UPPCL AE

Previous Year Paper

EE 1 January 2019 Shift 1

Uttar Pradesh
Power Corporation Limited

Participant ID:	
Participant Name:	
Test Center Name:	
Test Date:	01/01/2019
Test Time:	9:00 AM - 12:00 PM
Subject:	Electrical Engineering

Note

A. This is the provisional answer sheet. After considering all the complaints and suggestions, the final answer script will be released by 14 January 2019.

B. The correct answer key is mentioned with the sign (✔) . Candidate's response is mentioned as the 'Chosen Option' on the right.

Section : **EE (1 Mark)**

Q.1 For a non-ideal single-phase transformer, which of the following is not true?

Ans

✘ A.
Short circuit test reveals approximately the resistance and leakage reactance of the transformer windings.

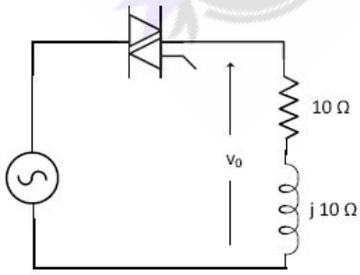
✘ B.
Open circuit test is usually done on the low voltage side of a transformer.

✔ C.
Open circuit test can reveal resistance and leakage reactance of transformer windings.

✘ D.
Open circuit test reveals approximately the magnetizing inductance and the core-loss resistance.

Question ID : **2449922513**
Status : **Answered**
Chosen Option :

Q.2 A triac based single phase voltage regulator feeds an R-L load as shown in the figure. What is the range of triggering angle for which the output voltage v_o is not controllable?



Ans

✘ A. $45^0 \le \alpha \le 180^0$

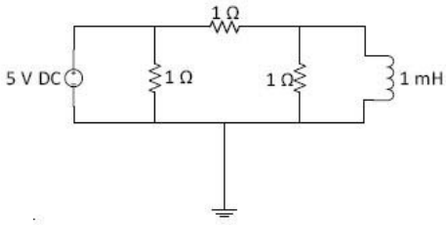
✘ B. $45^0 \le \alpha \le 90^0$

✔ C. $0^0 \le \alpha \le 45^0$

✘ D. $90^0 \le \alpha \le 180^0$

Question ID : **2449922541**
Status : **Answered**
Chosen Option :

Q.3 In the given circuit, with the shown ideal 5V DC source, the magnitude of the total current drawn from the source at steady-state is



Ans
✗ A. 2.5 A
✗ B. 5 A
✓ C. 10 A
✗ D. 7.5 A

Question ID : **2449922509**
Status : **Answered**
Chosen Option :

Q.4 The impulse response of a causal linear time-invariant system is given as $h(t)$. Now consider the following two statements:

P: The system satisfies superposition principle.

Q: $h(t) = 0$ for $t < 0$.

Which of the following is true?

Ans
✗ A. P is false and Q is true.
✗ B. P is false and Q is false.
✗ C. P is true and Q is false.
✓ D. P is true and Q is true.

Question ID : **2449922508**
Status : **Answered**
Chosen Option :

Q.5 What is the total electric flux through the surface of a sphere that has a radius of 1 m and carries a charge of 1 μC at its centre? Coulomb constant is given by $k_e = \frac{1}{4\pi\epsilon_0} = 8.99 \times 10^9\ N.m^2/C^2$; ϵ_0 is the permittivity of free space.

Ans
✓ A. $1.13 \times 10^5\ N.m^2/C$
✗ B. $8.99 \times 10^3\ N.m^2/C$
✗ C. $3.98 \times 10^3\ N/C$
✗ D. $0.28 \times 10^5\ N.m^2$

Question ID : **2449922534**
Status : **Not Answered**
Chosen Option : **--**

Q.6

A DC-DC buck-boost converter is operated with continuous current mode. If the input voltage is 50 V and the duty cycle of the switch is 0.6, the output DC voltage is

Ans
- ✗ A. 35 V
- ✓ B. 75 V
- ✗ C. 65 V
- ✗ D. 50 V

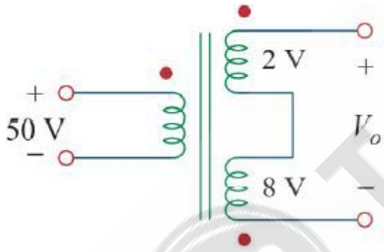
Question ID : **2449922540**
Status : **Answered**
Chosen Option :

Q.7 The minimum phase attained for the frequency response of a causal system $G(s) = \frac{s+10}{(s+1)(s+2)}$ as the frequency varies from 0 to ∞ rad/s is

Ans
- ✗ A. 180 degrees
- ✗ B. 90 degrees
- ✓ C. −90 degrees
- ✗ D. −180 degrees

Question ID : **2449922505**
Status : **Answered**
Chosen Option :

Q.8 A three-winding transformer is connected to an AC source with 50 V rms as shown in the following figure. Voltages induced in the secondary windings are 2 V rms and 8 V rms. The output rms voltage V_0 is,

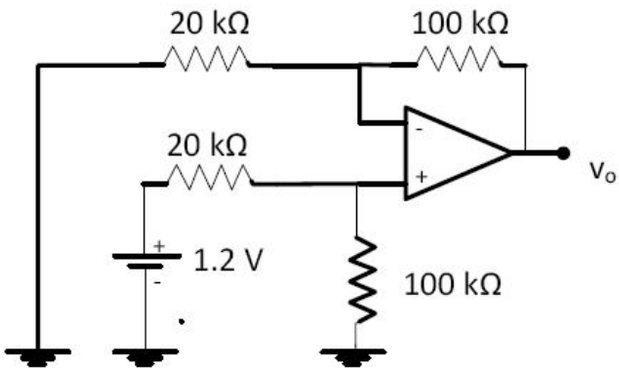


Ans
- ✓ A. -6 V
- ✗ B. 10 V
- ✗ C. -10 V
- ✗ D. 6 V

Question ID : **2449922530**
Status : **Answered**
Chosen Option :

Q.9

The op-amp in the circuit shown in the figure works in linear mode. The output voltage v_0 is



Ans
- ✗ A. 5 V
- ✓ B. 6 V
- ✗ C. 1 V
- ✗ D. 4 V

Question ID : **2449922543**
Status : **Answered**
Chosen Option :

Q.10 For operation in the normal active mode for a BJT, which of the following conditions is true?

Ans
- ✗ A. Both B-E and C-B junctions should be reversed biased.
- ✗ B. Both B-E and C-B junctions should be forward biased.
- ✗ C. B-E junction should be reversed biased and C-B junction should be forward biased.
- ✓ D. B-E junction should be forward biased and C-B junction should be reversed biased.

