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Uttar Pradesh
Power Corporation Limited

Participant ID:	
Participant Name:	
Test Center Name:	
Test Date:	01/01/2019
Test Time:	2:00 PM - 5:00 PM
Subject:	Electrical Engineering

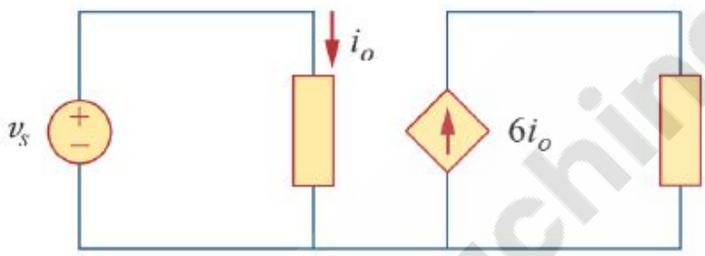
Note

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 The dependent source in the figure is



Ans

✗ A. Voltage-controlled voltage source

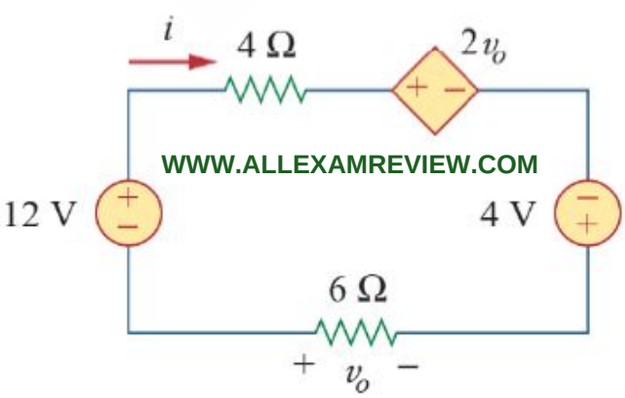
✗ B. Current-controlled voltage source

✔ C. Current-controlled current source

✗ D. Voltage-controlled current source

Question ID : **2449922230**
Status : **Answered**
Chosen Option :

Q.2 Find current i in the circuit given below.



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Ans
✔ A. $i = -8A$
✘ B. $i = 8A$
✘ C. $i = 12A$
✘ D. $i = -12A$

Question ID : **2449922227**
Status : **Answered**
Chosen Option :

Q.3 X_d, X_d', X_d'' are the steady state d-axis reactance, transient d-axis reactance, and sub-transient d-axis reactance of a salient pole alternator respectively. Which of the following statements is correct?

Ans
✘ A. $X_d'' > X_d' > X_d$
✘ B. $X_d'' > X_d > X_d'$
✘ C. $X_d' > X_d > X_d''$
✔ D. $X_d > X_d' > X_d''$

Question ID : **2449922249**
Status : **Answered**
Chosen Option :

Q.4 Two SCRs having forward on-state resistances of 0.05 Ω and 0.04 Ω respectively, are connected in parallel to supply a load. If the load current is 90 A, the current taken by the SCRs, respectively, are

Ans
✘ A. 50 A and 40 A
✔ B. 40 A and 50 A
✘ C. 30 A and 60 A
✘ D. 10 A and 80 A

Question ID : **2449922234**
Status : **Answered**
Chosen Option :

Q.5 In a circuit breaker, the stability of arc in vacuum depends upon

Ans
✔ A. Contact material and its vapour pressure, and circuit parameters
✘ B. Contact material and its vapour pressure
✘ C. Circuit parameters only
✘ D. Contact material and circuit parameters

Question ID : **2449922223**
Status : **Answered**
Chosen Option :

Q.6 A single phase half controlled converter bridge is feeding a load with constant ripple free current. If the triggering angle is 60^0, the displacement power factor of the converter is

Ans
✘ A. 0.707
✔ B. 0.866

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✗ C. 0.913

✗ D. 0.5

Question ID : **2449922238**
Status : **Answered**
Chosen Option :

Q.7 An insulating solid sphere of radius *R* has uniform positive volume charge density and total charge *Q*. Find the electric potential at a point outside the sphere, at a distance *r* from the centre of the sphere. Coulomb constant is given by, $k_e = \frac{1}{4\pi\epsilon_0}$.

Ans

✗ A. $-\frac{k_e Q}{r}$

✗ B. $-\frac{k_e Q^2}{r}$

✗ C. 0

✓ D. $\frac{k_e Q}{r}$

Question ID : **2449922232**
Status : **Answered**
Chosen Option :

Q.8 A DC generator is connected to a load through a double circuit transmission line. If the generator is transferring maximum power, say P_m, to the load, the total loss of the system is

Ans

✗ A. $P_m/4$

✗ B. P_m

✗ C. Insufficient data

✓ D. $P_m/2$

Question ID : **2449922224**
Status : **Answered**
Chosen Option :

Q.9 It is desirable to eliminate 5th harmonic voltage from the phase voltage of an alternator. The coils should be short-pitched by an electrical angle of

Ans

✗ A. 18^0

✓ B. 36^0

✗ C. 72^0

✗ D. 30^0

Question ID : **2449922250**
Status : **Answered**
Chosen Option :

Q.10 A charge $q_1 = 2\ \mu C$ is located at the origin in a Cartesian coordinate system, and a charge $q_2 = -6\ \mu C$ is located at (0, 3) m. Find the total electric potential due to these charges at the point *P*, whose coordinates are (4,0) 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.

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Ans
✔ A. $-6.29 \times 10^3 V$

✗ B. $5.32 \times 10^3 V$

✗ C. $-5.32 \times 10^3 V$

✗ D. $6.29 \times 10^3 V$

Question ID : **2449922231**
Status : **Answered**
Chosen Option :

Q.11 Find the correct statement related to the HVDC transmission.

Ans
✔ A.
HVDC can be used to interconnect two AC systems of different frequencies.

✗ B.
HVDC eliminates the reactive power requirement in the operation.

✗ C.
HVDC is always economical when compared with the AC transmission of same voltage level.

✗ D. HVDC minimizes harmonics at the converter stations.

Question ID : **2449922221**
Status : **Answered**
Chosen Option :

Q.12 For the causal system, $G(s) = \frac{4}{s^2+5s+4}$, the percentage overshoot in the output for a unit-step input is

Ans
✗ A. 10 %

✔ B. No overshoot

✗ C. 16.3 %

✗ D. 5 %

Question ID : **2449922202**
Status : **Answered**
Chosen Option :

Q.13 A list of relays and the power system components protected by the relays are given in the group I and group II, respectively. Choose the correct matches from the choices given below:

Group I		Group II	
P -	Distance Relay	1 -	Transformer
Q -	Under Frequency Relay	2 -	Turbines
R -	Differential Relay	3 -	Busbars
S -	Buchholz Relay	4 -	Shunt Capacitors
		5 -	Alternators
		6 -	Transmission Lines

Ans
✗ A. P-4, Q-3, R-2, S-1

✗ B. P-6, Q-4, R-5, S-3

✗ C. P-5, Q-2, R-1, S-6

✔ D. P-6, Q-5, R-3, S-1

Question ID : **2449922219**
Status : **Answered**

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Chosen Option :

Q.14 Two in-phase 50 Hz sinusoidal waveforms of unit amplitude are fed into channel 1 and 2, respectively, of an oscilloscope. Assuming that the voltage scale, time scale, and other settings are exactly the same for both the channels, what would be observed if the oscilloscope is operated in X-Y mode?

