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Question Booklet No.

QUESTION BOOKLET

ELECTRICAL ENGINEERING

Booklet Series

A

Roll No. | | | | | |

(Enter your Roll number in the above space)

Time Allowed : 2 Hours **Maximum Marks : 100**

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   (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **0.25 mark** assigned to that question will be deducted as penalty.

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1. A resistance of 10 Ω is connected in one branch of a linear network. The current in this branch is 5 A. If this resistor is replaced by 5 Ω, the maximum value of the current in this branch can be

[A] 15 A

[B] 10 A

[C] 20 A

[D] 25 A

2. A non-ideal voltage source has a source impedance Z_S with a resistive load, then at what value of load resistance the maximum power is transferred to load?

[A] Load resistance is equal to source resistance

[B] Load resistance is equal to complex conjugate of Z_S

[C] Load resistance is equal to magnitude of Z_S

[D] Load resistance is equal to source reactance

3. For a series *R-L-C* circuit at resonance condition, the power factor of the circuit at upper half power frequency is

[A] leading

[B] lagging

[C] unity

[D] zero

4. In a two-wattmeter method of power measurement, one of the wattmeters will show zero reading when the power factor of load is

[A] zero

[B] 0·5

[C] more than 0·5

[D] unity

5. The average power delivered to an impedance $(10 - j8)$ ohm by a current $20\cos(314t + 30°)$A is

[A] 200 W

[B] 500 W

[C] 1000 W

[D] 2 kW

6. A circular disc of radius 4 m with a charge density $\rho_s = 12 \sin\phi\ \mu C/m^2$ is enclosed by surface *S*, net flux (in μC) crossing *S* is

[A] 0

[B] 2

[C] 5

[D] 10

7. For the signal $f(t) = 3\sin 8\pi t + 6\sin 12\pi t + \sin 14\pi t$, the minimum sampling frequency (in Hz), satisfying the Nyquist criterion is

[A] 16

[B] 24

[C] 28

[D] 14

8. If $F(z) = (z^2 + z)/(z^2 - 2z + 1)$ is *z*-transform of sequence $f(k)$, then the value of $f(2)$ is

[A] 1

[B] 3

[C] 5

[D] 7

9. A system is defined by its impulse response $h(n) = 2^n u(n-2)$. The system is

[A] stable and causal

[B] causal but not stable

[C] stable but not causal

[D] unstable and non-causal

10. The ratio of starting to maximum torque of an induction motor is 0·5. If the rotor resistance of the motor is increased, this ratio

[A] will remain constant

[B] will decrease

[C] cannot be determined

[D] will increase

11. If a transformer is operated at rated frequency but at a voltage less than its rated value, no load current and iron loss as compared to their rated values will

[A] increase, decrease respectively

[B] both decrease

[C] decrease, increase respectively

[D] both increase

12. The no-load speed of a 250 V, separately excited DC motor is 25 radians/s. The armature resistance drop and brush drop are neglected. The field current is kept constant at rated value. The torque of the motor in N-m for an armature current of 10 A is

[A] 50

[B] 100

[C] 150

[D] 200

13. In an induction motor, the rotor field runs with respect to the stator field at

[A] synchronous speed in the same direction as the stator field

[B] the slip speed in the same direction as the stator field

[C] synchronous speed in the opposite direction as the stator field

[D] zero speed

14. A synchronous motor is operating on no-load at unity power factor. If the field current is reduced, then

[A] both power factor and current will decrease

[B] power factor will decrease whereas current will increase

[C] both power factor and current will increase

[D] power factor will increase whereas current will decrease

15. A 3-phase, 4-wire star-connected load takes line current of $5 \angle 90°$ A, $5 \angle -90°$ A and 5 A. The neutral current is

[A] 5 A

[B] 0 A

[C] 10 A

[D] 15 A

16. The power input to an induction motor is 100 kW when it runs at 2% slip. The stator losses are assumed negligible. Rotor copper loss is

[A] 2 kW

[B] 4 kW

[C] 98 kW

[D] 1 kW

17. In a thermal power plant, the feed water coming to the economiser is heated using

[A] HP steam

[B] direct heat in the furnace

[C] LP steam

[D] flue gases

18. The inertia constant of a 100 MVA, 50 Hz, 4-pole generator is 10 MJ/MVA. If the mechanical input to the machine is suddenly raised from 50 MW to 75 MW, then the rotor acceleration will be equal to

