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Your Personal Exams Guide

2P0521K23 (DAY-2, FIRST SESSION)

ವಿಷಯ ಸಂಕೇತ	ಸಮಯ	ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯ ವರ್ಷನ್ ಕೋಡ್	ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯ ಕ್ರಮ ಸಂಖ್ಯೆ
P	ಬೆ. 10.30 ರಿಂದ 11.50 ರ ವರೆಗೆ	A-3	0590457

ಒಟ್ಟು ಅವಧಿ	ಉತ್ತರಿಸಲು ಇರುವ ಗರಿಷ್ಠ ಅವಧಿ	ಗರಿಷ್ಠ ಅಂಕಗಳು	ಒಟ್ಟು ಪ್ರಶ್ನೆಗಳು	ನಿಮ್ಮ ಸಿಇಟಿ ಸಂಖ್ಯೆಯನ್ನು ಬರೆಯಿರಿ
80 ನಿಮಿಷಗಳು	70 ನಿಮಿಷಗಳು	60	60	23UGE 1 E 0 6 5

ಮಾಡಿ

1. ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರಿಂದ ಈ ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯನ್ನು ನಿಮಗೆ ಬೆ. 10.30 ಆದ ನಂತರ ಕೊಡಲಾಗಿರುತ್ತದೆ.
2. ಅಭ್ಯರ್ಥಿಗಳು ಸಿಇಟಿ ಸಂಖ್ಯೆಯನ್ನು ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಬರೆದು ಆದಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ವೃತ್ತಗಳನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತುಂಬಿದ್ದೀರೆಂದು ಖಾತ್ರಿ ಪಡಿಸಿಕೊಳ್ಳಿ.
3. ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯ ವರ್ಷನ್ ಕೋಡ್ ಅನ್ನು ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಬರೆದು ಆದಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ವೃತ್ತಗಳನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತುಂಬಬೇಕು.
4. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ವರ್ಷನ್ ಕೋಡ್ ಮತ್ತು ಕ್ರಮ ಸಂಖ್ಯೆಯನ್ನು ನಾಮಿನಲ್ ರೋಲ್‌ನಲ್ಲಿ ತಪ್ಪಿಲ್ಲದೆ ಬರೆಯಬೇಕು.
5. ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯ ಕೆಳಭಾಗದ ನಗದಿತ ಜಾಗದಲ್ಲಿ ಪೂರ್ಣ ಸಹಿ ಮಾಡಬೇಕು.

ಮಾಡಬೇಡಿ

1. **ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಮುದ್ರಿತವಾಗಿರುವ ಟೈಮಿಂಗ್ ಮಾರ್ಕ್‌ನ್ನು ತಿದ್ದಬಾರದು / ಹಾಳುಮಾಡಬಾರದು / ಅಳಿಸಬಾರದು.**
2. **ಮೂರನೇ ಬೆಲ್ ಬೆ. 10.40 ಕ್ಕೆ ಆಗುತ್ತದೆ. ಅಲ್ಲಿಯವರೆಗೂ,**
   - ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಬಲಭಾಗದಲ್ಲಿರುವ ಸೀಲ್ ಅನ್ನು ತೆಗೆಯಬಾರದು.
   - ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಒಳಗಡೆ ಇರುವ ಪ್ರಶ್ನೆಗಳನ್ನು ನೋಡಲು ಪ್ರಯತ್ನಿಸಬಾರದು ಅಥವಾ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಉತ್ತರಿಸಲು ಪ್ರಾರಂಭಿಸಬಾರದು.

ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಮುಖ್ಯ ಸೂಚನೆಗಳು

1. ಪ್ರಶ್ನೆಗಳಲ್ಲಿ ಬಳಸಿರುವ SIGNS AND SYMBOLS ಗಳನ್ನು, ಬೇರೆ ರೀತಿಯಲ್ಲಿ ಹೇಳದ ಹೊರತು, ನಿಗದಿತ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿನ ಅರ್ಥವನ್ನು ಪರಿಗಣಿಸಬೇಕು.
2. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ಒಟ್ಟು **60** ಪ್ರಶ್ನೆಗಳಿದ್ದು, ಪ್ರತಿ ಪ್ರಶ್ನೆಗೂ 4 ಬಹು ಆಯ್ಕೆ ಉತ್ತರಗಳು ಇರುತ್ತವೆ. ಪ್ರತಿ ಪ್ರಶ್ನೆಯ ಕೆಳಗೆ ಕೊಟ್ಟಿರುವ ನಾಲ್ಕು ಬಹು ಆಯ್ಕೆಯ ಉತ್ತರಗಳಲ್ಲಿ ಸರಿಯಾದ ಒಂದು ಉತ್ತರವನ್ನು ಆಯ್ಕೆ ಮಾಡಿ.
3. ಮೂರನೇ ಬೆಲ್ ಅಂದರೆ ಬೆ. **10.40**ರ ನಂತರ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಬಲಭಾಗದಲ್ಲಿರುವ ಸೀಲ್ ತೆಗೆದು ಈ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ಯಾವುದೇ ಪುಟಗಳು ಮುದ್ರಿತವಾಗಿಲ್ಲದೇ ಇರುವುದು ಕಂಡು ಬಂದಲ್ಲಿ ಅಥವಾ ಹರಿದು ಹೋಗಿದ್ದಲ್ಲಿ ಅಥವಾ ಯಾವುದೇ ಐಟಂಗಳು ಬಿಟ್ಟುಹೋಗಿದೆಯೇ ಎಂಬುದನ್ನು ವಿಚಿತಪಡಿಸಿಕೊಂಡು, ಈ ರೀತಿ ಆಗಿದ್ದರೆ ಕೂಡಲೇ ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯನ್ನು ಬದಲಾಯಿಸಿಕೊಳ್ಳುವುದು ನಂತರ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಉತ್ತರಿಸಲು ಪ್ರಾರಂಭಿಸುವುದು.
4. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿನ ಪ್ರಶ್ನೆಗೆ ಅನುಗುಣವಾಗಿರುವ ಸರಿ ಉತ್ತರವನ್ನು ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಅದೇ ಕ್ರಮ ಸಂಖ್ಯೆಯ ಮುಂದೆ ನೀಡಿರುವ ಸಂಬಂಧಿಸಿದ ವೃತ್ತವನ್ನು **ನೀಲಿ ಅಥವಾ ಕಪ್ಪು** ಶಾಯಿಯ ಬಾಲ್ ಪಾಯಿಂಟ್ ಪೆನ್‌ನಿಂದ ಸಂಪೂರ್ಣ ತುಂಬುವುದು.

ಸರಿಯಾದ ಕ್ರಮ CORRECT METHOD	ತಪ್ಪು ಕ್ರಮಗಳು WRONG METHODS
(A) ● (C) (D)	✓ (B) (C) (D) (A) (B) (C) ✓ (A) ● ● (D)
	(A) (B) (C) (D) (A) ● (C) (D)

5. ಈ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯನ್ನು ಸ್ಕ್ಯಾನ್ ಮಾಡುವ ಸ್ಕ್ಯಾನರ್ ಬಹಳ ಸೂಕ್ಷ್ಮವಾಗಿದ್ದು ಸಣ್ಣ ಗುರುತನ್ನು ಸಹ ದಾಖಲಿಸುತ್ತದೆ. ಆದ್ದರಿಂದ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಉತ್ತರಿಸುವಾಗ ಎಚ್ಚರಿಕೆ ವಹಿಸಿ.
6. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ಕೊಟ್ಟಿರುವ ಖಾಲಿ ಜಾಗವನ್ನು ರಫ್ ಕೆಲಸಕ್ಕೆ ಉಪಯೋಗಿಸಿ. ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯನ್ನು ಇದಕ್ಕೆ ಉಪಯೋಗಿಸಬೇಡಿ.
7. ಕೊನೆಯ ಬೆಲ್ ಅಂದರೆ ಬೆ. **11.50** ಆದ ನಂತರ ಉತ್ತರಿಸುವುದನ್ನು ನಿಲ್ಲಿಸಿ.
8. ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯನ್ನು ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರಿಗೆ ಯಥಾಸ್ಥಿತಿಯಲ್ಲಿ ನೀಡಿರಿ.
9. ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರು ಮೇಲ್ಭಾಗದ ಹಾಳೆಯನ್ನು ಪ್ರತ್ಯೇಕಿಸಿ (ಕಚೇರಿ ಪ್ರತಿ) ತನ್ನ ವಶದಲ್ಲಿ ಇಟ್ಟುಕೊಂಡು ತಳಬದಿಯ ಯಥಾಪ್ರತಿಯನ್ನು (Candidate's Copy) ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಕೊಡುತ್ತಾರೆ.