Ans

✗ A. A parabola

✓ B. A straight line inclined at 45° with respect to the X-axis

✗ C. An ellipse

✗ D. A circle of unit radius

Question ID : **2449922217**
Status : **Answered**
Chosen Option :

Q.15 A parallel-plate capacitor has plates of dimensions 2 cm by 3 cm, separated by a 1 mm thickness of paper with relative permittivity 3.7. Permittivity of free space, $\epsilon_0 = 8.85 \times 10^{-12} \frac{C^2}{Nm^2}$. Find the capacitance.

Ans

✓ A. $20\ pF$

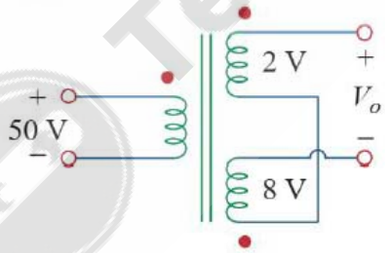
✗ B. $20\ \mu F$

✗ C. $10\ nF$

✗ D. $10\ \mu F$

Question ID : **2449922233**
Status : **Answered**
Chosen Option :

Q.16 A three-winding transformer is connected to a 50 V rms AC voltage source as shown in figure. Voltage induced in the secondary windings are 2 V rms and 8 V rms. The rms output voltage V_0 is,



Ans

✗ A. 6 V

✗ B. -10 V

✓ C. 10 V

✗ D. -6 V

Question ID : **2449922229**
Status : **Answered**
Chosen Option :

Q.17 Which of the following represents a causal, linear and time-invariant system?

Ans

✗ A. $y[n] = nx[n]$

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✗ B. $y[n] = x[n] + x[2n]$

✗ C. $y[n] = x[n] + x^2[n]$

✓ D. $y[n] = x[n] + x[n-1]$

Question ID : **2449922207**
Status : **Answered**
Chosen Option :

Q.18 In a single stage RC coupled BJT CE amplifier circuit, the emitter bypass capacitor C_E is removed. The AC small signal mid-band voltage gain of the amplifier will

Ans

✗ A. increase

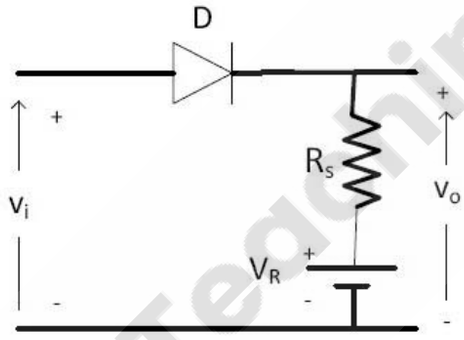
✓ B. decrease

✗ C. be infinity

✗ D. be unaffected

Question ID : **2449922245**
Status : **Answered**
Chosen Option :

Q.19 In the diode circuit shown $V_i = 10 \sin 314.159t$ V, $V_R = 5$ V. Assume diode 'D' to be ideal. The maximum and minimum values of the output voltage, V_o, are respectively



Ans

✗ A. +5 V and -5 V

✗ B. +10 V and -10 V

✗ C. +5 V and 0 V

✓ D. +10 V and +5 V

Question ID : **2449922240**
Status : **Answered**
Chosen Option :

Q.20 Consider a real-valued function $f(t)$ such that $f(t + 2\pi) = f(t)$ for all $t \geq 0$. Such a $f(t)$ can be represented as

$$f(t) = \frac{a_0}{2} + \sum_{n=1}^{\infty} [a_n \cos(nt) + b_n \sin(nt)] .$$

If $f(t) = \cos(3t) + \sin(4t)$, then the coefficient a_4 in the summation series, as indicated above, is

Ans

✗ A. 9

✗ B. 12

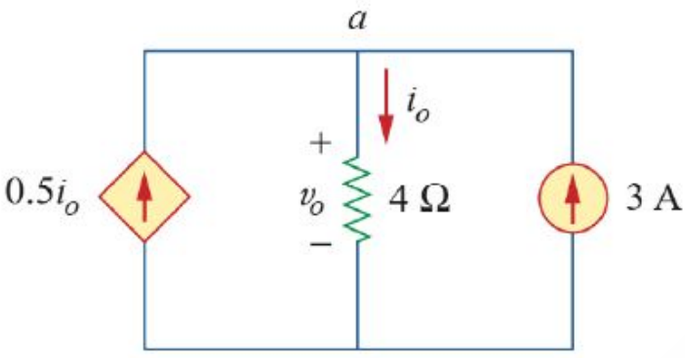
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✗ C. 1

✓ D. 0

Question ID : **2449922208**
Status : **Answered**
Chosen Option :

Q.21 Find current i_0 in the circuit.



Ans
✓ A. 6 A

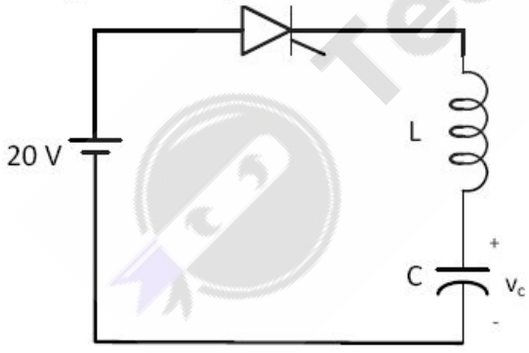
✗ B. 9 A

✗ C. −6 A

✗ D. −9 A

Question ID : **2449922228**
Status : **Answered**
Chosen Option :

Q.22 The thyristor in the figure is turned on at t = 0. The inductor and capacitor are initially uncharged. The steady state value of the capacitor voltage, v_c, is



Ans
✓ A. 40 V

✗ B. 10 V

✗ C. 20 V

✗ D. 30 V

Question ID : **2449922236**
Status : **Answered**
Chosen Option :

Q.23 Consider the following Laplace transforms of certain signals. For which of the following, final value theorem is not applicable?