Question ID : **2449922544**
Status : **Answered**
Chosen Option :

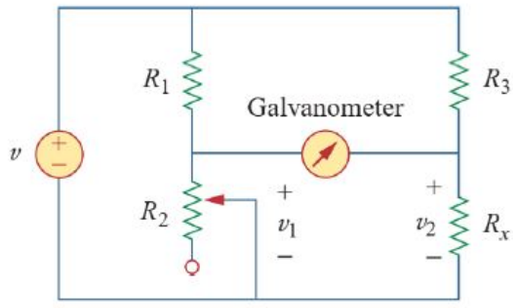
Q.11 A single phase full bridge voltage source inverter is operated with SPWM (sinusoidal pulse width modulation). The input DC voltage is 100 V. If the amplitude modulation index is 1, the rms value of fundamental component of output voltage is

Ans
- ✗ A. 141.4 V
- ✓ B. 70.7 V
- ✗ C. 50.3 V
- ✗ D. 90.7 V

Question ID : **2449922539**
Status : **Answered**
Chosen Option :

Q.12

In the given Wheatstone bridge, $R_1 = 500\ \Omega$, $R_3 = 200\ \Omega$.The bridge is balanced when $R_2$is adjusted to 125 Ω. Determine the unknown resistance R_x.



Ans
- ✗ A. $R_x = 100\ \Omega$
- ✗ B. $R_x = 200\ \Omega$
- ✓ C. $R_x = 50\ \Omega$
- ✗ D. $R_x = 125\ \Omega$

Question ID : **2449922529**
Status : **Answered**
Chosen Option :

Q.13 The causal system represented by $G(s) = \frac{9}{s^2+6s+9}$ is

Ans
- ✗ A. Undamped
- ✗ B. Underdamped
- ✓ C. Critically damped
- ✗ D. Overdamped

Question ID : **2449922504**
Status : **Answered**
Chosen Option :

Q.14 The average output voltage of a half controlled bridge converter is measured to be 103.53 V. If the bridge is supplied from a 230 V, 50 Hz sinusoidal source, the triggering angle of the thyristors in the bridge is approximately

Ans
- ✗ A. 60^0
- ✓ B. 90^0
- ✗ C. 120^0
- ✗ D. 30^0

Question ID : **2449922537**
Status : **Answered**
Chosen Option :

Q.15 Auto-transformer is used in the transmission and distribution systems

Ans
- ✗ A. When galvanic isolation is needed.
- ✗ B. When operator is not available
- ✗ C. When efficiency of transformer is not critical

✔ D. When the transformation ratio for voltage is small

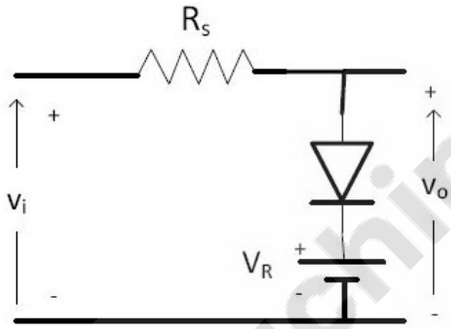
Question ID : **2449922523**
Status : **Answered**
Chosen Option :

Q.16 The compensating winding in a DC machine

Ans
✘ A. is located on the commutating poles.
✘ B. is located on commutators.
✘ C. is located in armature slots.
✔ D. is located on pole shoes.

Question ID : **2449922512**
Status : **Answered**
Chosen Option :

Q.17 In the diode circuit shown in the figure, $v_i = 10\sin 314.159t$ V and $V_R = 5$ V. Assume the diode to be ideal. The maximum and minimum values of the output voltage (v_o) are, respectively,



Ans
✘ A. +10 V and -5 V
✔ B. +5 V and -10 V
✘ C. +5 V and -5 V
✘ D. 10 V and -10 V

Question ID : **2449922547**
Status : **Answered**
Chosen Option :

Q.18 A load-flow program is run twice. In the second run, the previous reference bus gets changed to a PQ bus. Which one of the following statements is true?

Ans
✘ A. The system losses as well as complex bus voltages will change.
✘ B. Load flow result will remain same in all aspects.
✘ C.
The system losses will change but the complex bus voltages will remain same.
✔ D.
The system losses will be unchanged but the complex bus voltages will change.

Question ID : **2449922519**
Status : **Answered**
Chosen Option :

Q.19 In a balanced *acb* sequence, phase *a* to neutral voltage is $\bar{V}_{an} = 100\angle 20°$ V. Line-to-line voltage $\bar{V}_{ac}$ is given by

Ans
- ✔ A. $\bar{V}_{ac} = 100\sqrt{3}\angle 50°$ V
- ✘ B. $\bar{V}_{ac} = 100\sqrt{3}\angle -50°$ V
- ✘ C. $\bar{V}_{ac} = 100\angle 50°$ V
- ✘ D. $\bar{V}_{ac} = \frac{100}{\sqrt{3}}\angle 150°$ V

Question ID : **2449922532**
Status : **Answered**
Chosen Option :

Q.20 A 3-phase transformer bank is realized using three identical 1100/230 V, 10 kVA single phase transformers connected in delta-delta. If one of the single phase transformers develops a fault and is removed, the maximum load that the transformer bank in open delta can supply is

Ans
- ✘ A. 5.77 kVA
- ✘ B. 11.54 kVA
- ✔ C. 17.32 kVA
- ✘ D. 30 kVA

Question ID : **2449922550**
Status : **Answered**
Chosen Option :

Q.21 The purpose of emitter bypass capacitor in a CE BJT amplifier is to

Ans
- ✘ A. prevent saturation of the amplifier
- ✘ B. place the Q-point of the transistor in active region
- ✘ C. provide a stable biasing for the amplifier
- ✔ D. increase the mid band voltage gain of the amplifier

Question ID : **2449922546**
Status : **Answered**
Chosen Option :

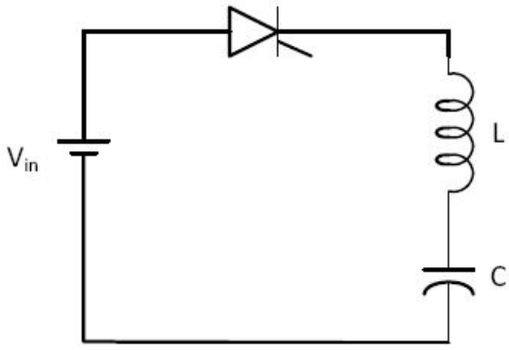
Q.22 A Buchholz relay is used for

Ans
- ✘ A. Protection of a transformer against internal and external faults
- ✔ B. Protection of a transformer against internal faults
- ✘ C. None of the options
- ✘ D. Protection of a transformer against external faults

Question ID : **2449922520**
Status : **Answered**
Chosen Option :

Q.23

The SCR in the circuit is turned on at t = 0. The conduction time duration of the SCR is



Ans
- ✗ A. $2\pi\sqrt{LC}$
- ✓ B. $\pi\sqrt{LC}$
- ✗ C. $\sqrt{LC}$
- ✗ D. $1/(2\pi\sqrt{LC})$

Question ID : **2449922542**
Status : **Answered**
Chosen Option :