[A] 22·5 electrical degree/s^2

[B] 225 electrical degree/s^2

[C] 125 electrical degree/s^2

[D] 12·5 electrical degree/s^2

19. The insulation resistance of a 30 km long underground cable is 10 MΩ. Other things being the same, the insulation resistance of a 15 km long cable will be

[A] 20 MΩ

[B] 40 MΩ

[C] 5 MΩ

[D] 10 MΩ

20. A synchronous generator connected to an infinite bus having $E_f = 1{\cdot}3$ pu, $X_S = 1{\cdot}1$ pu and delivering power 0·6 pu. The reactive power delivered under this condition is (neglect resistance of generator)

[A] 0·21 pu

[B] 0·11 pu

[C] 0·15 pu

[D] 0·01 pu

21. The open-loop transfer function of a unity-gain feedback control system is given by $G(s) = \dfrac{2}{(s+1)(s+2)}$, the gain margin of the system in dB is

[A] zero

[B] one

[C] five

[D] ∞

22. For a feedback control system with a characteristic equation $1 + \dfrac{K}{s(s+1)(s+3)} = 0$, the break-away point on real axis as K increases is

[A] −1·577

[B] −0·423

[C] −1·605

[D] −1·005

23. The impulse response of an LTI system is a unit ramp function, the transfer function of the system is

[A] $1/s^2$

[B] $1/s$

[C] 1

[D] $2/s^3$

24. The initial slope of Bode plot for a transfer function having double pole at origin is

[A] 20 dB/decade

[B] −20 dB/decade

[C] −40 dB/decade

[D] −60 dB/decade

25. In RH criteria, if all the elements in a row are zeros, it indicates that roots lie on the

[A] origin

[B] positive real axis

[C] imaginary axis

[D] negative real axis

26. A 0–200 V voltmeter has an accuracy of 2 percent at full-scale reading. What will be the error (in %) if it reads 50 V?

[A] 1

[B] 2

[C] 4

[D] 8

27. A 10 bit A/D converter is used to digitise an analog signal in the 0 to 5 V range. The maximum peak to peak ripple voltage that can be allowed in the DC supply voltage is

[A] nearly 100 mV

[B] nearly 5·0 mV

[C] nearly 25 mV

[D] nearly 75 mV

28. In common emitter amplifier, the un-bypassed emitter resistance provides

[A] current-series feedback

[B] voltage-shunt feedback

[C] negative voltage feedback

[D] positive current feedback

29. A single-phase full converter with *R-L* load can be operated in

[A] first quadrant only

[B] first and second quadrants only

[C] first and fourth quadrants only

[D] all four quadrants

30. A single-phase full-bridge VSI operating in square-wave mode supplies a purely inductive load. If the inverter time period is T, then the time duration for which each of the feedback diodes conduct in a cycle is

[A] T

[B] $T/4$

[C] $T/2$

[D] $T/8$

31. A DC-DC boost converter, operating in continuous conduction mode, is supplying a load at 400 V with input voltage of 200 V. The off-time of the switch is 20 μs. The operating frequency of the converter is

[A] 25 kHz

[B] 50 kHz

[C] 100 kHz

[D] 200 Hz

32. In a series *R-L-C* high Q circuit, the current peaks at a frequency

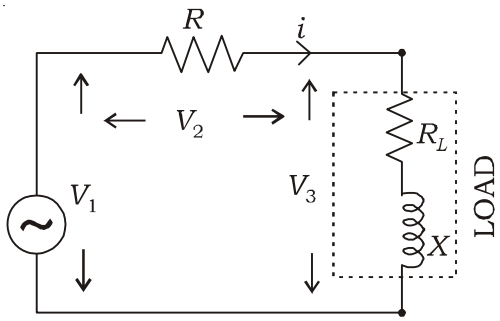
[A] equal to resonant frequency

[B] greater than the resonant frequency

[C] less than the resonant frequency

[D] None of the above

Direction (Q. Nos. 33 and 34) : In the circuit shown below, the three voltmeter readings are $V_1 = 220$ V, $V_2 = 122$ V and $V_3 = 136$ V :



