 (C) Multi machine system (D) None of the above
20. 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
21. The operator 'a' rotates the vector in anticlockwise direction by
- (A) 90 degrees (B) 120 degrees
 (C) 180 degrees (D) -120 degrees
22. Find the value of a^{729} where 'a' is an operator
- (A) 1.0 (B) a
 (C) a^2 (D) 625
23. The impedance value of a 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
24. 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
25. The shape of the disc of an induction disc relay is
- (A) Circular (B) Spiral
 (C) Elliptical (D) Triangular

26. If α is skew angle of rotor bars in a squirrel cage induction motor the skew factor is
- (A) $\cos \alpha/2$ (B) $\frac{\sin \alpha/2}{\alpha/2}$
 (C) $\frac{\cos \alpha/2}{\alpha/2}$ (D) $\sin \alpha/2$
27. During reverse current braking of 3-phase induction motor, under no load condition, energy dissipated in rotor 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
28. 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
29. When V-curve of synchronous motor is obtained experimentally, it is frequently observed that the lowest point on V-curve does not indicate unity power factor. This is
- (A) due to variations in 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
30. A 440 V, 50 Hz slip ring induction motor has a 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 8.8 A is
- (A) 2 ohms (B) 1 ohm
 (C) 1.2 ohm (D) 2.2 ohms
31. 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) 70% (B) 80%
 (C) 90% (D) 60%
32. Symmetrical duplex wave windings are not possible in dc machines if
- (A) no. of pole pairs is divisible by 2
 (B) no. of slots is multiple of 2
 (C) no. of pole pairs is odd number
 (D) no. of commutator segments is multiple of 2

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

- P : The gain margin is determined from the gain at the gain cross-over frequency.
 Q : The phase margin is determined from the phase at the phase-cross over frequency.
 (A) Only statement P is correct (B) Only statement Q is correct
 (C) Neither of the statements is correct (D) Both the statements are correct

34. 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

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

- (A) Platinum (B) Thermistors
 (C) Copper (D) Nickel

36. 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

37. Principle of argument is the basis for

- (A) Compensation using bode plots (B) Compensation using pole-placement
 (C) Nyquist criterion (D) R-H criterion

38. Pick the odd man out.

- (A) Moving iron meter (B) Moving coil meter
 (C) Dynamometer wattmeter (D) Watt-hour meter

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

- (A) zero (B) 0.5
 (C) less than 0.5 (D) greater than 0.5

40. 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
 (D) magnetic flux density and luminous flux

41. 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

42. The equivalent resistance in ohms in the circuit shown is

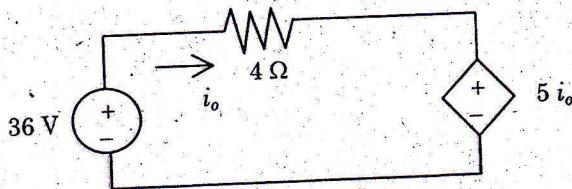


(A) $\frac{1}{6}$ (B) 6
(C) $\frac{3}{4}$ (D) $\frac{4}{3}$

43. When the total charge in a capacitor is doubled, the energy stored
(A) remains the same (B) is halved
(C) is doubled (D) is quadrupled

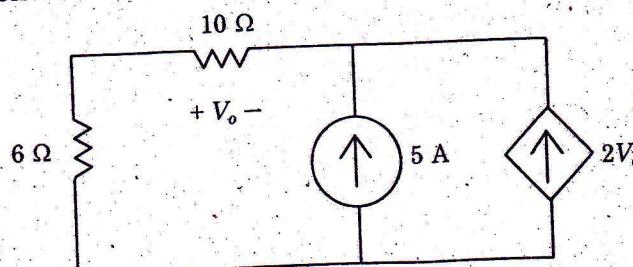
44. KVL is based on the principle of conservation of
(A) charge (B) energy
(C) mass (D) momentum