Q.24 A sequence $u[n]$ is defined as $u[n] = \begin{cases} 1, if\ n \geq 0 \\ 0, if\ n < 0 \end{cases}$ for $n = \{-\infty, \dots, -1, 0, 1, \dots, \infty\}$. The z-transform of $u[n]$ is $U(z)$. The region of convergence for which the z-transform of $u[n]$ exists is

Ans
- ✓ A. $|z| > 1$
- ✗ B. $|z| < 1$
- ✗ C. $|z| = 1$
- ✗ D. $|z| > 0$

Question ID : **2449922511**
Status : **Answered**
Chosen Option :

Q.25 The graph of an electrical network has N nodes and B branches. The number of links, L, for any tree spanning all nodes is given by

Ans
- ✗ A. B+N
- ✗ B. N-B+1
- ✗ C. N-2B+1
- ✓ D. B-N+1

Question ID : **2449922525**
Status : **Answered**
Chosen Option :

Q.26 A single phase power transformer is to be energized (switched on to the input supply) to have minimal inrush current. The switching-on instant should be at

Ans
- ✗ A. Zero input voltage
- ✗ B. ½ of the maximum input voltage
- ✓ C. Maximum input voltage

✗ D. $1/\sqrt{2}$ of the maximum input voltage

Question ID : **2449922549**
Status : **Answered**
Chosen Option :

Q.27 Consider the following Laplace transforms of certain signals. For which of the following, final value theorem is not applicable?

Ans

✗ A. $\frac{s-1}{s+2}$

✗ B. $\frac{s+1}{s+2}$

✗ C. $\frac{s+1}{(s+2)(s+3)}$

✓ D. $\frac{s+1}{s-2}$

Question ID : **2449922502**
Status : **Answered**
Chosen Option :

Q.28 Consider a signal $g(t)$, such that $g(t) = 0$ for $t < 0$. If the Laplace transform of $g(t)$ is $G(s)$, then with constant τ, the Laplace transform of $g(t-\tau)$ is

Ans

✗ A. $G(s+\tau)$

✗ B. $e^{s\tau}G(s\tau)$

✓ C. $e^{-s\tau}G(s)$

✗ D. $G(s-\tau)$

Question ID : **2449922507**
Status : **Answered**
Chosen Option :

Q.29 Two inductors of 5 H and 4 H have mutual inductance of 2.5 H between them. The coupling coefficient is

Ans

✗ A. 1.78

✗ B. 0.125

✓ C. 0.56

✗ D. 4.47

Question ID : **2449922533**
Status : **Answered**
Chosen Option :

Q.30 To ensure successful turn-on of a thyristor, the minimum gate pulse width of the thyristor gate pulse should be sufficient to ensure the cathode current to reach

Ans

✗ A. the holding value of thyristor current

✗ B. the peak value of thyristor current

✔ C. the latching value of thyristor current

✘ D. 50% of the peak value of thyristor current

Question ID : **2449922538**
Status : **Answered**
Chosen Option :

Q.31 The transfer function $G(s) = \frac{1}{s^2}$ has a 0 dB crossing in its Bode magnitude plot at

Ans

✘ A. 100 rad/s.

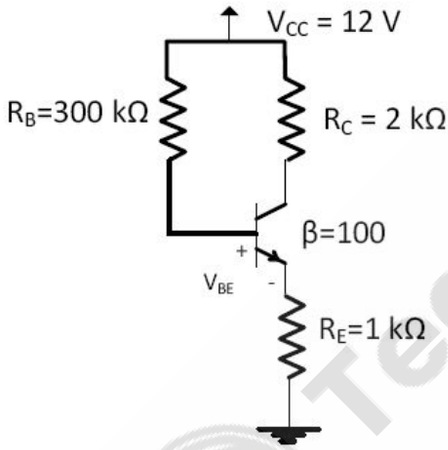
✘ B. 10 rad/s.

✘ C. 0.1 rad/s.

✔ D. 1 rad/s.

Question ID : **2449922501**
Status : **Answered**
Chosen Option :

Q.32 A BJT biasing circuit is shown in the figure. The transistor is operating in the active region with V_{BE} = 0.7 V. The value of collector current in mA is



Ans

✘ A. 4.813

✘ B. 1.210

✘ C. 3.512

✔ D. 2.817

Question ID : **2449922545**
Status : **Answered**
Chosen Option :

Q.33 Inductance of a power transmission line increases with

Ans

✘ A. Increase in diameter of the conductor

✘ B. Decrease in line length

✔ C. Increase in spacing between the phase conductors

✘ D. Increase in load current carried by the conductor

Question ID : **2449922521**

Status : **Answered**
Chosen Option :

Q.34 The following are various energy sources:

1. Solar
2. Wind
3. Tidal
4. Wave
5. Geo-thermal

From the above energy sources, the renewable energy sources are

Ans
- ✗ A. 1 and 2 only
- ✓ B. All the energy sources mentioned above
- ✗ C. 1, 2, and 4 only
- ✗ D. 1, 2, and 3 only

Question ID : **2449922524**
Status : **Answered**
Chosen Option :

Q.35 An ideal air-core coil has an inductance of 2 mH. The number of turns of the coil is doubled and its length is halved. Assuming that the inner cross-sectional area of the core remains constant, the new inductance of this altered air-core coil is

Ans
- ✗ A. 8 mH
- ✓ B. 16 mH
- ✗ C. 4 mH
- ✗ D. 32 mH

Question ID : **2449922510**
Status : **Answered**
Chosen Option :

Q.36 An electrostatic field is given by $\vec{E} = \left(\frac{x}{2} + 2y\right)\hat{\mathbf{i}} + 2x\,\hat{\mathbf{j}}\ V/m$. Find the work done in moving a point charge $Q = -20\ \mu C$ from the origin to (4,0,0) m. $(\hat{\mathbf{i}}, \hat{\mathbf{j}})$ are the unit vectors along x, y axes.

Ans
- ✓ A. $80\ \mu J$
- ✗ B. $40\ \mu J$
- ✗ C. $40\ kJ$
- ✗ D. $80\ J$

Question ID : **2449922536**
Status : **Answered**
Chosen Option :

Q.37 The effective charge flowing through a wire is given by, $q = 5t \sin 4\pi t$ mC. Calculate the instantaneous current flowing at time $t = 0.5$ s.