33. The power factor of the load is

[A] 0·45

[B] 0·50

[C] 0·55

[D] 0·60

34. The $R_L = 5\ \Omega$, the approximate power consumption of the load is

[A] 700 W

[B] 750 W

[C] 800 W

[D] 850 W

35. A capacitor used for power factor correction in single-phase circuit decreases

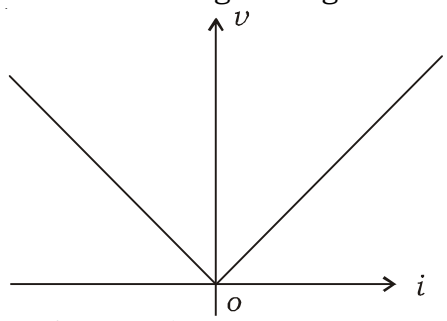
[A] the power factor

[B] the line current

[C] both the line current and the power factor

[D] the line current and increases the power factor

36. The v-i characteristics of an element is shown in the given figure.



The element is

[A] non-linear, active, non-bilateral

[B] linear, active, non-bilateral

[C] non-linear, passive, non-bilateral

[D] non-linear, active, bilateral

37. Two heaters rated at 1000 W, 250 V each, are connected in series across a 250 V, 50 Hz AC mains. The total power drawn from the supply would be

[A] 1000 W

[B] 500 W

[C] 250 W

[D] 2000 W

38. A circular loop has its radius increasing at the rate of 2 m/s. The loop is placed perpendicular to a constant magnetic field of 0·1 Wb/m^2. When the radius of the loop is 2 m, the e.m.f. induced in the loop will be

[A] 0·8π V

[B] 0·4π V

[C] 0·2π V

[D] zero

39. The mutual inductance between two coupled coils is 10 mH. If the turns in one coil are doubled and that in the other are halved, then the mutual inductance will be

[A] 5 mH

[B] 10 mH

[C] 14 mH

[D] 20 mH

40. The energy stored in the magnetic field of a solenoid 30 cm long and 3 cm in diameter wound with 1000 turns of wire carrying current of 10 A is

[A] 0·015 J

[B] 0·15 J

[C] 0·5 J

[D] 1·15 J

41. Consider the function

$$F(s) = \frac{5}{s(s^2 + 3s + 1)}$$

where $F(s)$ is Laplace transform of function $f(t)$. The initial value of $f(t)$ is

[A] 5

[B] 5/2

[C] 5/3

[D] 0

42. Given two continuous time signals $x(t) = e^{-t}$ and $y(t) = e^{-2t}$ which exist for $t > 0$, the convolution $z(t) = x(t) * y(t)$ is

[A] $e^{-t} - e^{-2t}$

[B] e^{-3t}

[C] e^{+t}

[D] $e^{-t} + e^{-2t}$

43. Match the following :

List—I	**List—II**
a. Even Signal	1. $x(n) = \left(\frac{1}{4}\right)^n u(n)$
b. Causal Signal	2. $x(-n) = x(n)$
c. Periodic Signal	3. $x(t)u(t)$
d. Energy Signal	4. $x(n) = x(n + N)$

Codes :

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

44. Let $x(t) \leftrightarrow X(j\omega)$ be Fourier transform pair. The Fourier transform of the signal $x(5t-3)$ in terms of $X(j\omega)$ is given as

[A] $\frac{1}{5}e^{-\frac{j3\omega}{5}}X\left(\frac{j\omega}{5}\right)$

[B] $\frac{1}{5}e^{\frac{j3\omega}{5}}X\left(\frac{j\omega}{5}\right)$

[C] $\frac{1}{5}e^{-j3\omega}X\left(\frac{j\omega}{5}\right)$

[D] $\frac{1}{5}e^{j3\omega}X\left(\frac{j\omega}{5}\right)$

45. The output $y(t)$ of a causal LTI system described by $H(s)=\frac{(s+1)}{s^2+2s+2}$ for a given input $x(t)=e^{-t}u(t)$ is