45. The current in the circuit is

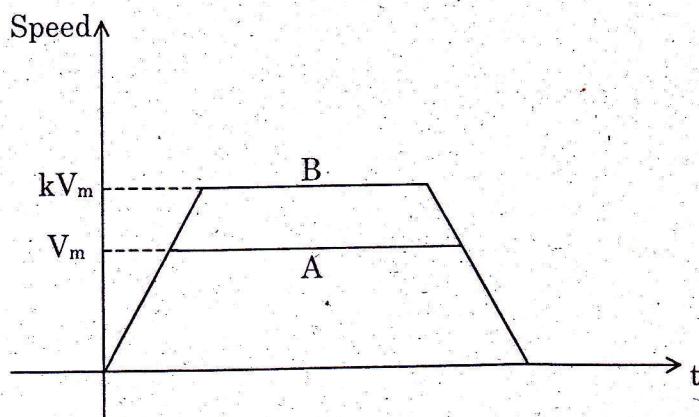


(A) 9 A (B) 7.75 A
(C) 10.25 A (D) 4 A

46. The dependent source in the circuit shown is classified as



(A) VCCS (B) VCVS
(C) CCCS (D) CCVS

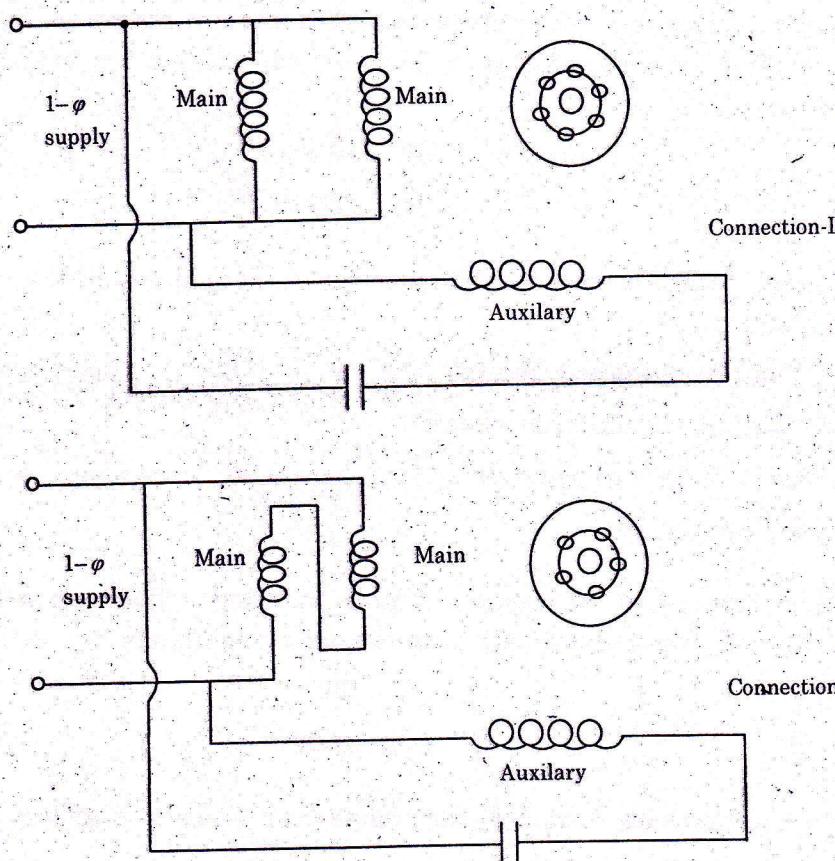


- (A) $SECA > SEC_B$ (B) $SECA < SEC_B$
 (C) $SECA = \frac{1}{2} SEC_B$ (D) $SECA = SEC_B$

53. The device which is used as voltage variable resistor

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

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



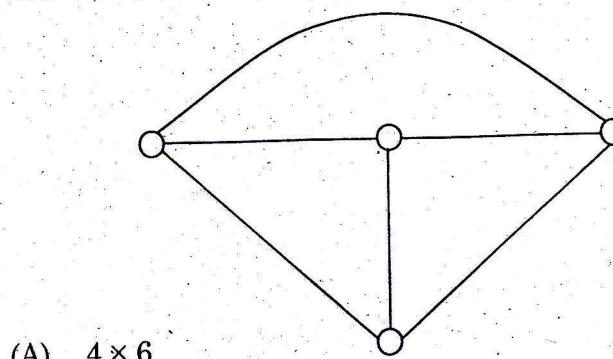
If T_1 , T_2 are torques produced by connection I and II respectively, the following is the correct option.