ಸೂಚನೆ: ಕನ್ನಡ ಆವೃತ್ತಿಯ ಪ್ರಶ್ನೆಗಳಲ್ಲಿ ಉತ್ತರಿಸುವ ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಕನ್ನಡದಲ್ಲಿ ಮುದ್ರಿತವಾಗಿರುವ ಪ್ರಶ್ನೆಗಳ ಬಗ್ಗೆ ಏನಾದರೂ ಸಂದೇಹವಿದ್ದಲ್ಲಿ ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಯ ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯನ್ನು ನೋಡಬಹುದು. ಏನಾದರೂ ವ್ಯತ್ಯಾಸ ಕಂಡುಬಂದಲ್ಲಿ ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಯನ್ನು ಅಂತಿಮ ಎಂದು ಪರಿಗಣಿಸಲಾಗುವುದು.

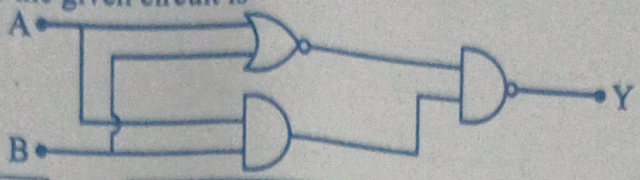
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1. When a p-n junction diode is in forward bias, which type of charge carriers flows in the connecting wire ?
(A) Ions (B) Protons (C) Holes (D) Free electrons

2. A full-wave rectifier with diodes D_1 and D_2 is used to rectify 50 Hz alternating voltage. The diode D_1 conducts _____ times in one second.
(A) 25 (B) 75 (C) 50 (D) 100

3. The truth table for the given circuit is



(A)

A	B	Y
1	1	1
1	0	0
0	1	1
0	0	1

(B)

A	B	Y
1	1	1
1	0	1
0	1	1
0	0	1

(C)

A	B	Y
1	1	1
1	0	1
0	1	1
0	0	0

(D)

A	B	Y
1	1	1
1	0	1
0	1	0
0	0	1

4. The energy gap of an LED is 2.4 eV. When the LED is switched 'ON', the momentum of the emitted photons is
(A) 2.56×10^{-27} kg.m.s^{-1}
(B) 1.28×10^{-11} kg.m.s^{-1}
(C) 0.64×10^{-27} kg.m.s^{-1}
(D) 1.28×10^{-27} kg.m.s^{-1}

5. In the following equation representing β^-decay, the number of neutrons in the nucleus X is
$$^{210}_{83}Bi \longrightarrow X + e^{-1} + \bar{\nu}$$
(A) 127 (B) 125 (C) 84 (D) 126

6. A nucleus with mass number 220 initially at rest emits an alpha particle. If the Q value of reaction is 5.5 MeV, calculate the value of kinetic energy of alpha particle.
(A) 5.4 MeV (B) 7.4 MeV (C) 4.5 MeV (D) 6.5 MeV

7. A radioactive sample has half-life of 3 years. The time required for the activity of the sample to reduce to $\frac{1}{5}$th of its initial value is about
(A) 7 years (B) 15 years (C) 5 years (D) 10 years

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8. A body of mass 10 kg is kept on a horizontal surface. The coefficient of kinetic friction between the body and the surface is 0.5. A horizontal force of 60 N is applied on the body. The resulting acceleration of the body is about

(A) $5\ ms^{-2}$ (B) $6\ ms^{-2}$ (C) zero (D) $1\ ms^{-2}$

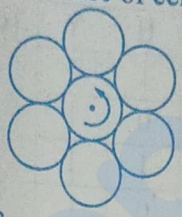
9. A ball of mass 0.2 kg is thrown vertically down from a height of 10 m. It collides with the floor and loses 50% of its energy and then rises back to the same height. The value of its initial velocity is

(A) $14\ ms^{-1}$ (B) $196\ ms^{-1}$ (C) $20\ ms^{-1}$ (D) zero

10. The moment of inertia of a rigid body about an axis

(A) does not depend on its shape.
(B) depends on the position of axis of rotation.
(C) does not depend on its size.
(D) does not depend on its mass.

11. Seven identical discs are arranged in a planar pattern, so as to touch each other as shown in the figure. Each disc has mass 'm' radius R. What is the moment of inertia of system of six discs about an axis passing through the centre of central disc and normal to plane of all discs ?



(A) $100\ mR^2$ (B) $55\ \frac{mR^2}{2}$ (C) $85\ \frac{mR^2}{2}$ (D) $27\ mR^2$

12. The true length of a wire is 3.678 cm. When the length of this wire is measured using instrument A, the length of the wire is 3.5 cm. When the length of the wire is measured using instrument B, it is found to have length 3.38 cm. Then the

(A) measurement with A is more accurate while measurement with B is more precise.
(B) measurement with B is more accurate and precise.
(C) measurement with A is more precise while measurement with B is more accurate.
(D) measurement with A is more accurate and precise.