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Ans

✗ A. $\frac{s-2}{(s+1)(s+3)}$

✗ B. $\frac{s}{s+1}$

✗ C. $\frac{s+1}{(s+2)(s+3)}$

✓ D. $\frac{s}{(s-1)(s+2)}$

Question ID : **2449922203**
Status : **Answered**
Chosen Option :

Q.24 An overhead line having a surge impedance of 400 Ω is connected in series with an underground cable having a surge impedance of 100 Ω. If the surge of 50 kV travels from the line end towards the line-cable junction, the value of the transmitted voltage wave at the junction is

Ans

✓ A. 20 kV

✗ B. 50 kV

✗ C. 30 kV

✗ D. 80 kV

Question ID : **2449922225**
Status : **Answered**
Chosen Option :

Q.25 A current $i(t) = 6\sin(2\pi ft)$ A with $f = 50$ Hz passes through a coil with an inductance of 2 mH. The net change in energy stored in the coil over a time interval of 20 ms is

Ans

✗ A. 0.036 J

✗ B. 0.072 J

✓ C. 0 J

✗ D. 0.018 J

Question ID : **2449922212**
Status : **Answered**
Chosen Option :

Q.26 A current impulse, 5δ(t) units, is forced through an ideal capacitor C. The voltage, $V_c(t)$, across the capacitor is given by

Ans

✗ A. $5t$

✗ B. $5u(t) - C$

✓ C. $\frac{5u(t)}{C}$

✗ D. $\frac{5t}{C}$

Question ID : **2449922226**
Status : **Answered**

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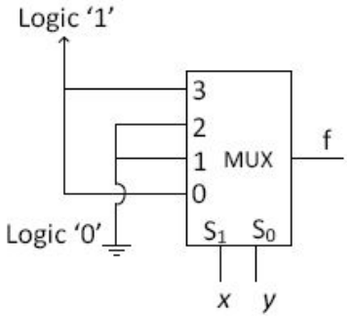
Chosen Option :

Q.27 The maximum phase attained for the frequency response of a causal system, $G(s) = \frac{s+1}{(2s+1)(s+3)}$ as the frequency varies from 0 to ∞ rad/s is

Ans
- ✗ A. 90degrees
- ✗ B. −180degrees
- ✗ C. −90degrees
- ✓ D. 0degrees

Question ID : **2449922204**
Status : **Answered**
Chosen Option :

Q.28 The output f of the 4-to-1 MUX is shown in the figure. The function, f, is given as



Ans
- ✓ A. $\bar{x}\bar{y}$+xy
- ✗ B. $\bar{x}$y+x$\bar{y}$
- ✗ C. $x + y$
- ✗ D. $\bar{x}$+$\bar{y}$

Question ID : **2449922242**
Status : **Answered**
Chosen Option :

Q.29 Consider a polynomial, $s^3 - 2s^2 + s + 1$. The number of roots of the polynomial on the open left half of complex s-plane is

Ans
- ✗ A. Less than or equal to 3.
- ✓ B. Strictly less than 3.
- ✗ C. Equal to 3.
- ✗ D. Strictly greater than 3.

Question ID : **2449922205**
Status : **Answered**
Chosen Option :

Q.30 A DC A-h meter is rated for 15 A, 250 V. The meter constant is 14.4 A-s/rev. The meter constant at rated voltage can be expressed as

Ans
- ✗ A. 3600 rev/kWh

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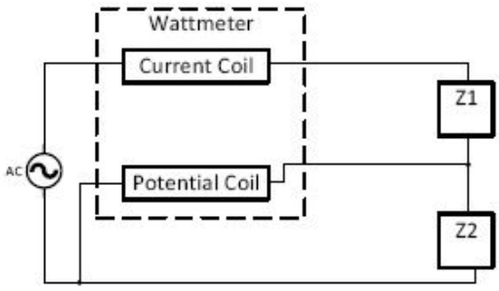
✔ B. 1000 rev/kWh

✘ C. 3750 rev/kWh

✘ D. 960 rev/kWh

Question ID : **2449922216**
Status : **Answered**
Chosen Option :

Q.31 A wattmeter is connected as shown in the figure. The wattmeter reads



Ans

✔ A. Power consumed by Z_2

✘ B. Power consumed by Z_1

✘ C. Total power consumed by Z_1 and Z_2

✘ D. Always zero

Question ID : **2449922218**
Status : **Answered**
Chosen Option :

Q.32 A buck-boost converter with continuous inductor current is operated with a duty cycle of 0.4. If the input voltage is 50 V (DC), the output voltage is

Ans

✔ A. 33.33 V

✘ B. 16.66 V

✘ C. 93.33 V

✘ D. 66.66 V

Question ID : **2449922239**
Status : **Answered**
Chosen Option :

Q.33 For harnessing low variable water heads, the suitable hydro turbine with high percentage of reaction and runner adjustment vanes is

Ans

✘ A. Pelton

✔ B. Kaplan

✘ C. Impeller

✘ D. Francis

Question ID : **2449922220**
Status : **Answered**
Chosen Option :

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Q.34 An 8:1 multiplexer has how many select inputs?

Ans
- ✗ A. 2
- ✗ B. 1
- ✓ C. 3
- ✗ D. 8

Question ID : **2449922241**
Status : **Answered**
Chosen Option :

Q.35 For an induction motor operating at a slip s, the ratio of the gross mechanical power output to air-gap power is equal to

Ans
- ✗ A. s
- ✓ B. 1-s
- ✗ C. $1-s^2$
- ✗ D. $1-\sqrt{s}$

Question ID : **2449922248**
Status : **Answered**
Chosen Option :

Q.36 R_1 and R_4 are the opposite arms of a Wheatstone bridge as are R_2 and R_3. The source voltage is applied across R_1 and R_3. Under balanced conditions which one of the following is true?

Ans
- ✗ A. $R_1 = R_2 + R_3 + R_4$
- ✗ B. $R_1 = R_3R_4 / R_2$
- ✗ C. $R_1 = R_2R_4 / R_3$
- ✓ D. $R_1 = R_2R_3 / R_4$

Question ID : **2449922215**
Status : **Answered**
Chosen Option :

Q.37 The minimized form of the function, F, which is shown in the figure, is

F

X \ YZ	00	01	11	10
0	0	1	0	0
1	1	1	1	0

Ans
- ✗ A. XY+YZ+ZX
- ✓ B. $\bar{Y}Z+X\bar{Y}+XZ$
- ✗ C. $\bar{Y}Z+XZ$
- ✗ D. X+ZY

Question ID : **2449922243**
Status : **Answered**

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Chosen Option :

Q.38 The insulation strength of an EHV transmission line is designed mainly with the following consideration

Ans
✗ A. Harmonics
✗ B. Load power factor
✗ C. Corona
✓ D. Switching over voltage

Question ID : **2449922222**
Status : **Answered**
Chosen Option :

Q.39 A signal $K\cos(\omega t)$ is given as an input to a real causal linear time-invariant system. The steady state output of the system for this input is obtained as $L\cos(\eta t + \phi)$. With K, L, ω, η, ϕ as constants, which of the following is true?