Ans
- ✓ A. 31.4 mA
- ✗ B. 0 A
- ✗ C. 2.5 mA

✗ D. 3.14 A

Question ID : **2449922527**
Status : **Answered**
Chosen Option :

Q.38 A circuit with a resistor, inductor, and capacitor in series has a resonant frequency of f_0 Hz. If all the component values are now doubled, the new resonant frequency is

Ans

✗ A. $2f_0$

✓ B. $f_0/2$

✗ C. $f_0/4$

✗ D. f_0

Question ID : **2449922516**
Status : **Answered**
Chosen Option :

Q.39 The inductance of a certain moving-iron ammeter is expressed as $L = 10 + 3\theta - \frac{\theta^2}{4}$ μH, where θ is the deflection in radians from the zero position. The control spring torque is 25×10^{-6} Nm/radian. The deflection of the pointer in radians, when the meter carries current of 5 A rms, is

Ans

✗ A. 2.4

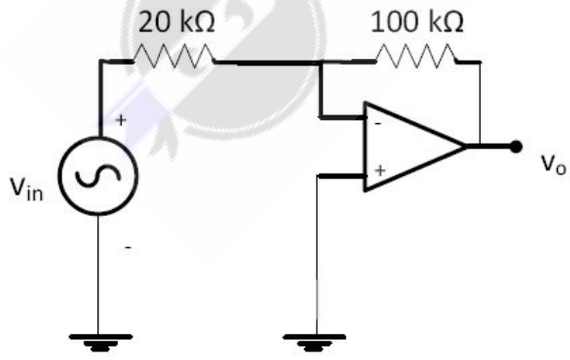
✗ B. 2.0

✓ C. 1.2

✗ D. 1.0

Question ID : **2449922515**
Status : **Answered**
Chosen Option :

Q.40 The open-loop gain-bandwidth product of an op-amp is given as 10,000 Hz. The op-amp is used in an inverting amplifier as shown in the figure. The bandwidth of the inverting amplifier is



Ans

✓ A. 2000 Hz

✗ B. 1000 Hz

✗ C. 10,000 Hz

✗ D. 5000 Hz

Question ID : **2449922548**

Status : **Answered**
Chosen Option :

Q.41 A water boiler at a home in Lucknow is switched to the AC mains supply power. The frequency of instantaneous power consumed by the boiler is

Ans
- ✗ A. 0 Hz
- ✗ B. 50 Hz
- ✓ C. 100 Hz
- ✗ D. 150 Hz

Question ID : **2449922518**
Status : **Answered**
Chosen Option :

Q.42 A transmission line of surge impedance 300 Ω is connected to a load of 300 Ω. The reflection coefficient of transmission line at the load end will be

Ans
- ✓ A. 0
- ✗ B. -1
- ✗ C. 2
- ✗ D. +1

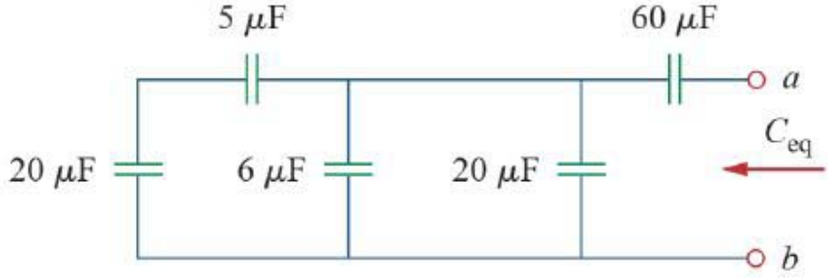
Question ID : **2449922522**
Status : **Answered**
Chosen Option :

Q.43 A parallel-plate capacitor has an area $A = 2 \times 10^{-4}\ m^2$ and a plate separation $d = 1\ mm$. Permittivity of free space, $\epsilon_0 = 8.85 \times 10^{-12}\ \frac{C^2}{Nm^2}$. Its capacitance is,

Ans
- ✗ A. $1.77\ nF$
- ✗ B. $4.23\ \mu F$
- ✗ C. $4.23\ nF$
- ✓ D. $1.77\ pF$

Question ID : **2449922535**
Status : **Answered**
Chosen Option :

Q.44 Find the equivalent capacitance, C_{eq}, at the terminals *a*-*b* of the circuit.



Ans
- ✓ A. 20 μF
- ✗ B. 85 μF

✗ C. $80\ \mu F$

✗ D. $46\ \mu F$

Question ID : **2449922531**
Status : **Answered**
Chosen Option :

Q.45 Kelvin double bridge is best suited for the measurement of

Ans

✓ A. Low resistance

✗ B. Capacitance

✗ C. Inductance

✗ D. High resistance

Question ID : **2449922517**
Status : **Answered**
Chosen Option :

Q.46 The time constant of the causal system represented by $G(s) = \frac{1}{s+5}$ is

Ans

✗ A. $10/\pi$ seconds

✗ B. 5 seconds

✓ C. 0.2 seconds

✗ D. $\pi/10$ seconds

Question ID : **2449922503**
Status : **Answered**
Chosen Option :

Q.47 The equation $e_f = -\frac{d\phi}{dt}$, where e_f is the emf and ϕ is the flux linkage in a single-turn coil, can best represent

Ans

✗ A. Faraday's Law

✓ B. Faraday's Law and Lenz Law

✗ C. Lenz Law and Biot-Savart Law

✗ D. Biot-Savart Law

Question ID : **2449922526**
Status : **Answered**
Chosen Option :

Q.48 A linear time-invariant system, initially at rest, when subjected to a unit-step input at $t = 0$, gives a response $y(t) = te^{-t}$ for $t \geq 0$. The transfer function of the system is

Ans

✗ A. $\frac{1}{s^2}$

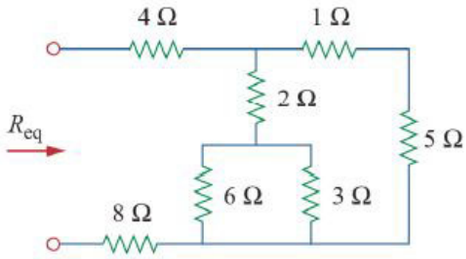
✗ B. $\frac{1}{(s+1)^2}$

✔ C. $\frac{s}{(s+1)^2}$

✘ D. $\frac{1}{s(s+1)^2}$

Question ID : **2449922506**
Status : **Answered**
Chosen Option :

Q.49 Find the equivalent resistance, R_{eq}, looking into the terminals of the following circuit as indicated.



Ans

✔ A. 14.4 Ω

✘ B. 12.4 Ω

✘ C. 15.2 Ω

✘ D. 10 Ω

Question ID : **2449922528**
Status : **Answered**
Chosen Option :

Q.50 For an ideal single-phase transformer with primary-to-secondary turns ratio of N: 1, the ratio of instantaneous input power to instantaneous output power is

Ans

✔ A. $1:1$

✘ B. $N:1$

✘ C. $1:N$

✘ D. $N^2:1$

Question ID : **2449922514**
Status : **Answered**
Chosen Option :

Section : **EE (2 Mark)**

Q.1 A sequence $u[n]$ is defined as $u[n] = \begin{cases} 1, if\ n \geq 0 \\ 0, if\ n < 0 \end{cases}$ for $n = \{-\infty, \dots, -1, 0, 1, \dots, \infty\}$. Consider a sequence $x[n] = n^2 a^n u[n]$, where a is a positive constant. The z-transform of the sequence with appropriate region of convergence is

Ans

✔ A. $\frac{az(z+a)}{(z-a)^3}$

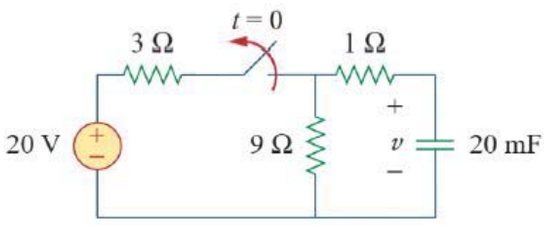
✘ B. $\frac{z}{(z-a)^2}$

✗ C. $\dfrac{az}{(z-a)^2}$

✗ D. $\dfrac{ze^{-a}}{(z-e^{-a})^2}$

Question ID : **2449922553**
Status : **Answered**
Chosen Option :

Q.2 The switch in the circuit has been closed for a long time, and it is opened at time $t = 0$. Find $v(t)$ for $t \geq 0$.