13. A body is moving along a straight line with initial velocity v_0. Its acceleration a is constant. After t seconds, its velocity becomes v. The average velocity of the body over the given time interval is

(A) $\bar{v} = \frac{v^2 + v_0^2}{2at}$ (B) $\bar{v} = \frac{v^2 + v_0^2}{at}$ (C) $\bar{v} = \frac{v^2 - v_0^2}{2at}$ (D) $\bar{v} = \frac{v^2 - v_0^2}{at}$

14. A particle is in uniform circular motion. Related to one complete revolution of the particle, which among the statements is incorrect ?

(A) Displacement of the particle is zero.
(B) Average speed of the particle is zero.
(C) Average velocity of the particle is zero.
(D) Average acceleration of the particle is zero.

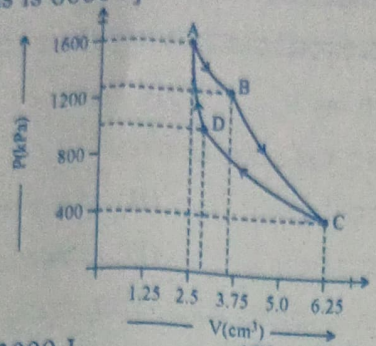
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15. 100 g of ice at 0 °C is mixed with 100 g of water at 100 °C. The final temperature of the mixture is
[Take $L_f = 3.36 \times 10^5$ J kg^{-1} and $S_w = 4.2 \times 10^3$ J kg^{-1}k^{-1}]
(A) 10 °C (B) 50 °C (C) 1 °C (D) 40 °C

16. The P-V diagram of a Carnot's engine is shown in the graph below. The engine uses 1 mole of an ideal gas as working substance. From the graph, the area enclosed by the P-V diagram is
[The heat supplied to the gas is 8000 J]

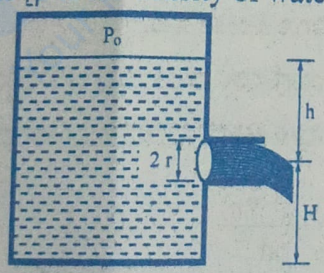


(A) 2000 J (B) 3000 J (C) 1000 J (D) 1200 J

17. When a planet revolves around the Sun, in general, for the planet
(A) linear momentum and aerial velocity are constant.
(B) kinetic and potential energy of the planet are constant.
(C) angular momentum about the Sun and aerial velocity of the planet are constant.
(D) linear momentum and linear velocity are constant.

18. A stretched wire of a material whose Young's modulus $Y = 2 \times 10^{11}$ Nm^{-2} has Poisson's ratio 0.25. Its lateral strain $\varepsilon_l = 10^{-3}$. The elastic energy density of the wire is
(A) 1×10^5 Jm^{-3} (B) 4×10^5 Jm^{-3} (C) 8×10^5 Jm^{-3} (D) 16×10^5 Jm^{-3}

19. A closed water tank has cross-sectional area A. It has a small hole at a depth of h from the free surface of water. The radius of the hole is r so that $r << \sqrt{\frac{A}{\pi}}$. If P_o is the pressure inside the tank above water level, and P_a is the atmospheric pressure, the rate of flow of the water coming out of the hole is [ρ is the density of water]



(A) $\pi r^2 \sqrt{2gh + \frac{2(P_o - P_a)}{\rho}}$ (B) $\pi r^2 \sqrt{2gH}$

(C) $\pi r^2 \sqrt{gh + \frac{2(P_o - P_a)}{\rho}}$ (D) $\pi r^2 \sqrt{2gh}$

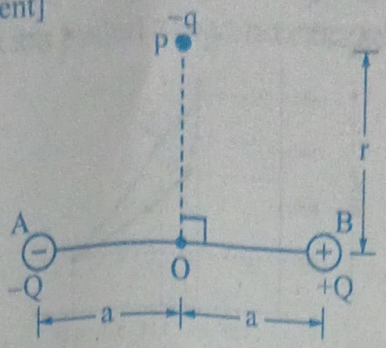
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20. A positively charged glass rod is brought near uncharged metal sphere, which is mounted on an insulated stand. If the glass rod is removed, the net charge on the metal sphere is
(A) Zero (B) 1.6×10^{-19} C (C) Positive charge (D) Negative charge

21. In the situation shown in the diagram, magnitude of $q << |Q|$ and $r >> a$. The net force on the free charge $-q$ and net torque on it about O at the instant shown are respectively
[$p = 2aQ$ is the dipole moment]