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

55. The memory which needs refreshing

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

56. The reduced incidence matrix of the graph shown in figure is of the order

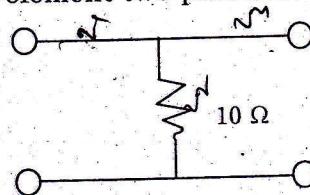


- (A) 4×6
(C) 3×6
(B) 6×4
(D) 4×5

$$Z_1 = 0, Z_3 = 0$$

$$\left[\begin{array}{c} Z_1 \\ Z_2 \\ Z_2 + Z_3 \\ Z_3 \end{array} \right] = \left[\begin{array}{c} 0 \\ 10 \\ 10 \\ 10 \end{array} \right]$$

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

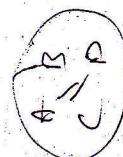


- (A) 10Ω
(C) 0Ω
(B) 0.1Ω
(D) nonexistent

$$y_{11} = \frac{Z_1}{Z_1 + Z_2}$$

58. Which of the following is true for the Fourier coefficients of an odd function?

- (A) $a_0 = 0$ $a_n = 0$ $b_n \neq 0$
 (B) $a_0 \neq 0$ $a_n \neq 0$ $b_n = 0$
 (C) $a_0 \neq 0$ $a_n = 0$ $b_n \neq 0$
 (D) $a_0 = 0$ $a_n \neq 0$ $b_n \neq 0$



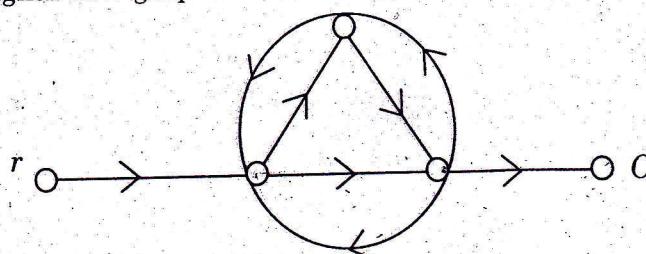
59. Which of the following functions is not an even function?

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

60. Which of the following pairs of h -parameters has the same dimensions?

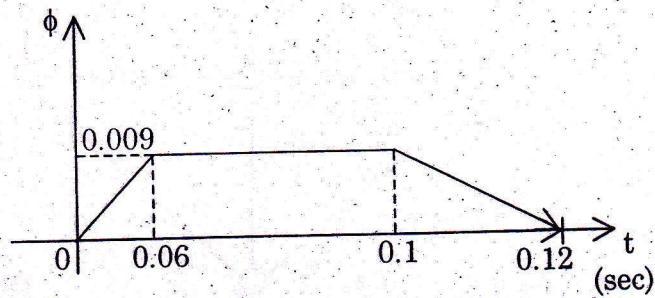
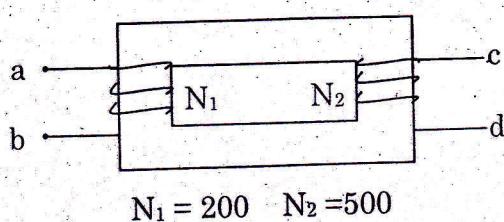
- (A) h_{11} and h_{12}
 (B) h_{12} and h_{21}
 (C) h_{11} and h_{22}
 (D) h_{12} and h_{22}