Ans

✓ A. $v(t) = 15e^{-5t}$ V

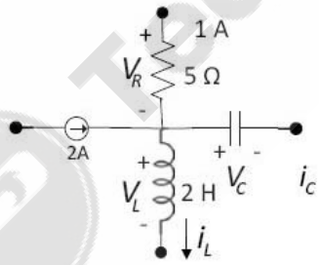
✗ B. $v(t) = 15$ V

✗ C. $v(t) = 0$ V

✗ D. $v(t) = 15e^{-20t}$ V

Question ID : **2449922567**
Status : **Answered**
Chosen Option :

Q.3 A segment of a circuit is shown in the figure below. If $V_R = 5$ V and $V_C = 4\sin 2t$ V, the voltage V_L is



Ans

✓ A. 32sin2t V

✗ B. 16cos2t V

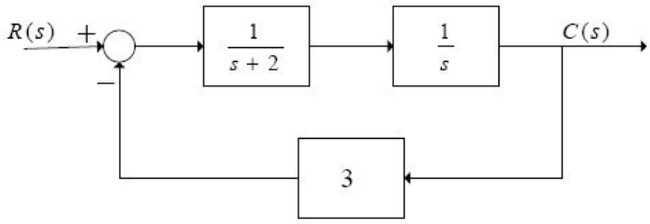
✗ C. 3 - 8cos2t V

✗ D. 16sin2t V

Question ID : **2449922563**
Status : **Answered**
Chosen Option :

Q.4

Consider the system in the figure shown. The input to the system is $R(s)$ and the output of the system is $C(s)$. The system is of Type



Ans
- ✗ A. 1
- ✗ B. 3
- ✓ C. 0
- ✗ D. 2

Question ID : **2449922552**
Status : **Answered**
Chosen Option :

Q.5 The positive value of K for which $\left[1+\frac{K}{(s+1)(s+2)}\right]$ will have zeroes on the right-half of the complex s-plane is

Ans
- ✗ A. 20
- ✓ B. No such K exists
- ✗ C. 0.1
- ✗ D. 10

Question ID : **2449922551**
Status : **Answered**
Chosen Option :

Q.6 A combinatorial circuit is described by a function as the sum of min-terms. The function is defined as f(A,B,C) = ∑m(0,1,2,3,4,5,6)

A is the MSB and C is the LSB. The minimized expression of the function is

Ans
- ✗ A. ABC
- ✗ B. $\bar{B}+\bar{C}$
- ✗ C. $\bar{A}+\bar{B}+C$
- ✓ D. $\bar{A}+\bar{B}+\bar{C}$

Question ID : **2449922574**
Status : **Answered**
Chosen Option :

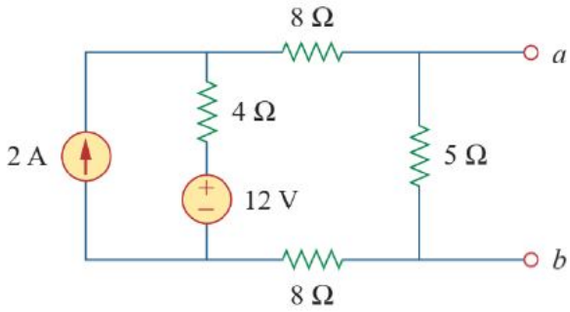
Q.7 A current of $-8+6\sqrt{2}(\sin\omega t+30^\circ)$ A is passed through three meters. These are a zero-centered PMMC meter, a true RMS meter, and a moving iron instrument. The respective readings (in A) will be

Ans
- ✗ A. 8, 6, 10
- ✗ B. -8, 6, 10
- ✗ C. 8, 6, 8

✔ D. -8, 10, 10

Question ID : **2449922562**
Status : **Answered**
Chosen Option :

Q.8 Find Norton equivalent resistance, R_N, and equivalent current source, i_N, at terminals a and b of the circuit.



Ans
✘ A. $R_N = 3.53\ \Omega, i_N = 0.71\ \text{A}$
✔ B. $R_N = 4\ \Omega, i_N = 1\ \text{A}$
✘ C. $R_N = 12\ \Omega, i_N = 2\ \text{A}$
✘ D. $R_N = 5\ \Omega, i_N = 2\ \text{A}$

Question ID : **2449922565**
Status : **Answered**
Chosen Option :

Q.9 A 240 V DC shunt motor has an armature resistance of 0.6 Ω. The full load armature current is 30 A. The ratio of the stalling torque to the full load torque when a resistance of 1 Ω is connected in series with the armature is

Ans
✘ A. 3
✘ B. 6
✔ C. 5
✘ D. 4

Question ID : **2449922575**
Status : **Answered**
Chosen Option :

Q.10 $\int_{-\pi}^{\pi} \sin(t)\sin(3t)\,dt =$

Ans
✘ A. 2π
✔ B. 0
✘ C. $\pi/2$
✘ D. π

Question ID : **2449922554**
Status : **Answered**
Chosen Option :

Q.11 An ammeter with range of 0 to 100 μA has an internal resistance of 100 Ω. For extending its range to 0 to 500 μA, the shunt resistance required is

Ans

✗ A. 20 Ω

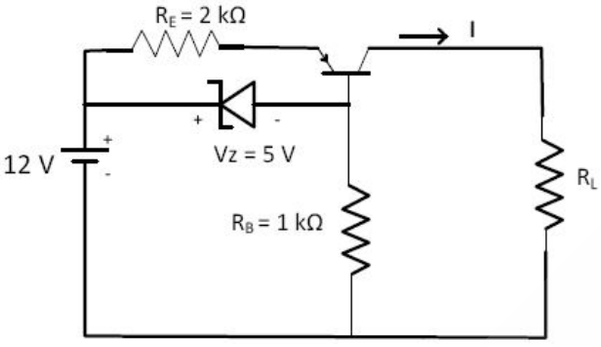
✗ B. 22.22 Ω

✗ C. 50 Ω

✓ D. 25 Ω

Question ID : **2449922561**
Status : **Answered**
Chosen Option :

Q.12 A BJT current source is given in the figure. Assume the Si-PNP transistor to operate in active region. The value of current I in mA is