Ans
✗ A. L is equal to K, and η need not be equal to ω.
✗ B. L is equal to K, and η is equal to ω.
✗ C. L need not be equal to K, and η need not be equal to ω.
✓ D. L need not be equal to K, and η is equal to ω.

Question ID : **2449922209**
Status : **Answered**
Chosen Option :

Q.40 Which of the following is a linear system?

Ans
✓ A. $y = 2x$
✗ B. $y = x^3 + x$
✗ C. $y = x^2$
✗ D. $y = x + 1$

Question ID : **2449922201**
Status : **Answered**
Chosen Option :

Q.41 For a non-ideal single-phase transformer, which of the following is true?

Ans
✗ A.
The power factor observed on the primary side leads and on the secondary side lags for any load connected to the transformer's secondary side.

✗ B.
The power factor observed on the primary side and secondary side of the transformer are always same.

✗ C.
The power factor observed on the primary side lags and on the secondary side lags for any load connected to the transformer's secondary side.

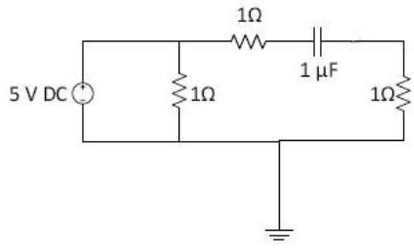
✓ D.

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The power factor observed on the primary side and secondary side of the transformer depends on the load connected to the transformer.

Question ID : **2449922213**
Status : **Answered**
Chosen Option :

Q.42 In the given circuit, with the shown ideal 5 V DC source, the magnitude of the total current drawn from the source at steady-state is



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

Question ID : **2449922210**
Status : **Answered**
Chosen Option :

Q.43 A half controlled single phase bridge converter is supplying an R-L load. The triggering angle is α. If the load current is continuous, the duration for which the freewheeling of the load takes place in a half cycle of the input voltage is

Ans
✗ A. $2\pi-\alpha$
✗ B. $\pi-\alpha$
✗ C. $\pi-2\alpha$
✓ D. α

Question ID : **2449922237**
Status : **Answered**
Chosen Option :

Q.44 Which of the following is not true for damper windings in a grid-connected three-phase synchronous machine?

Ans
✓ A. Damper windings help in starting of synchronous generator.
✗ B. Damper windings help in damping out oscillations in a synchronous motor.
✗ C. Damper windings help in starting of synchronous motor.
✗ D. Damper windings help in damping out oscillations in a synchronous generator.

Question ID : **2449922214**
Status : **Answered**
Chosen Option :

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Q.45 The average output voltage of a single phase full controlled bridge converter is measured to be 103.5 V. The load current is assumed to be continuous. 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. 90^0

✓ B. 60^0

✗ C. 120^0

✗ D. 30^0

Question ID : **2449922235**
Status : **Answered**
Chosen Option :

Q.46 The coil span of a winding in an alternator is 150^0 electrical. The pitch factor of the coil is

Ans

✓ A. 0.9659

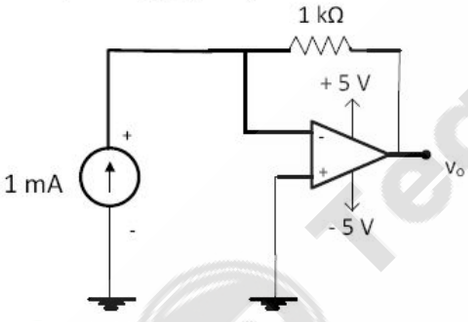
✗ B. 0.9396

✗ C. 0.9914

✗ D. 0.8660

Question ID : **2449922247**
Status : **Answered**
Chosen Option :

Q.47 The circuit shown in the figure uses an ideal op-amp working with +5 V and -5 V power supplies. The output voltage, v_o, is equal to



Ans

✓ A. -1 V

✗ B. +5 V

✗ C. -2 V

✗ D. +1 V

Question ID : **2449922244**
Status : **Answered**
Chosen Option :

Q.48 A unity feedback system has the forward path transfer function $G(s)$. The steady state error is zero if

Ans

✗ A. $G(s)$ is Type-1 and input is unit-ramp.

✗ B. $G(s)$ is Type-0 and input is unit-step.

✓ C. $G(s)$ is Type-1 and input is unit-step.

✗ D. $G(s)$ is Type-0 and input is unit-ramp.

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Question ID : **2449922206**
Status : **Answered**
Chosen Option :

Q.49 An ideal air-core coil has an inductance of 1 mH. The number of turns of the coil is halved and its length is doubled. 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. 2 mH
- ✗ C. 0.5 mH
- ✓ D. 0.125 mH

Question ID : **2449922211**
Status : **Answered**
Chosen Option :

Q.50 A DC shunt motor is running at 1000 rpm when supplied from a 240 V DC. Neglecting losses and magnetic saturation, the speed of the motor when connected to 180 V DC source will be

Ans
- ✓ A. 1000 rpm
- ✗ B. 750 rpm
- ✗ C. 1350 rpm
- ✗ D. 1200 rpm

Question ID : **2449922246**
Status : **Answered**
Chosen Option :

Section : **EE (2 Mark)**

Q.1 A solid sphere made of insulating material has a radius R and has a total charge Q distributed uniformly in its volume. What is the magnitude of the electric field intensity, E, at a distance r (0<r<R) from the center of the sphere?

Ans
- ✓ A. $\frac{1}{4\pi\varepsilon_0}\times\frac{Qr}{R^3}$
- ✗ B. $\frac{3}{4\pi\varepsilon_0}\times\frac{Qr}{R^3}$
- ✗ C. $\frac{1}{4\pi\varepsilon_0}\times\frac{Q}{r^2}$
- ✗ D. $\frac{1}{4\pi\varepsilon_0}\times\frac{QR}{r^3}$

Question ID : **2449922263**
Status : **Answered**
Chosen Option :

Q.2

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Consider an ideal DC shunt generator. Under no-load condition, the net steady-state torque experienced by the rotor at rotational speed of N rpm is τ_N Nm. Under no-load conditions, this rotor experiences a net steady-state torque of τ_{2N} Nm for a rotational speed of $2N$ rpm. Which of the following is true?

Ans
- ✔ A. $\tau_N = \tau_{2N} = 0$
- ✘ B. $\tau_{2N} = \frac{\tau_N}{2}, \tau_N \neq 0$
- ✘ C. $\tau_{2N} = 2\tau_N, \tau_N \neq 0$
- ✘ D. $\tau_{2N} = \tau_N \neq 0$

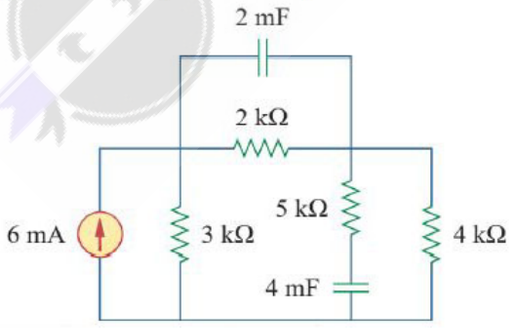
Question ID : **2449922255**
Status : **Answered**
Chosen Option :

Q.3 Which of the following transfer function does not have negative real part for $s = j\omega$ for all $\omega \in [0, \infty)$?