61. The signal flow graph shown in figure has

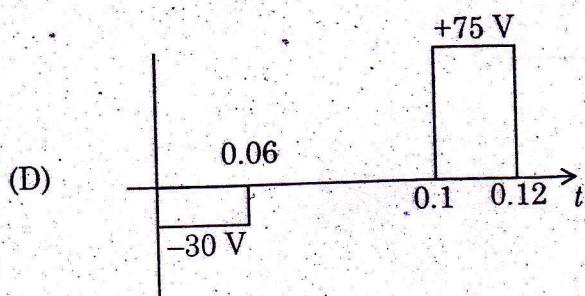
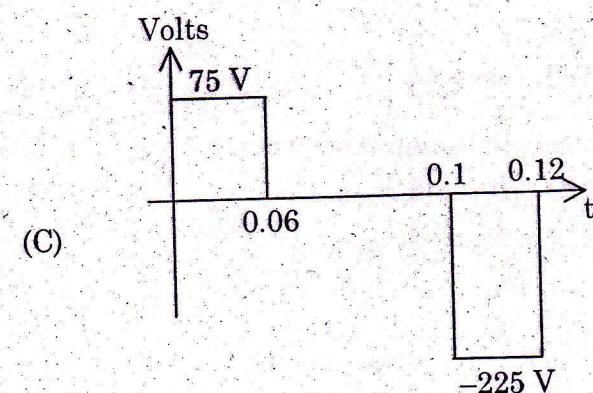
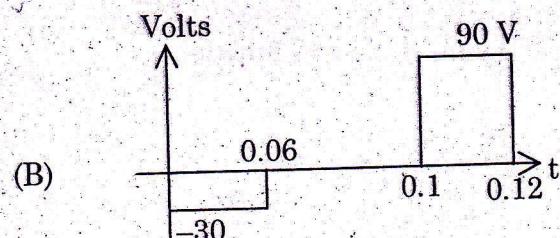
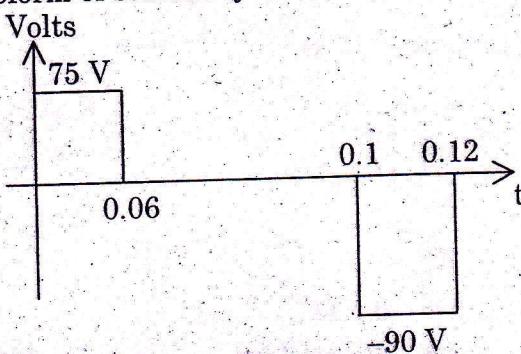


- (A) 2 forward paths and 5 loops
 (B) 2 forward paths and 4 loops
 (C) 1 forward path and 5 loops
 (D) 1 forward path and 4 loops