Ans

✗ A. 1.85

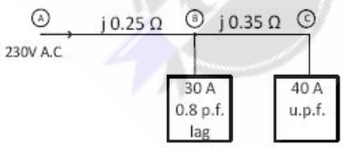
✓ B. 2.15

✗ C. 5.25

✗ D. 4.1

Question ID : **2449922573**
Status : **Not Answered**
Chosen Option : **--**

Q.13 A single phase AC distribution line supplies two single phase loads as shown in the figure below. The impedances of line segments A-B and B-C are j0.25 Ω and j0.35 Ω, respectively. The voltage drop from A to C is



Ans

✗ A. 30 + j 4.5 V

✓ B. 4.5 + j 30 V

✗ C. 30 – j 4.5 V

✗ D. 4.5 – j 30 V

Question ID : **2449922559**
Status : **Answered**
Chosen Option :

Q.14

A factory draws 100 kW at 0.8 p.f. lagging from a 3-phase, 11 kV supply. It is desired to raise the p.f. to unity using capacitor bank. The total power rating of the capacitor bank is

Ans
- ✔ A. 75 kVAR
- ✘ B. 100 kVAR
- ✘ C. 62.5 kVAR
- ✘ D. 50 kVAR

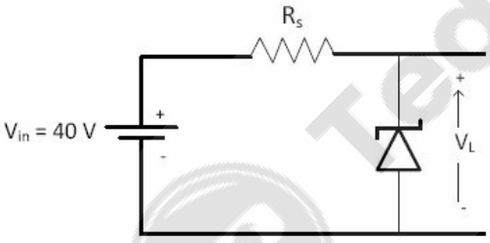
Question ID : **2449922558**
Status : **Answered**
Chosen Option :

Q.15 An open circuit test is conducted on a 1100/110 V, 50 Hz single-phase transformer with instruments connected on the low voltage side of the transformer. The voltmeter reads 110 V. The ammeter reads 2 A. The wattmeter reading is 65 W. The approximate core-loss resistance and magnetizing reactance, referred to the low voltage side, are respectively,

Ans
- ✘ A. 1.8615 Ω, 0.5757 Ω
- ✘ B. 18.615 Ω, 5.757 Ω
- ✘ C. 18615 Ω, 5757 Ω
- ✔ D. 186.15 Ω, 57.57 Ω

Question ID : **2449922556**
Status : **Answered**
Chosen Option :

Q.16 The Zener diode in the circuit has a Zener voltage, V_z, of 15 V and power rating of 0.5 Watt. If the input voltage is 40 V, what is the minimum value of R_s that prevents the Zener diode from being destroyed?

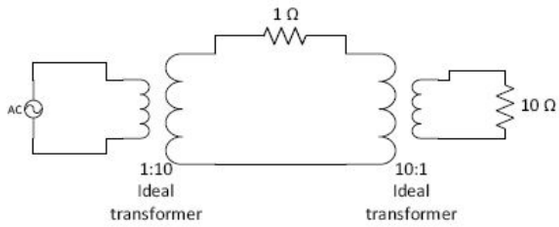


Ans
- ✘ A. 150 Ω
- ✘ B. 250 Ω
- ✔ C. 750 Ω
- ✘ D. 550 Ω

Question ID : **2449922572**
Status : **Answered**
Chosen Option :

Q.17

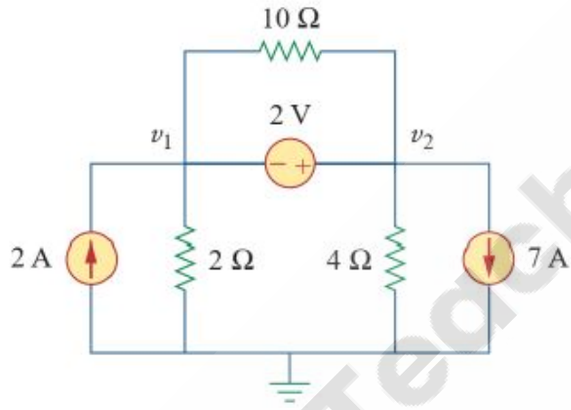
In the circuit shown, assume that the voltage source and transformers are ideal. The AC voltage source is $10\sqrt{2}\sin(100\pi t)$ V. The rms value of the current flowing through the 1 Ω resistor is approximately (rounded off till first decimal place)



Ans
- ✔ A. 0.1A
- ✘ B. 9.1A
- ✘ C. 10.0A
- ✘ D. 0.9A

Question ID : **2449922555**
Status : **Answered**
Chosen Option :

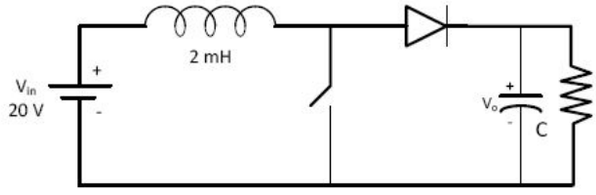
Q.18 For the circuit shown in the figure, find the node voltages v_1 and v_2.



Ans
- ✘ A. $v_1 = 8.33\,\text{V}, v_2 = 10.33\,\text{V}$
- ✘ B. $v_1 = 6\,\text{V}, v_2 = 8\,\text{V}$
- ✘ C. $v_1 = 4\,\text{V}, v_2 = -28\,\text{V}$
- ✔ D. $v_1 = -7.33\,\text{V}, v_2 = -5.33\,\text{V}$

Question ID : **2449922564**
Status : **Answered**
Chosen Option :

Q.19 In a boost converter shown in the figure, the duty cycle is 0.5. The inductor current is assumed to be continuous. Capacitor C is assumed to be very large. If the switching frequency is 20 kHz, the peak to peak inductor current ripple is



Ans
- ✘ A. 0.45 A

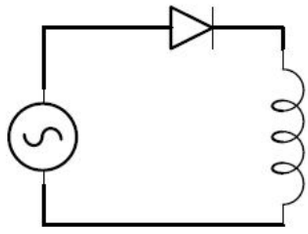
✗ B. 0.35 A

✓ C. 0.25 A

✗ D. 0.15 A

Question ID : **2449922571**
Status : **Not Answered**
Chosen Option : **--**

Q.20 A sinusoidal AC voltage source feeds a pure inductor through a diode as shown in the figure. The duration of conduction (in degrees) of the diode in one input power cycle is



Ans

✗ A. 30^0

✗ B. 90^0

✓ C. 360^0

✗ D. 180^0

Question ID : **2449922570**
Status : **Answered**
Chosen Option :

Q.21 A single phase full bridge voltage source inverter is operated in 180^0 mode with square wave output. If the input DC supply is 100 V, the rms value of the fundamental output voltage is

Ans

✗ A. 80 V

✗ B. 50 V

✓ C. 90 V

✗ D. 70 V

Question ID : **2449922569**
Status : **Answered**
Chosen Option :

Q.22 A charge $q_1 = 7\,\mu C$ is located at the origin, and a second charge $q_2 = -5\,\mu C$ is located on the positive x-axis, 0.3 m from the origin. Find the electric field at point P, which has coordinates (0, 0.4) m. Coulomb constant is given by, $k_e = \frac{1}{4\pi\epsilon_0} = 8.99 \times 10^9 N.m^2/C^2$; ϵ_0 is the permittivity of free space; $(\hat{\mathbf{i}}, \hat{\mathbf{j}})$ are the unit vectors along x, y axes.