[A] $y(t)=e^{-t}\sin t\, u(t)$

[B] $y(t)=e^{-(t-1)}\sin(t-1)\,u(t-1)$

[C] $y(t)=\sin(t-1)\,u(t-1)$

[D] $y(t)=e^{-t}\cos t\, u(t)$

46. Which of the following losses occurring in a DC machine varies significantly with the load?

[A] Armature copper loss

[B] Shunt field copper loss

[C] Magnetic or iron loss

[D] Mechanical loss

47. The armature core of a DC machine gets overheated due to

[A] copper loss occurring in the armature winding only

[B] eddy-current loss only

[C] hysteresis loss only

[D] All of the above

48. The armature resistance of a PMDC motor is 0·8 ohm. At no-load, the motor draws 1·5 A from a supply voltage of 25 V and runs at 1500 r.p.m. The efficiency of the motor while it is operating on load at 1500 r.p.m. drawing a current of 3·5 A from the same source will be

[A] 48%

[B] 57·1%

[C] 59·2%

[D] 88·8%

49. The low voltage winding of a 400/230 V single-phase 50 Hz transformer is to be connected to a 25 Hz supply. In order to keep the magnetization current at the same level in both the cases, the voltage at 25 Hz should be

[A] 230 V

[B] 460 V

[C] 115 V

[D] 65 V

50. A 50 Hz transformer having equal hysteresis and eddy-current losses at rated excitation is operated at 45 Hz at 90% of its rated voltage. Compared to rated operating point, the core losses under this condition

[A] are reduced by 10%

[B] are reduced by 19%

[C] are reduced by 14·5%

[D] remain unchanged

51. The phasor diagram of a transformer on load can be drawn only if you know

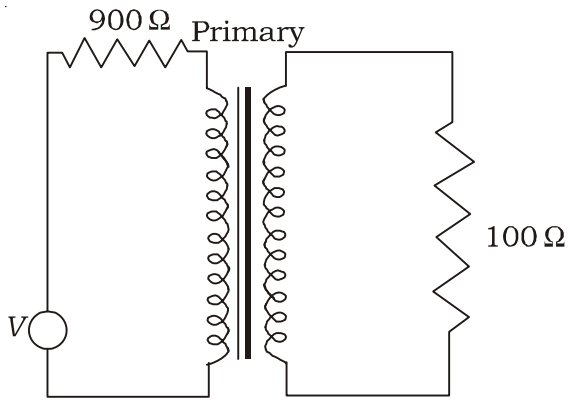
[A] equivalent circuit parameters of the transformer

[B] load current

[C] load p.f.

[D] All of the above

52. Consider the circuit shown in the given figure.



For maximum power transfer to the load, the primary to secondary turn-ratio may be

[A] 9 : 1

[B] 3 : 1

[C] 1 : 3

[D] 1 : 9

53. Match the machine characteristics given in List—I with their corresponding quantities given in List—II :

List—I (Machine characteristics)	**List—II (Quantity)**
a. Open circuit characteristic	1. P_f vs I_f
b. V-curve	2. E_a vs I_a
c. Internal characteristics	3. E_g vs I_f
d. Inverted V-curve	4. I_a vs I_f

Codes :

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

54. When the load on a transmission line is equal to the surge impedance loading

[A] the receiving-end voltage is less than the sending-end voltage

[B] the sending-end voltage is less than the receiving-end voltage

[C] the receiving-end voltage is equal to the sending-end voltage

[D] None of the above

55. A distance relay is said to be inherently directional if its characteristic on R-X diagram

[A] is a straight line off-set from the origin

[B] is a circle that passes through the origin

[C] is a circle that encloses the origin

[D] Always a separate directional relay is required

56. In a PMMC instrument, the central spring stiffness and the strength of the magnet decrease by 0·04% and 0·02% respectively due to a rise in temperature by 1 °C. With a rise in temperature of 10 °C, the instrument reading will

[A] increase by 0·2%

[B] decrease by 0·2%

[C] increase by 0·6%

[D] decrease by 0·6%

57. A 50 Hz, 3-phase synchronous generator has inductance per phase of 15 mH. The capacitance of generator and circuit breaker is 0·002 μF. What is its natural frequency of oscillation?