Ans
- ✘ A. $\frac{1}{(s+2)^2}$
- ✔ B. $\frac{s+1}{(s+2)(s+3)}$
- ✘ C. $\frac{1}{s^2}$
- ✘ D. $\frac{1}{(s+2)(s+3)}$

Question ID : **2449922252**
Status : **Answered**
Chosen Option :

Q.4 Find the energy stored in the capacitors in the given circuit below under steady state condition.



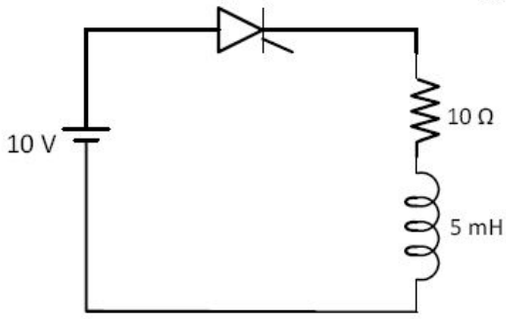
Ans
- ✘ A. 10 mJ, 120 mJ
- ✘ B. 0 J, 0 J
- ✘ C. 4 mJ, 64 mJ
- ✔ D. 16 mJ, 128 mJ

Question ID : **2449922265**

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Status : **Answered**
Chosen Option :

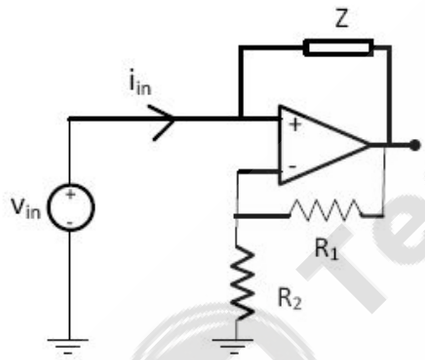
Q.5 A thyristor circuit is shown in the figure. If the latching current of the thyristor is 10 mA, the minimum width of the gate pulse for successful triggering of the thyristor is



Ans
- ✗ A. 1 μs
- ✗ B. 4 μs
- ✓ C. 5 μs
- ✗ D. 3 μs

Question ID : **2449922269**
Status : **Answered**
Chosen Option :

Q.6 The op-amp shown in the figure is ideal. The input impedance v_{in}/i_{in} is given by



Ans
- ✗ A. $-Z\frac{R_1}{R_1+R_2}$
- ✗ B. $Z\frac{R_2}{R_1}$
- ✗ C. Z
- ✓ D. $-Z\frac{R_2}{R_1}$

Question ID : **2449922273**
Status : **Answered**
Chosen Option :

Q.7

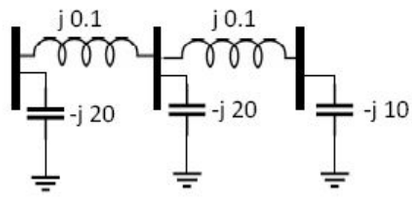
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A generator delivers power of 1 p.u. to an infinite bus through a purely reactive network. The maximum power that could be delivered by the generator is 2.0 p.u. A three-phase fault occurs at the terminals of the generator which reduces the generator output to zero. The fault is cleared after t_c seconds. The original network is then restored. The maximum swing of the rotor angle (δ) of the generator is found to be δ_{max} = 120 electrical degrees. The value of cos δ at time $t = t_c$ is

Ans
- ✔ A. 0.285
- ✘ B. 0.471
- ✘ C. 0.512
- ✘ D. 0.352

Question ID : **2449922257**
Status : **Not Answered**
Chosen Option : **--**

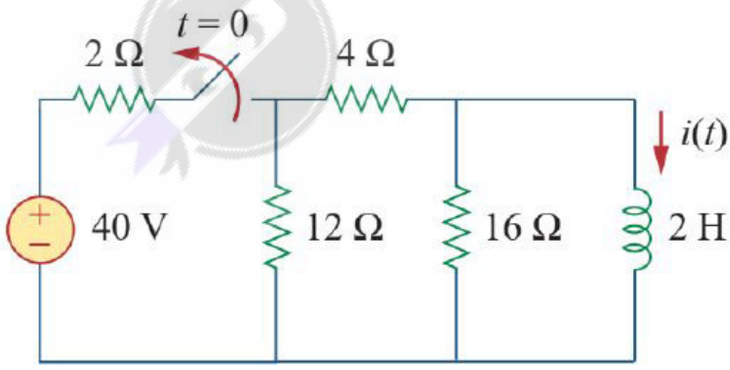
Q.8 The network shown in the given figure has impedances in p.u. as indicated. The diagonal elements of Y_{BUS} matrix are



Ans
- ✘ A. -j 19.9, -j 19.8, -j 9.9
- ✘ B. j 9.95, j 19.95, j 9.9
- ✘ C. j 19.9, j 19.8, j 9.9
- ✔ D. -j 9.95, -j 19.95, -j 9.9

Question ID : **2449922259**
Status : **Answered**
Chosen Option :

Q.9 The switch in the circuit below has been closed for a long time. At time $t = 0$, the switch is opened. Calculate $i(t)$ for $t \geq 0$.



Ans
- ✘ A. $10e^{-4t}$ A
- ✘ B. $8e^{-5t}$ A
- ✘ C. $10e^{4t}$ A
- ✔ D. $6e^{-4t}$ A

Question ID : **2449922266**

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Status : **Answered**
Chosen Option :

Q.10 Find the force on a straight conductor of length 0.3 m in $-\hat{\mathbf{k}}$ direction, carrying current of 5 A, where the field is, $\vec{B} = 3.5 \times 10^{-3}(\hat{\mathbf{i}} - \hat{\mathbf{j}})$T. The unit vectors along x, y, z axes are $\hat{\mathbf{i}}, \hat{\mathbf{j}}, \hat{\mathbf{k}}$, respectively.