Ans

✗ A. $-(1.1\hat{\mathbf{i}} + 2.5\hat{\mathbf{j}}) \times 10^5\, N/C$

✓ B. $(1.1\hat{\mathbf{i}} + 2.5\hat{\mathbf{j}}) \times 10^5\, N/C$

✗ C. $(2.5\hat{\mathbf{i}} - 1.1\hat{\mathbf{j}}) \times 10^5\, N/C$

✗ D. $-(2.5\hat{\mathbf{i}} + 1.1\hat{\mathbf{j}}) \times 10^5\, N/C$

Question ID : **2449922568**
Status : **Not Answered**

Chosen Option : --

Q.23 The terminal voltage of an ideal DC voltage source is 12 V, when connected to a 2 W resistive load. When the load is disconnected, the terminal voltage rises to 12.4 V. What are the values of source voltage, v_s, and internal resistance, R_s, of the source?

Ans
✗ A. $v_s = 12\ \text{V}, R_s = 4\ \Omega$
✗ B. $v_s = 10\ \text{V}, R_s = 8\ \Omega$
✗ C. $v_s = 12.4\ \text{V}, R_s = 4\ \Omega$
✓ D. $v_s = 12.4\ \text{V}, R_s = 2.4\ \Omega$

Question ID : **2449922566**
Status : **Answered**
Chosen Option :

Q.24 Incremental fuel costs in Rs/MWh for a plant consisting of two generating units are given by

$\frac{dF_1}{dP_1} = 0.4P_1 + 400$ and $\frac{dF_2}{dP_2} = 0.48P_2 + 320$

The allocation of loads P_1 and P_2 between generating units 1 and 2, respectively, for minimum cost of generation to serve a total load of 900 MW, neglecting losses, is

Ans
✗ A. 200 MW and 700 MW
✗ B. 500 MW and 400 MW
✗ C. 300 MW and 600 MW
✓ D. 400 MW and 500 MW

Question ID : **2449922557**
Status : **Answered**
Chosen Option :

Q.25 A power system has three synchronous generators. The turbine-governor characteristics corresponding to the generators are

P1 = 50(50 – f), P2 = 100(51 – f), P3 = 150(52 – f)

where, f denotes the system frequency in Hz, and P1, P2, P3 are the power outputs of the turbines in MW. Assuming generators and transmission network to be lossless, the system frequency for a load of 700 MW is

Ans
✓ A. 49 Hz
✗ B. 47.5 Hz
✗ C. 48 Hz
✗ D. 49.5 Hz

Question ID : **2449922560**
Status : **Answered**
Chosen Option :

Section : **Hindi**

Q.1 दिए गए विकल्पों में से कौन सा वाक्यांश नीचे लिखे शब्द का सही अर्थ है?

शब्द-: अजातशत्रु

Ans

✗ A. जिसके बहुत से शत्रु हों

✓ B. जिसका कोई भी शत्रु न हो

✗ C. जिससे जन्म से शत्रुता हो

✗ D. जन्म से शत्रुता का बोध होना

Question ID : **2449922579**
Status : **Answered**
Chosen Option :

Q.2 दिए गए विकल्पों में से कौन सा विकल्प दिए हुए शब्द का पर्यायवाची नहीं हैं?

शब्द-: आँख

Ans

✓ A. चारु

✗ B. नयन

✗ C. चक्षु

✗ D. लोचन

Question ID : **2449922578**
Status : **Answered**
Chosen Option :

Q.3 मुंशी प्रेमचंद की कहानी "ईदगाह" में हामिद अपनी दादी के लिए मेले से क्या खरीदकर लाता है?

Ans

✓ A. चिमटा

✗ B. थाली

✗ C. बेलन

✗ D. तवा

Question ID : **2449922576**
Status : **Answered**
Chosen Option :

Q.4 दिए गए विकल्पों में से कौन सा विकल्प नीचे लिखे शब्द का सही सन्धि-विग्रह है?

शब्द-: नीरस

Ans

✗ A. नइ + रस

✓ B. निः + रस

✗ C. नीर + रस

✗ D. निइ + रस

Question ID : **2449922580**
Status : **Answered**
Chosen Option :

Q.5 दिए गए वाक्यांशों में से सर्वोचित वाक्यांश चुनकर नीचे दिए गए मुहावरे को पूरा करें ।

मुहावरा:- बाल की _____

Ans

✗ A. कटाई करना

✗ B. रंगाई करना

✔ C. खाल निकालना

✘ D. जड़ निकालना

Question ID : **2449922577**
Status : **Answered**
Chosen Option :

Section : **GK**

Q.1 न्युरेम्बर्ग निम्नलिखित में से किस घटना से जुड़ा है?

Ans ✘ A.
द्वितीय विश्वयुद्ध की समाप्ति के बाद विश्व शांति एवं सौहार्द की चर्चा के लिए विश्व भर के नेता यहाँ एकत्र हुए थे।

✘ B.
प्रथम विश्वयुद्ध की समाप्ति के बाद विश्व शांति एवं सौहार्द की चर्चा के लिए विश्व भर के नेता यहाँ एकत्र हुए थे।

✔ C.
द्वितीय विश्वयुद्ध की समाप्ति के बाद यहाँ पर युद्ध अपराधियों पर मुकदमे चलाये गये थे।

✘ D.
प्रथम विश्वयुद्ध की समाप्ति के बाद यहाँ पर युद्ध अपराधियों पर मुकदमे चलाये गये थे।

Question ID : **2449922584**
Status : **Answered**
Chosen Option :

Q.2 'वॉर एंड पीश' (War and Peace) नामक उपन्यास के लेखक कौन हैं?

Ans ✘ A. फ़्योदोर दोस्तोयेव्स्की

✔ B. लियो टॉल्स्टॉय

✘ C. अलेक्जेंडर पुष्किन

✘ D. मिखाइल गोर्बाचेव

Question ID : **2449922590**
Status : **Answered**
Chosen Option :

Q.3 निम्नलिखित खिलाड़ियों में से किसने सबसे अधिक बार विंबलडन का महिला एकल खिताब जीता है?

Ans ✘ A. वीनस विलियम्स

✔ B. मार्टिना नवरातिलोवा

✘ C. सेरेना विलियम्स

✘ D. स्टेफी ग्राफ

Question ID : **2449922588**
Status : **Answered**
Chosen Option :

Q.4

निम्नलिखित व्यक्तियों में से बांग्लादेश के पहले राष्ट्रपति कौन थे?

Ans
✗ A. परवेज मुशर्रफ
✗ B. शेख हसीना
✗ C. खालिदा जिया
✓ D. शेख मुजीबुर रहमान

Question ID : **2449922583**
Status : **Answered**
Chosen Option :

Q.5 In which city Humayun's tomb is located?