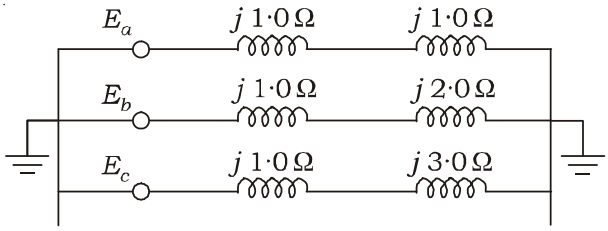
[A] 29 kHz

[B] 2·0 kHz

[C] 290 kHz

[D] 29 MHz

58. A 3-phase alternator generating unbalanced voltages is connected to an unbalanced load through a 3-phase transmission line as shown in the given figure.



The neutral of the alternator and the star-point of the load are solidly grounded. The phase voltages of the alternator are $E_a = 10\angle 0°\ \text{V}$, $E_b = \angle -90°\ \text{V}$, $E_c = \angle 120°\ \text{V}$. The positive sequence component of the load current is

[A] $1{\cdot}310\angle -107°\ \text{A}$

[B] $0{\cdot}332\angle -120°\text{A}$

[C] $0{\cdot}996\angle -120°\text{A}$

[D] $3{\cdot}510\angle -81°\text{A}$

59. Which of the following factors limits the deflection of the pointer of a PMMC instrument to about 90°?

1. Its damping mechanism
2. Linearity of the magnetic field in which the coil moves
3. Control spring arrangement
4. Shape of the pole shoe of the horseshoe magnet

Select the correct answer using the codes given below :

[A] Only 1 and 3

[B] Only 2 and 4

[C] Only 2 and 3

[D] Only 1 and 4

60. A PMMC type ammeter and a moving-iron type ammeter are connected in series in a resistive circuit fed from output of a half-wave rectifier voltage source. If the moving-iron type reads 5 A, the PMMC type instrument is likely to read

[A] 0 A

[B] 2·5 A

[C] 3·18 A

[D] 5 A

61. In a digital voltmeter, input signal is integrated for a duration of 500 clock cycles. To eliminate the effect of 100 Hz noise present in the signal, what is the maximum clock frequency?

[A] 5 kHz

[B] 50 kHz

[C] 100 kHz

[D] 250 kHz

62. Consider the following statements in connection with DAC :

1. The resolution of a 10-bit DAC is nearly equal to 0·1% of its full-scale range.
2. The linearity of a DAC depends principally on the accuracy of the resistors used.
3. The R-2R ladder type DAC requires less number of resistors compared to weighted-resistor type of DAC.
4. The output of a DAC should be monotonic.

Which of the above statements are correct?

[A] 1, 2 and 3

[B] 1, 2 and 4

[C] 2, 3 and 4

[D] 1, 3 and 4

63. The current through the current coil of a wattmeter is given by $i = (1 + 2\sin \omega t)$ A and the voltage across the pressure coil is $v = (2 + 3 \sin 2\omega t)$ V. The wattmeter will read

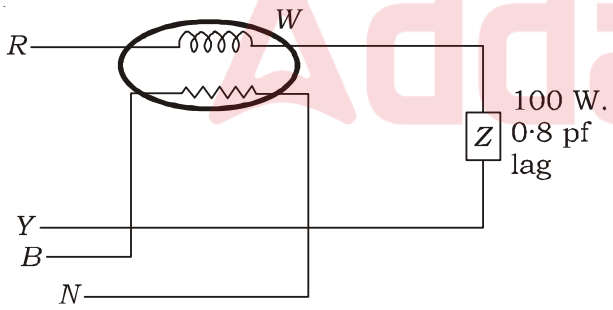
[A] 8·00 W

[B] 5·05 W

[C] 2·0 W

[D] 1·0 W

64. A single-phase load is connected between *R* and *Y* terminals of a 415 V, symmetrical 3-phase, 4-wire system with phase sequence *RYB*. A wattmeter is connected in the system as shown in the given figure. The power factor of the load is 0·8 lagging. The wattmeter will read



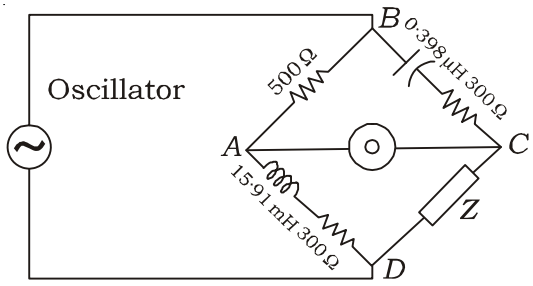
[A] +597 W

[B] –795 W

[C] +795 W

[D] –597 W

65. The AC bridge shown in the given figure is used to measure the impedance *Z*. If the bridge is balanced for oscillator frequency f = 2 kHz, the impedance *Z* will be