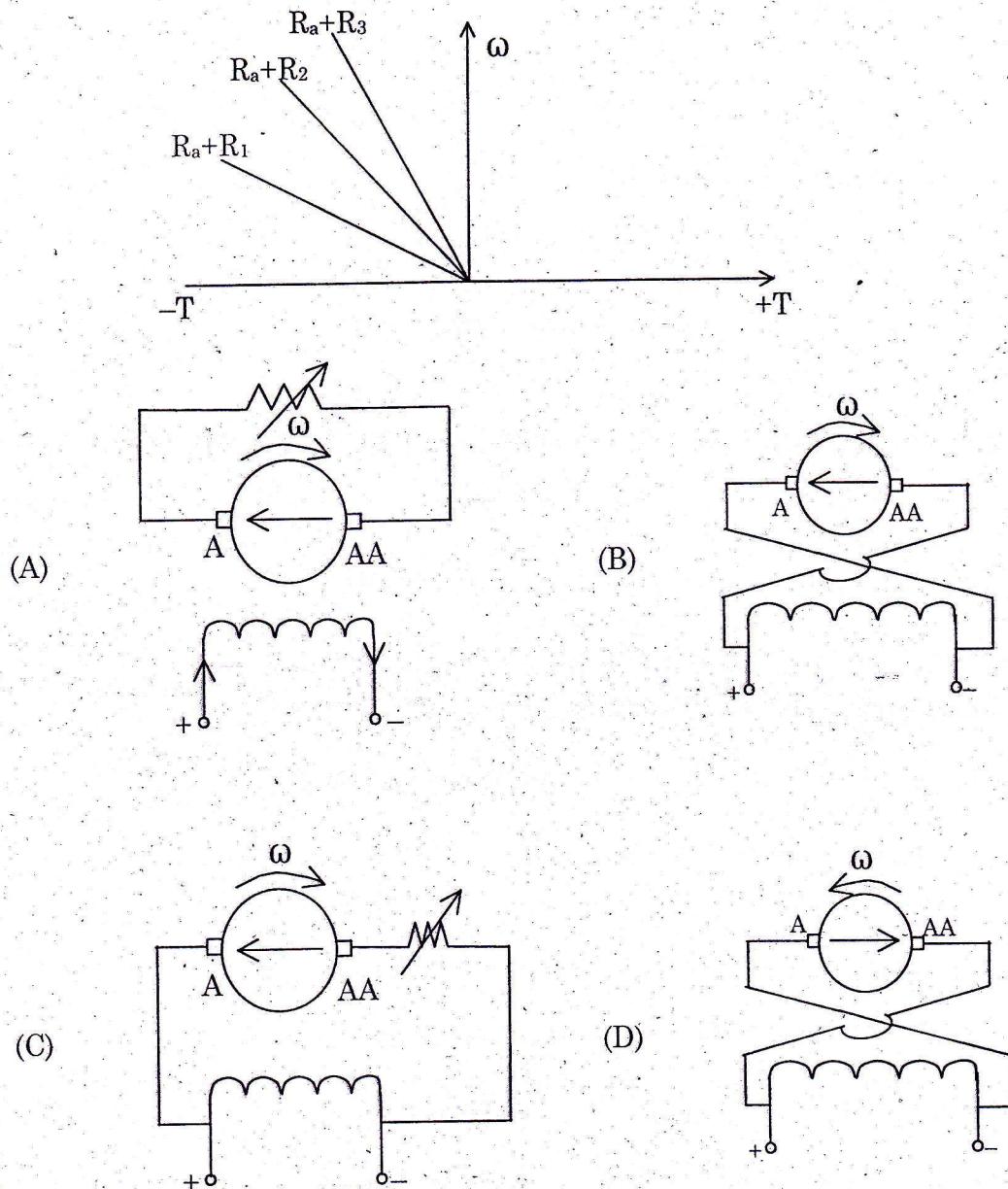
62. The core of a two winding transformer is subjected to magnetic flux variation shown below :



The waveform of secondary induced emf would be



70. The characteristic shown below is related to a mode of dc shunt machine. Pick up correct circuit for the characteristic.



73. A network has the given truth table.

x_1	x_2	$f(x_1, x_2)$
0	0	1
0	1	1
1	0	0
1	1	1

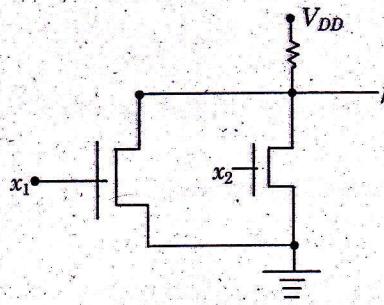
f is given by

- (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) $x_1 x_2 + \bar{x}_2 x_1$