Ans

✔ A. $-5.25 \times 10^{-3}(\hat{\mathbf{i}} + \hat{\mathbf{j}})$ N

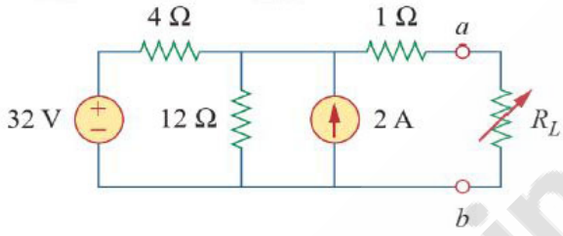
✘ B. $5.25\hat{\mathbf{k}}$ N

✘ C. $-5.25\hat{\mathbf{i}} + 3.75\,\hat{\mathbf{j}}$ N

✘ D. $6.25 \times 10^{3}(\hat{\mathbf{i}} + \hat{\mathbf{j}} + \hat{\mathbf{k}})$ N

Question ID : **2449922268**
Status : **Answered**
Chosen Option :

Q.11 Find Thevenin equivalent voltage V_{th} and resistance R_{th} of the given circuit below, to the left of the terminals a and b.



Ans

✘ A. $R_{th} = 12\ \Omega, V_{th} = 32\text{V}$

✘ B. $R_{th} = 13\ \Omega, V_{th} = 24\text{V}$

✔ C. $R_{th} = 4\ \Omega, V_{th} = 30\text{V}$

✘ D. $R_{th} = 4\ \Omega, V_{th} = 32\text{V}$

Question ID : **2449922264**
Status : **Answered**
Chosen Option :

Q.12 Consider a causal system $G(s) = \frac{1}{s^3}$. Assuming that the units of the input and output are the same, amplitude of the steady-state output for an input $r(t) = 10\sin(100\,t)$ given to $G(s)$ is

Ans

✘ A. 10^{-4}

✔ B. 10^{-5}

✘ C. 10^{-6}

✘ D. 10^{-3}

Question ID : **2449922251**
Status : **Answered**
Chosen Option :

Q.13 $\int_{-\pi}^{\pi} \cos(t)\cos(3t)\,dt =$

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Ans
✔ A. 0

✗ B. π

✗ C. $\pi/2$

✗ D. 2π

Question ID : **2449922253**
Status : **Answered**
Chosen Option :

Q.14 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 $x[n] = ne^{-an}u[n]$, where a is a positive constant. The z-transform of the sequence with appropriate region of convergence is

Ans
✗ A. $\dfrac{z}{(z-a)^2}$

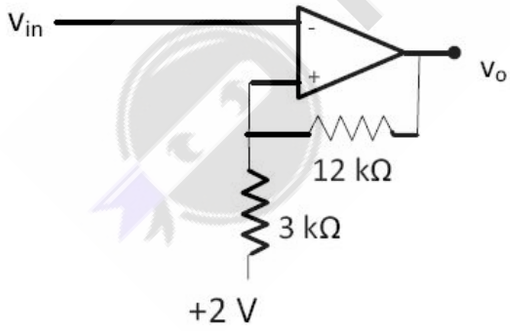
✗ B. $\dfrac{1}{z}$

✔ C. $\dfrac{ze^{-a}}{(z-e^{-a})^2}$

✗ D. $\dfrac{z}{z-e^{-a}}$

Question ID : **2449922254**
Status : **Answered**
Chosen Option :

Q.15 The output saturation voltages of the Schmitt trigger circuit shown in the figure is ±15 V. The input trip point voltages are



Ans
✔ A. 4.6 V and -1.4 V

✗ B. +3 V and -3 V

✗ C. +15 V and -15 V

✗ D. 2.3 V and -0.7 V

Question ID : **2449922274**
Status : **Answered**
Chosen Option :

Q.1

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6 An 800 kV 3-phase transmission line is having per phase line inductance of 1.1 mH/km and per phase line capacitance of 11.68 nF/km. Its power transfer capability under surge impedance loading is

Ans
✗ A. 1204 MW
✗ B. 2606 MW
✓ C. 2085 MW
✗ D. 1504 MW

Question ID : **2449922258**
Status : **Not Answered**
Chosen Option : **--**

Q.17 A short circuit test is conducted on a 1100/110 V, 50 Hz single-phase transformer with instruments connected on the high voltage side of the transformer. The voltmeter reads 40 V. The ammeter reads 10 A. The wattmeter reading is 300 W. The approximate winding resistance and leakage reactance, referred to high-voltage side, are respectively,

Ans
✗ A. 30 Ω, 26.4 Ω
✓ B. 3.0 Ω, 2.64 Ω
✗ C. 0.3 Ω, 0.264 Ω
✗ D. 0.003 Ω, 0.00264 Ω

Question ID : **2449922256**
Status : **Answered**
Chosen Option :

Q.18 An 8085 assembly language program is given as follows.

```
LXI H, 8100 H
MVI M, 20 H
MVI A, 40 H
INX H
MVI M, 30 H
ADD M
HLT
```

The value of A at the end of the execution of the program is

Ans
✗ A. 90 H
✓ B. 70 H
✗ C. 40 H
✗ D. 60 H

Question ID : **2449922272**
Status : **Answered**
Chosen Option :

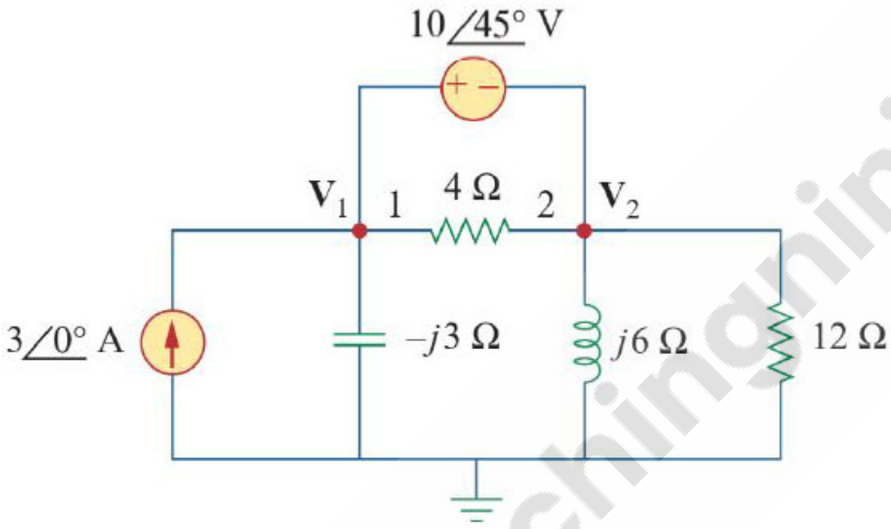
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Q.19 A single phase fully controlled bridge converter supplies a load drawing constant and ripple free load current. If the triggering angle is 60^0, the input power factor will be

Ans
- ✔ A. 0.45
- ✘ B. 0.55
- ✘ C. 0.71
- ✘ D. 0.86

Question ID : **2449922271**
Status : **Answered**
Chosen Option :

Q.20 Compute node voltage phasor $\bar{V}_2$ in the circuit below.