[A] $(260 + j0)\ \Omega$

[B] $(0 + j200)\ \Omega$

[C] $(260 - j200)\ \Omega$

[D] $(260 + j200)\ \Omega$

66. Match Boolean Logic Function given in List—I with their corresponding Inverse of Function given in List—II :

List—I (Boolean Logic Function)	**List—II (Inverse of Function)**
P. $ab + bc + ca + abc$	1. $\bar{a}(\bar{b} + \bar{c})$
Q. $ab + \bar{a}\bar{b} + \bar{c}$	2. $\bar{a}\bar{b} + \bar{b}\bar{c} + \bar{c}\bar{a}$
R. $a + bc$	3. $(a \oplus b)c$
S. $(\bar{a} + \bar{b} + \bar{c})(a + \bar{b} + \bar{c})(\bar{a} + \bar{b} + \bar{c})$	4. $abc + \bar{a}bc + ab\bar{c}$

Codes :

	P	Q	R	S
[A]	3	2	1	4
[B]	2	3	1	4
[C]	3	2	4	1
[D]	2	3	4	1

67. A multistage amplifier has a low-pass response with three real poles at $s = -\omega_1$, $-\omega_2$ and ω_3. The approximate overall bandwidth B of the amplifier will be given by

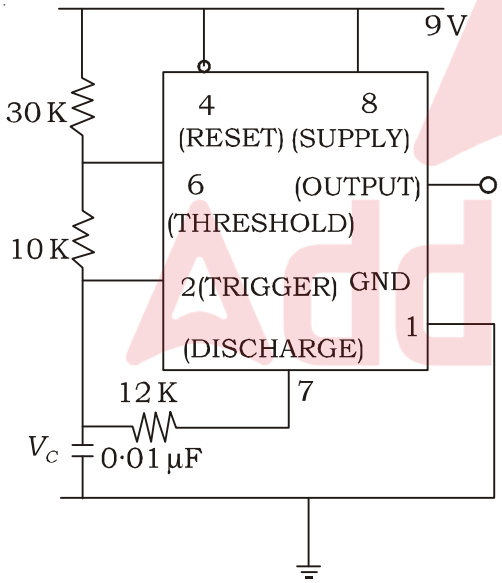
[A] $B = \omega_1 + \omega_2 + \omega_3$

[B] $\frac{1}{B} = \frac{1}{\omega_1} + \frac{1}{\omega_2} + \frac{1}{\omega_3}$

[C] $B = (\omega_1 + \omega_2 + \omega_3)^{1/3}$

[D] $B = \sqrt{\omega_1^2 + \omega_2^2 + \omega_3^2}$

68. An astable multivibrator circuit using IC 555 timer is shown below. Assume that the circuit is oscillating steadily.



The voltage V_C across the capacitor varies between

[A] 3 V to 5 V

[B] 3 V to 6 V

[C] 3·6 V to 6 V

[D] 3·6 V to 5 V

69. The input voltage given to a converter is $v_i = 100\sqrt{2}\sin(100\pi t)$ V.

The current drawn by the converter is

$$i_i = [10\sqrt{2}\sin(100\pi t - \pi/3) + 5\sqrt{2}\sin(300\pi t + \pi/4) + 2\sqrt{2}\sin(500\pi t - \pi/6)]\ \text{A}$$

The input power factor of the converter is

[A] 0·31

[B] 0·44

[C] 0·5

[D] 0·71

70. Commutation overlap in the phase-controlled AC to DC converter is due to

[A] load inductance

[B] harmonic content of load current

[C] switching operation in the converter

[D] source inductance

71. Chopper circuits are used to control the speed of DC motors which are fed from fixed DC voltage sources. Variable voltage output can be obtained by which of the following methods?