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

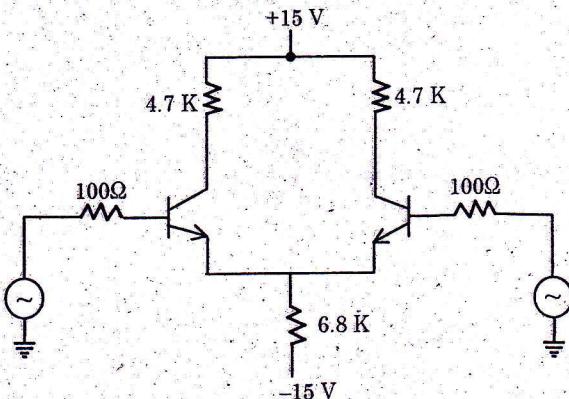
- (A) 120 (B) 90
 (C) 300 (D) 100

75. The circuit shown below is equivalent of



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

76. Find the differential mode gain of the amplifier shown in fig. if $h_{ie} = 2.8 \text{ K}$ and $h_{fe} = 100$.



- (A) 162 (B) 254
 (C) 197 (D) 210

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

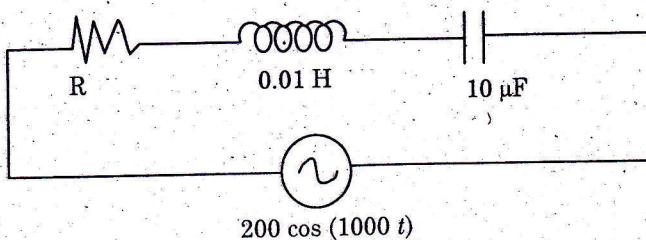
(A) $\frac{Y_m}{2}$

(B) $\frac{Y_m}{\sqrt{3}}$

(C) $\frac{Y_m}{\pi}$

(D) $\frac{2Y_m}{\pi}$

78. The current in the RLC series circuit shown



- (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

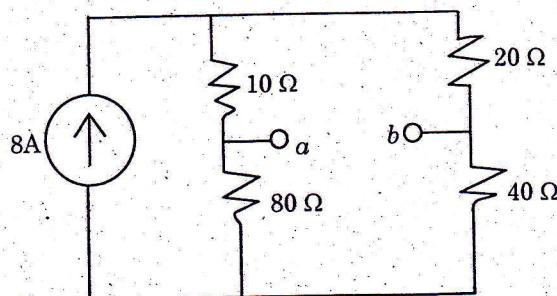
79. Read the statements P and Q and pick up correct option.

P : An inductor acts like a short circuit to d.c.

Q : The current through a capacitor cannot change abruptly

- (A) Both the statements P and Q are correct
- (B) Neither of the statements is correct
- (C) Only statement P is correct
- (D) Only statement Q is correct