Ans
- ✔ A. $31.41\angle -87.18°$ V
- ✘ B. $10\angle 45°$ V
- ✘ C. $-120\angle 79.34°$ V
- ✘ D. $120\angle 79.34°$ V

Question ID : **2449922267**
Status : **Answered**
Chosen Option :

Q.21 Four ammeters M1, M2, M3, and M4 with the following specifications are available:

Instrument	Type	Full Scale Value	Accuracy % of Full Scale
M1	$3^{1/2}$ digital dual slope	20	±0.10
M2	PMMC	10	±0.20
M3	Electrodynamic	5	±0.50
M4	Moving Iron	1	±1.00

A current of 1 A is to be measured. To ensure minimum error in the reading, one should select the meter

Ans
- ✘ A. M3
- ✔ B. M4
- ✘ C. M1
- ✘ D. M2

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Question ID : **2449922262**
Status : **Answered**
Chosen Option :

Q.22 A 50 Hz transformer has equal hysteresis and eddy current losses at rated operating condition. If the voltage is reduced to 80% of the rated value and frequency is made 40 Hz, compared to the rated operating condition, the core loss of the transformer is reduced by

Ans
- ✗ A. 15%
- ✗ B. 10%
- ✗ C. 8%
- ✓ D. 28%

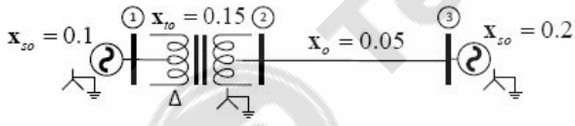
Question ID : **2449922275**
Status : **Answered**
Chosen Option :

Q.23 A three phase diode bridge rectifier is feeding a highly inductive load. The load current is assumed to be 100 A ripple free DC. If the three phase input is 400 V, 50 Hz, AC, the rms value of the current through each diode is

Ans
- ✓ A. 57.73 A
- ✗ B. 33.33 A
- ✗ C. 66.67 A
- ✗ D. 16.67 A

Question ID : **2449922270**
Status : **Answered**
Chosen Option :

Q.24 The zero sequence reactances (in p.u.) are indicated in the network shown in the figure below. The zero sequence driving point reactance of node 3 will be



Ans
- ✓ A. 0.1
- ✗ B. 0.05
- ✗ C. 0.3
- ✗ D. 0.2

Question ID : **2449922260**
Status : **Answered**
Chosen Option :

Q.25 Two 100 V full scale PMMC type DC volt meters having figure-of-merit (FOM) of 10 kΩ/V and 20 kΩ/V are connected in series. The series combination can be used to measure maximum DC voltage of

Ans
- ✗ A. 100 V
- ✗ B. 50 V
- ✗ C. 200 V

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✔ D. 150 V

Question ID : **2449922261**
Status : **Not Answered**
Chosen Option : **--**

Section : **Hindi**

Q.1 दिए गए विकल्पों में से कौन-सा विकल्प दिए हुए शब्द का पर्यायवाची नहीं है?
शब्द:- पक्षी

Ans
✔ A. वारि
✘ B. पखेरू
✘ C. विहंग
✘ D. खग

Question ID : **2449922278**
Status : **Answered**
Chosen Option :

Q.2 नीचे दिए गए दोनों वाक्यों को पढ़िए ।
वाक्य १. "रामचरितमानस" की रचना गोस्वामी तुलसीदास ने की थी ।
वाक्य २. "गोदान" उपन्यास के लेखक मुंशी प्रेमचंद हैं ।
नीचे दिए गए विकल्पों में से कौन सा विकल्प सही है?

Ans
✔ A. दोनों वाक्य सही हैं
✘ B. वाक्य २ सही है किन्तु वाक्य १ सही नहीं है
✘ C. दोनों वाक्य सही नहीं हैं
✘ D. वाक्य १ सही है किन्तु वाक्य २ सही नहीं है

Question ID : **2449922280**
Status : **Answered**
Chosen Option :

Q.3 दिए गए विकल्पों में से कौन सा विकल्प नीचे लिखे शब्द का सही सन्धि-विग्रह है?
शब्द:- स्वेच्छा

Ans
✘ A. स्वः + एच्छा
✘ B. स्वे + च्छा
✘ C. स्वे + इच्छा
✔ D. स्व + इच्छा

Question ID : **2449922276**
Status : **Answered**
Chosen Option :

Q.4 दिए गए वाक्यांशों में से सर्वोचित वाक्यांश चुनकर नीचे दिए गए मुहावरे को पूरा करें ।
मुहावरा:- दूध का दूध _____

Ans
✘ A. दही की नदी

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✗ B. दही का दही

✗ C. दूध में पानी

✓ D. पानी का पानी

Question ID : **2449922279**
Status : **Answered**
Chosen Option :

Q.5 दिए गए विकल्पों में से कौन सा वाक्यांश नीचे लिखे शब्द का सही अर्थ है?

शब्द:- अवैतनिक

Ans

✗ A. जिसका वेतन निर्धारित ना किया जा सके

✓ B. बिना वेतन के कार्य करने वाला

✗ C. अनैतिक कार्य करने वाला

✗ D. अनैतिक कार्य करने की उम्र (वय)

Question ID : **2449922277**
Status : **Answered**
Chosen Option :

Section : **GK**

Q.1 The Aligarh Muslim University was founded by which of the following persons?

Ans

✗ A. Maulana Azad

✗ B. Mohammed Ali Jinnah

✓ C. Syed Ahmed Khan

✗ D. Feroze Gandhi

Question ID : **2449922289**
Status : **Answered**
Chosen Option :

Q.2 'Light-years' is a unit of measurement for which of the following?

Ans

✗ A. Illumination

✗ B. Time

✗ C. Total solar energy incident on the earth in a year

✓ D. Distance

Question ID : **2449922288**
Status : **Answered**
Chosen Option :

Q.3 Who is the author of the collection of short stories 'The Canterbury Tales'?

Ans

✓ A. Geoffrey Chaucer

✗ B. William Shakespeare

✗ C. William Langland

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✗ D. T.S. Eliot

Question ID : **2449922290**
Status : **Answered**
Chosen Option :

Q.4 Who was the first person to set foot on the moon?

Ans
✗ A. Micheal Collins
✓ B. Neil Amstrong
✗ C. Yuri Gagarin
✗ D. Rakesh Sharma

Question ID : **2449922281**
Status : **Answered**
Chosen Option :

Q.5 Where is the headquarter of the International Court of Justice located?

Ans
✗ A. Paris
✓ B. The Hague
✗ C. New York
✗ D. Geneva

Question ID : **2449922282**
Status : **Answered**
Chosen Option :

Q.6 Which of the following positions is associated with T.N. Seshan?

Ans
✗ A. Chief Justice of India
✗ B. Governor of the Reserve Bank of India
✓ C. Chief Election Commissioner of India
✗ D. Vice Chairman of the Planning Commission

Question ID : **2449922283**
Status : **Answered**
Chosen Option :

Q.7 In which of the following cities Kumbh Mela is not held?