1. Varying the 'on' to 'off' time ratio
2. Adjusting the wave shape
3. Adjusting the frequency of switching
4. Using a saturable core reactor in series with the motor

[A] 1 and 2

[B] 1 and 3

[C] 2 and 3

[D] 2 and 4

72. In AC motor control, the ratio of voltage-to-frequency is maintained at constant value to

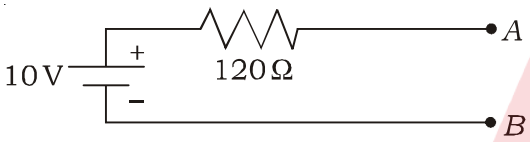
[A] make maximum use of magnetic circuit

[B] make minimum use of magnetic circuit

[C] maximize the current drawn from the supply to provide torque

[D] provide maximum pull-out torque

73. The voltage across the terminals *AB* for the circuit shown in the given figure is



[A] 5 V

[B] 10 V

[C] 12 V

[D] 20 V

74. What inductance will give the same reactance as a capacitor of 2 μF, when both are at 50 Hz?

[A] 5 H

[B] 25 H

[C] 50 H

[D] 100 H

75. The total power in a 3-phase system, whether star or delta connected, is given by

[A] $3 \times V_L \times I_L \times \cos\phi$

[B] $\sqrt{3} \times V_L \times I_L \times \cos\phi$

[C] $\frac{1}{3} \times V_L \times I_L \times \cos\phi$

[D] $\frac{1}{\sqrt{3}} \times V_L \times I_L \times \cos\phi$

76. A circular coil of 160 turns has a radius of 4·5 cm. The coil carries a current *I* of 0·6 amp. The magnitude of the magnetic field is

[A] $1{\cdot}34 \times 10^{-3}$ T

[B] $13{\cdot}4 \times 10^{-3}$ T

[C] $0{\cdot}134 \times 10^{-3}$ T

[D] 134×10^{-3} T

77. A system with input $x(t)$ and output $y(t)$ is described by the relation $y(t) = t^2 x(t)$. The system is

[A] non-linear and time-varying

[B] non-linear and time-invariant

[C] linear and time-varying

[D] linear and time-invariant

78. Which of the following equivalence between *Z*-transform and Laplace transform holds?

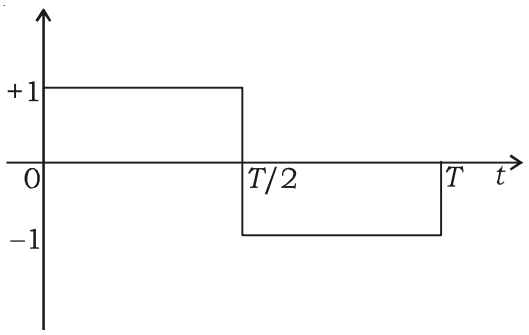
[A] The left-half of the *s*-plane maps into the interior of the unit circle in the *z*-plane

[B] The right-half of the s-plane maps into the exterior of the unit circle in the *z*-plane

[C] The imaginary axis of *s*-plane maps into the boundary of unit circle in the *z*-plane

[D] All of the above

79. The second harmonic component of the periodic waveform given in the figure has an amplitude of



[A] 0

[B] 1

[C] $2/\pi$

[D] $\sqrt{5}$

80. Non-linear system ***cannot*** be analysed by Laplace transform because

[A] it has no zero initial conditions

[B] superposition law cannot be applied

[C] non-linearity is generally not well defined

[D] All of the above

81. If rated DC voltage is applied instead of AC to the primary of a transformer, then

[A] secondary of transformer will burn

[B] primary of transformer will burn

[C] secondary voltage will be excessively high

[D] there will be no secondary voltage

82. In a 50 kVA, 11 kV/400 V transformer, the iron and copper losses are 500 W and 600 W respectively under rated conditions. The efficiency on unity power factor at full load will be

[A] 96·85%

[B] 97·85%

[C] 99%

[D] 98%

83. A 3300/300 V single-phase transformer gives 0·6 A and 60 W as ammeter and wattmeter readings when supply is given to the low voltage winding and high voltage winding is kept open. The power factor of no load current is

[A] 0·44

[B] 0·38

[C] 0·33

[D] 0·35

84. Two transformers of identical voltages but of different capacities are operating in parallel. For satisfactory load sharing

[A] impedances must be equal

[B] per-unit impedances must be equal

[C] per-unit impedances and X/R ratios must be equal

[D] impedance and X/R ratios must be equal

85. The armature current for a DC motor is calculated by which of the following formulas, where V = supply voltage (in volts), E_b = back e.m.f. (in volts) and R_a = armature resistance?