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



(A) $\frac{240}{7} \Omega$

(B) 36Ω

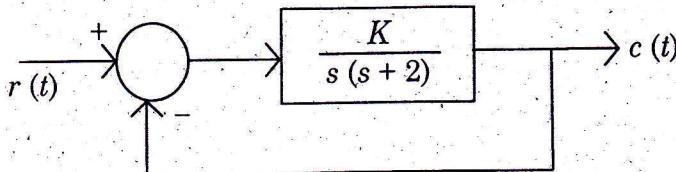
(C) 150Ω

(D) 24Ω

82. 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

83. The step-response of the system for $K=1$ is



- (A) over-damped
- (B) critically damped
- (C) under-damped
- (D) undamped

84. A unity-feedback system has forward-path transfer function

$$G(s) = \frac{K}{s(s+4)(s+5)}$$

The break-away point lies between

- (A) -4 and $-\infty$
- (B) -4 and -5
- (C) 0 and -5
- (D) 0 and -4

85. In force-current analogy capacitance is analogous to

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

86. The steady state error to a unit ramp input for a unity feedback system with transfer function

$$G(s) = \frac{20}{s(s+2)(s^2 + 2s + 2)}$$

- (A) 0
- (B) 5
- (C) 0.2
- (D) ∞

$$ess = \frac{1}{s} \left(\frac{20}{s^2 + 2s + 2} \right)$$

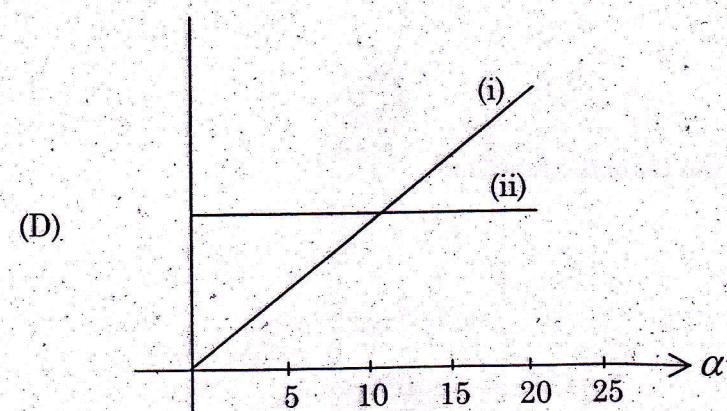
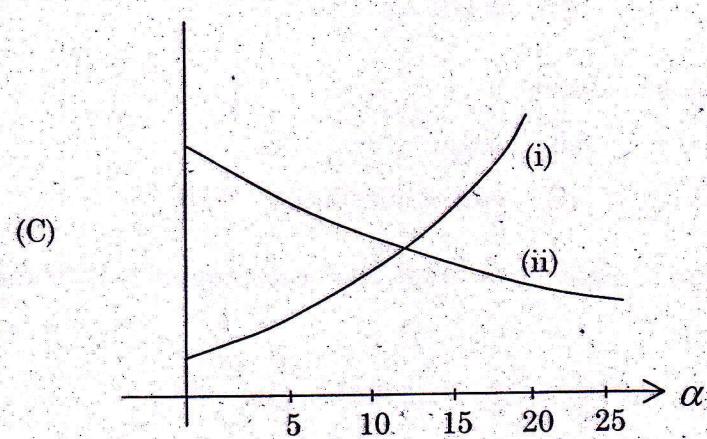
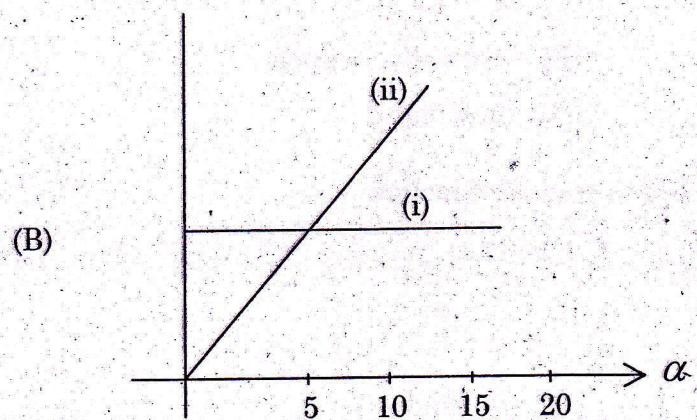
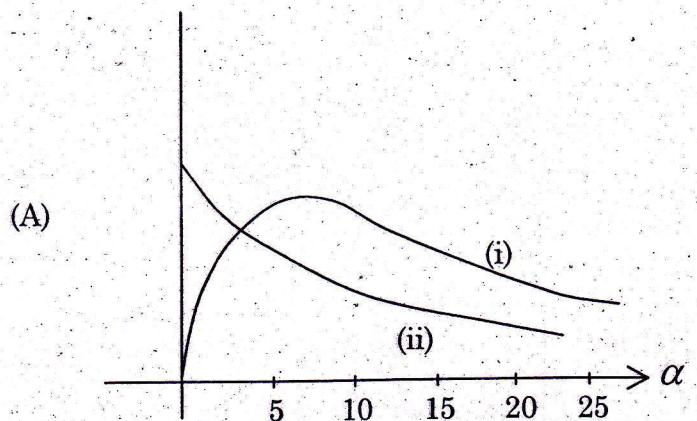
87. The slope of the bode gain plot of the transfer function

$$\frac{Ks}{(s+1)(s+10)}$$

between $\omega=1$ and $\omega=10$ is

- (A) zero slope
- (B) -20 dB/decade
- (C) -40 dB/decade
- (D) +20 dB/decade

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



88. An over head line has span of 220 meters. The line conductor weighs 700 Kg per 1000 meters, the max. allowed tension in the line is 1400 Kg. then max. Sag in line is
 (A) 3.02 m (B) 2.85 m
 (C) 2.45 m (D) 1.2 m