Ans
✓ A. New Delhi
✗ B. Agra
✗ C. Fatehpur Sikri
✗ D. Sasaram

Question ID : **2449922586**
Status : **Answered**
Chosen Option :

Q.6 श्री ई श्रीधरन निम्नलिखित में से किस संगठन के साथ सबसे घनिष्ठ रूप से जुड़े हुए हैं?

Ans
✗ A. भारतीय अंतरिक्ष अनुसंधान संगठन
✗ B. नीति आयोग
✓ C. कोंकण रेलवे
✗ D. भारतीय रिज़र्व बैंक

Question ID : **2449922585**
Status : **Answered**
Chosen Option :

Q.7 What is the capital of Hungary?

Ans
✗ A. Helsinki
✓ B. Budapest
✗ C. Lisbon
✗ D. Brussels

Question ID : **2449922587**
Status : **Answered**
Chosen Option :

Q.8 निम्नलिखित कथनों में से कौन-सा कथन सही है?

Ans
✗ A. सभी अक्षांश रेखायें उत्तरी एवं दक्षिणी ध्रुव पर मिलती हैं
✗ B. भूमध्य रेखा कोलंबो से होकर गुजरती है

✔ C. सभी देशान्तर रेखायें उत्तरी एवं दक्षिणी ध्रुव पर मिलती हैं

✘ D. भूमध्य रेखा प्रयागराज (इलाहाबाद) से होकर गुजरती है

Question ID : **2449922582**
Status : **Answered**
Chosen Option :

Q.9 Which scientist received the Bharat Ratna in the same year as Sachin Tendulkar?

Ans

✘ A. Anil Kakodkar

✘ B. A.P.J. Abdul Kalam

✔ C. C.N.R. Rao

✘ D. V. Rajaraman

Question ID : **2449922581**
Status : **Answered**
Chosen Option :

Q.10 Which of the following persons has not served as the Chief Minister of Uttar Pradesh?

Ans

✘ A. N. D. Tiwari

✘ B. Govind Ballabh Pant

✔ C. Sarojini Naidu

✘ D. Chandra Bhanu Gupta

Question ID : **2449922589**
Status : **Answered**
Chosen Option :

Section : **Reasoning (1 Mark)**

Q.1 Which one of the following pairs of vectors are orthogonal?

Ans

✘ A. $[1,2,4]^T$ and $[-3,0,1]^T$

✔ B. $[1,2,4]^T$ and $[-2,-1,1]^T$

✘ C. $[1,2,4]^T$ and $[-12,-1,1]^T$

✘ D. $[1,2,4]^T$ and $[5,0,-1]^T$

Question ID : **2449922592**
Status : **Answered**
Chosen Option :

Q.2 $\lim_{t\to 0}\left(\frac{\sin t}{t}\right) =$

Ans

✘ A. undefined

✔ B. 1

✘ C. 0

✘ D. -1

Question ID : **2449922591**
Status : **Answered**
Chosen Option :

Q.3 मजदूरों के एक समूह ने 15 दिनों में काम करने का वादा किया था किन्तु उनमें से 5 मजदूर काम पर नहीं पहुँच पाये। यदि शेष मजदूरों का समूह 18 दिनों में इस काम को पूरा करता है, तो आरंभ में प्रस्तावित मजदूरों की संख्या ज्ञात करें।

Ans
✗ A. 25
✓ B. 30
✗ C. 35
✗ D. 20

Question ID : **2449922594**
Status : **Answered**
Chosen Option :

Q.4 Which word does not belong with others?

Ans
✗ A. Tiger
✗ B. Lion
✗ C. Leopard
✓ D. Elephant

Question ID : **2449922593**
Status : **Answered**
Chosen Option :

Q.5 Find the value of Z:

1=5

2=10

3=15

4=10

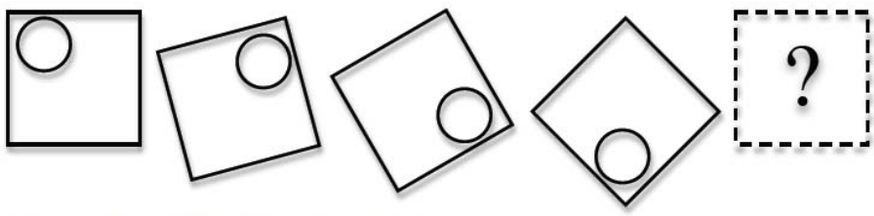
5=Z

Ans
✓ A. 1
✗ B. 0
✗ C. 20
✗ D. 25

Question ID : **2449922595**
Status : **Answered**
Chosen Option :

Section : **Reasoning (2 Mark)**

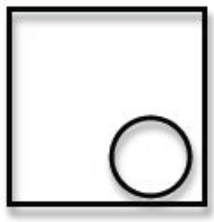
Q.1



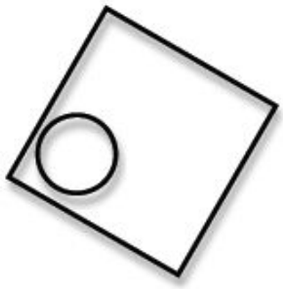
Which of the shapes below continues the sequence?

Ans

✗ A.



✓ B.



✗ C.

✗ D.

Question ID : **2449922598**
Status : **Answered**
Chosen Option :

Q.2 Consider the matrix,

$$\mathbf{A} = \begin{bmatrix} a & b \\ 0 & c \end{bmatrix}$$

Eigenvalues of the matrix are given by

Ans

✗ A. $\lambda_1 = b, \lambda_2 = ac$

✓ B. $\lambda_1 = a, \lambda_2 = c$

✗ C. $\lambda_1 = 0, \lambda_2 = 0$

✗ D. $\lambda_1 = ac, \lambda_2 = 0$

Question ID : **2449922597**
Status : **Answered**
Chosen Option :

Q.3 Consider the following three systems of equations:

Case a: $x_1 + x_2 = 1,\ 2x_1 - x_2 = 0$

Case b: $x_1 + x_2 = 1,\ 2x_1 + 2x_2 = 2$

Case c: $x_1 + x_2 = 1,\ x_1 + x_2 = 0$

Which one of the following statements is true?

Ans

✗ A. None of the cases can be solved.

✗ B.

Case a has many solutions; **case b** has unique solution; **case c** has no solution.

✗ C.

Case a has no solution; **case b** has unique solution; **case c** has many solutions.

✓ D.

Case a has unique solution; **case b** has many solutions; **case c** has no solution.

Question ID : **2449922596**
Status : **Answered**
Chosen Option :

Q.4

Which of the shapes below continues the sequence?

Ans

✓ A.

✗ B.

✗ C.

✗ D. 

Question ID : **2449922599**
Status : **Answered**
Chosen Option :

Q.5 Look at the series:

1, 1, 4, 9, 25, 64, ___

What number should come next.

Ans

✗ A. 144

✗ B. 100

✓ C. 169

✗ D. 121

Question ID : **2449922600**
Status : **Answered**
Chosen Option :