[A] $I_a = \dfrac{V - E_b}{R_a}$

[B] $I_a = \dfrac{V + E_b}{R_a}$

[C] $I_a = \dfrac{V - 2E_b}{R_a}$

[D] $I_a = \dfrac{V + 2E_b}{R_a}$

86. The speed at which a 6-pole alternator should be driven to generate 50 cycle per second is

[A] 1500 r.p.m.

[B] 1600 r.p.m.

[C] 1200 r.p.m.

[D] 1000 r.p.m.

87. The best location of power factor correction equipment to be installed on the transmission line is at the

[A] sending end

[B] receiving end

[C] middle of the line

[D] quarter of the line

88. A medium line with parameters A, B, C and D is extended by connecting a short line of impedance Z in series. The overall $ABCD$ parameters of the series combination will be

[A] $A,\ AZ,\ C + D/Z,\ D$

[B] $A,\ AZ + B,\ C,\ CZ + D$

[C] $A + BZ,\ B,\ C + DZ,\ D$

[D] $AZ,\ B,\ C/Z,\ D$

89. If in a transmission line, resistance and inductance are found to be equal and regulation appears to be zero, then the load will

[A] have unity power factor

[B] have zero power factor

[C] be 0·707 leading

[D] be 0·807 leading

90. In load flow analysis, the load connected at a bus is represented as

[A] constant current drawn from the bus

[B] constant impedance connected at the bus

[C] voltage and frequency dependent source at the bus

[D] constant real and reactive power drawn from the bus

91. A car is running at a constant speed of 50 km/hr. Which of the following is the feedback element for the driver?

[A] Clutch

[B] Eyes

[C] Needle of the speedometer

[D] Steering wheel

92. Differentiator is usually ***not*** a part of a control system because

[A] it reduces the gain margin

[B] it increases error

[C] it increases input noise

[D] it reduces damping

93. The phase lead compensation is used to

[A] increase rise time and decrease overshoot

[B] decrease both rise time and overshoot

[C] increase both rise time and overshoot

[D] decrease rise time and increase overshoot

94. A moving coil instrument gives full-scale deflection with a current of 100 mA when potential difference across its terminals is 50 mV. The shunt resistance to enable the instrument to read up to 100 A is

[A] 10 Ω

[B] 8 Ω

[C] 6 Ω

[D] $5{\cdot}005 \times 10^{-4}$ Ω

95. A digital voltmeter has a read outrange from 0 to 9999 counts. When full-scale reading is 9·999 V, the resolution of the full-scale reading is

[A] 0·001

[B] 1000

[C] 3-digit

[D] 1 mV

96. A CRO screen has ten divisions on the horizontal scale. If a voltage signal $5\sin(314t + 45°)$ is examined with a line base setting of 5 msec/div, then the number of cycles of signal displayed on the screen will be

[A] 0·5

[B] 2·5

[C] 5

[D] 10

97. Transistor can be used as an amplifier when it is operated in

[A] saturation region

[B] cut-off region

[C] active region

[D] both saturation and cut-off regions

98. An amplifier without feedback has a gain of 1000. What is the gain with negative feedback of 0·009?

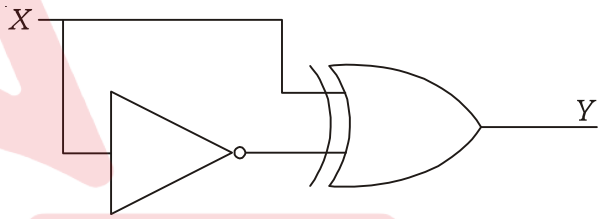
[A] 900

[B] 125

[C] 100

[D] 10

99. The output Y of the logic circuit shown in the given figure is



[A] 1

[B] 0

[C] X

[D] $\bar{X}$

100. The applied sine voltage to SCR is $V_m = 200$ V and $R = 10$ Ω. If the gate trigger lags the AC supply by 120°, then the average load current is

[A] $\frac{10}{\pi}$ A

[B] $\frac{5}{\pi}$ A

[C] $-\frac{5}{\pi}$ A

[D] $-\frac{15}{\pi}$ A

SPACE FOR ROUGH WORK

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