89. If the potential across string of insulator units assembly is 38 kV, no. 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 %

90. 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

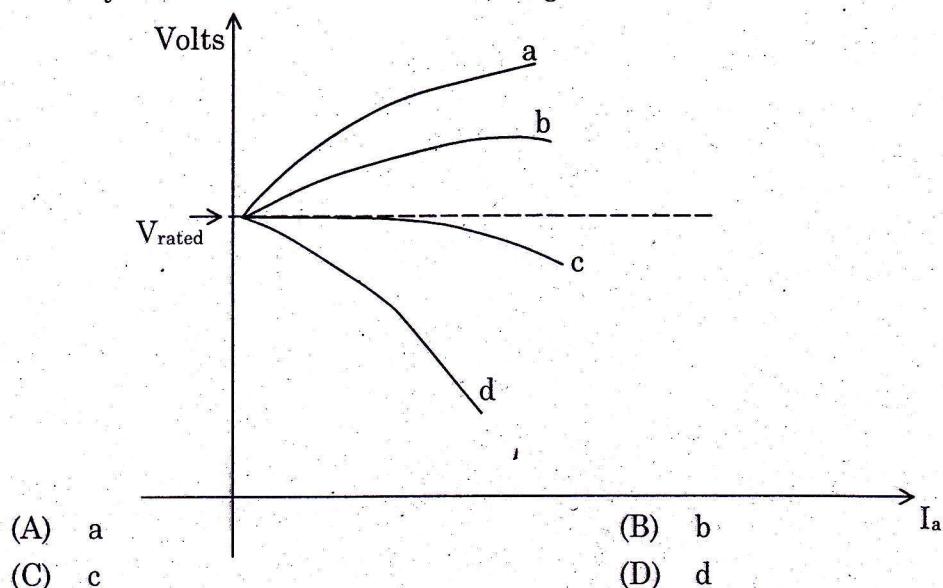
91. A generating station has max. Demand of 30 MW, a load factor of 60% and a plant capacity factor 50%, the reserve capacity of the plant is
 (A) 5 MW (B) 4 MW
 (C) 6 MW (D) 10 MW

92. The receiving end voltage and current are numerically equal to the corresponding sending end values that is $|Vs| = |Vr|$ and $|Is| = |Ir|$ then such a line is called
 (A) An infinite line (B) A natural line
 (C) A tuned line (D) A loss less line conductor

93. Guard ring is used for
 (A) Increasing the potential across each unit
 (B) Equalizing the potential across each unit
 (C) Decreasing the potential across each unit
 (D) Both (A) and (C)

94. The insulation resistance of a cable of length 10 Km is 1.0 Mega ohm. Its resistance for 50 Km length will be
 (A) 0.02 Mega ohms (B) 5.0 Mega ohms
 (C) 0.2 Mega ohms (D) 2.0 Mega ohms

95. In a power plant a reserve generating capacity which is not in service but is in operation is known as
 (A) Hot reserve (B) Cold reserve
 (C) Firm hot reserve (D) Spinning reserve



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

I_{f_0} = Field current required to produce rated voltage on open circuit

I_f = Field current required to produce rated voltage at full load zpf leading

I_{f_0} = Field current required to produce rated voltage at full load upf

I_f = Field current required to produce rated voltage at full load zpf lagging

The lowest among the above field currents would be

- (A) I_{f_0} (B) I_{f_3}
 (C) I_f (D) I_{f_1}

99. The per phase induced emf of an alternator has an expression

$$e=10\sin wt + 2\cos(3wt + 90^\circ)$$

The peak value of induced emf is

100. A synchronous motor has $X_s = 1.0$ pu. It operates at $V = 1.0$ pu. The pu value of current when $\bar{E} = 0.5 \angle 0^\circ$ pu will be

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