Ans
✗ A. Nasik
✗ B. Haridwar
✗ C. Prayagraj (Allahabad)
✓ D. Varanasi

Question ID : **2449922287**
Status : **Answered**
Chosen Option :

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Q.8 Where was the first Asian Games held?

Ans
✗ A. Manila
✗ B. Jakarta
✓ C. New Delhi
✗ D. Tokyo

Question ID : **2449922285**
Status : **Answered**
Chosen Option :

Q.9 What is the narrow stretch of water separating India and Sri Lanka called?

Ans
✓ A. Palk Strait
✗ B. Berring Strait
✗ C. Tamil Strait
✗ D. Vasco Strait

Question ID : **2449922286**
Status : **Answered**
Chosen Option :

Q.10 Which of the following Army Generals is not known as one of the leaders in World War II?

Ans
✓ A. Manekshaw
✗ B. De Gaulle
✗ C. Rommel
✗ D. Eisenhower

Question ID : **2449922284**
Status : **Answered**
Chosen Option :

Section : **Reasoning (1 Mark)**

Q.1 If 20% of a = b, then b% of 20 is the same as

Ans
✓ A. 4% of a
✗ B. 10% of a
✗ C. 6% of a
✗ D. 8% of a

Question ID : **2449922294**
Status : **Answered**
Chosen Option :

Q.2

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Consider the matrix,

$$\mathbf{A} = \begin{bmatrix} 2 & 3 & 5 & 6 \\ 1 & 4 & 7 & 8 \\ 0 & 0 & 0 & 0 \\ 3 & 7 & 9 & 8 \end{bmatrix}$$

Which of the following statements is not correct?

Ans
- ✗ A. $\mathbf{A}^{-1}$ does not exist
- ✗ B. Matrix **A** is singular
- ✓ C. rank (**A**)=4
- ✗ D. $\det(\mathbf{A}) = 0$

Question ID : **2449922292**
Status : **Answered**
Chosen Option :

Q.3 Which word does not belong with others?

Ans
- ✓ A. Flute
- ✗ B. Violin
- ✗ C. Guitar
- ✗ D. Sitar

Question ID : **2449922293**
Status : **Answered**
Chosen Option :

Q.4 Arrange the words given below in a meaningful sequence:

1. Poverty
2. Population
3. Death
4. Unemployment
5. Disease

Ans
- ✗ A. 2,3,4,5,1
- ✓ B. 2,4,1,5,3
- ✗ C. 1,2,3,4,5
- ✗ D. 3,4,2,5,1

Question ID : **2449922295**
Status : **Answered**
Chosen Option :

Q.5 The minimum point of the function $\frac{x^3}{3} - x$ is at

Ans
- ✗ A. $x = 0$
- ✗ B. $x = \frac{1}{\sqrt{3}}$

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✔ C. $x = -1$

✗ D. $x = 1$

Question ID : **2449922291**
Status : **Answered**
Chosen Option :

Section : **Reasoning (2 Mark)**

Q.1 The directional derivative of the surface, $f = (x^2 + y^2 + z^2)$ at the point P: $[2, -2, 1]^T$ along the vector $\mathbf{a} = [-1, -1, 0]^T$ is given by

Ans

✔ A. 0

✗ B. 8

✗ C. 4

✗ D. 6

Question ID : **2449922296**
Status : **Answered**
Chosen Option :

Q.2 Look at the series:

1, 2, 6, 12, 25, 48, ___

What number should come next.

Ans

✗ A. 65

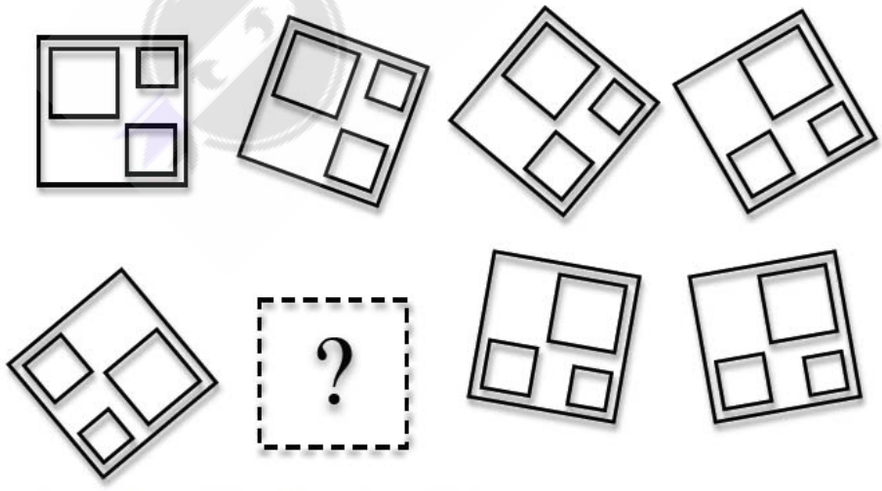
✔ B. 91

✗ C. 100

✗ D. 75

Question ID : **2449922300**
Status : **Answered**
Chosen Option :

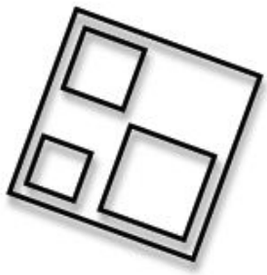
Q.3

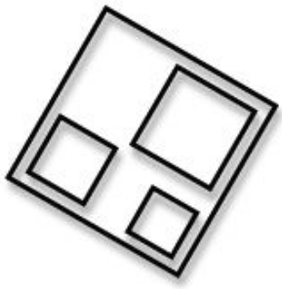


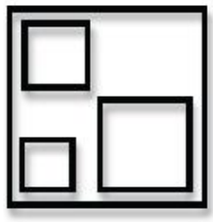
Which of the shapes below continues the sequence?

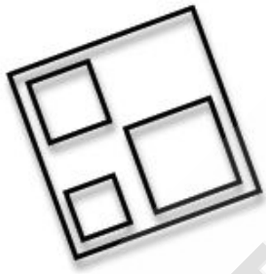
Ans

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✗ A. 

✓ B. 

✗ C. 

✗ D. 

Question ID : **2449922298**
Status : **Answered**
Chosen Option :

Q.4 

Which of the shapes below continues the sequence?

Ans

✗ A. 

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✔ B. 

✘ C. 

✘ D. 

Question ID : **2449922299**
Status : **Answered**
Chosen Option :

Q.5 Consider the matrix,

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

Eigenvalues of the matrix are given by,

Ans

✘ A. $\lambda_1 = a + b, \lambda_2 = a - b$

✘ B. $\lambda_1 = a^2, \lambda_2 = b^2$

✔ C. $\lambda_1 = a - jb, \lambda_2 = a + jb$

✘ D. $\lambda_1 = b - ja, \lambda_2 = b + ja$

Question ID : **2449922297**
Status : **Answered**
Chosen Option :

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