(A) $\frac{1}{4\pi\varepsilon_0}\frac{pq}{r^2}\hat{k}, \frac{1}{4\pi\varepsilon_0}\frac{pq}{r^3}\hat{i}$ (B) $-\frac{1}{4\pi\varepsilon_0}\frac{pq}{r^2}\hat{k}, -\frac{1}{4\pi\varepsilon_0}\frac{pq}{r^3}\hat{i}$

(C) $\frac{1}{4\pi\varepsilon_0}\frac{pq}{r^3}\hat{i}, +\frac{1}{4\pi\varepsilon_0}\frac{pq}{r^2}\hat{k}$ (D) $\frac{1}{4\pi\varepsilon_0}\frac{pq}{r^3}\hat{i}, -\frac{1}{4\pi\varepsilon_0}\frac{pq}{r^2}\hat{k}$

22. Pressure of ideal gas at constant volume is proportional to _____.
(A) average potential energy of the molecules (B) total energy of the gas
(C) average kinetic energy of the molecules (D) force between the molecules

23. A block of mass m is connected to a light spring of force constant k. The system is placed inside a damping medium of damping constant b. The instantaneous values of displacement, acceleration and energy of the block are x, a and E respectively. The initial amplitude of oscillation is A and ω' is the angular frequency of oscillations. The incorrect expression related to the damped oscillations is

(A) $\omega' = \sqrt{\frac{k}{m} - \frac{b^2}{4m^2}}$ (B) $E = \frac{1}{2}kA^2 e^{-\frac{bt}{m}}$

(C) $m\frac{d^2x}{dt^2} + b\frac{dx}{dt} + kx = 0$ (D) $x = Ae^{-\frac{b}{m}}\cos(\omega' t + \phi)$

24. The speed of sound in an ideal gas at a given temperature T is v. The rms speed of gas molecules at that temperature is v_{rms}. The ratio of the velocities v and v_{rms} for helium and oxygen gases are X and X' respectively. Then $\frac{X}{X'}$ is equal to

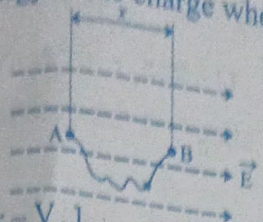
(A) $\frac{5}{\sqrt{21}}$ (B) $\sqrt{\frac{5}{21}}$ (C) $\frac{21}{5}$ (D) $\frac{21}{\sqrt{5}}$

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25. A uniform electric field vector $\vec{E}$ exists along horizontal direction as shown. The electric potential at A is V_A. A small point charge q is slowly taken from A to B along the curved path as shown. The potential energy of the charge when it is at point B is

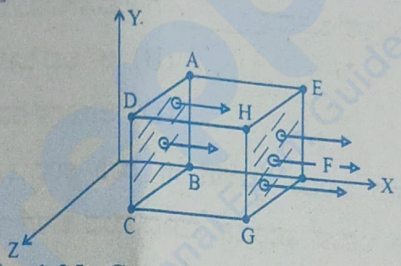


(A) $q[V_A + Ex]$ (B) $q[Ex - V_A]$ (C) qEx (D) $q[V_A - Ex]$

26. A parallel plate capacitor of capacitance C_1 with a dielectric slab in between its plates is connected to a battery. It has a potential difference V_1 across its plates. When the dielectric slab is removed, keeping the capacitor connected to the battery, the new capacitance and potential difference are C_2 and V_2 respectively. Then,

(A) $V_1 > V_2, C_1 > C_2$ (B) $V_1 < V_2, C_1 > C_2$ (C) $V_1 = V_2, C_1 > C_2$ (D) $V_1 = V_2, C_1 < C_2$

27. A cubical Gaussian surface has side of length a = 10 cm. Electric field lines are parallel to x-axis as shown. The magnitudes of electric fields through surfaces ABCD and EFGH are $6kNC^{-1}$ and $9kNC^{-1}$ respectively. Then the total charge enclosed by the cube is [Take $\varepsilon_0 = 9 \times 10^{-12}\ Fm^{-1}$]

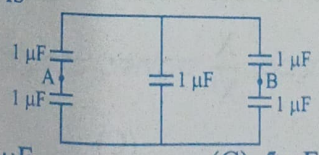


(A) 1.35 nC (B) –1.35 nC (C) 0.27 nC (D) –0.27 nC

28. Electric field at a distance 'r' from an infinitely long uniformly charged straight conductor, having linear charge density λ is E_1. Another uniformly charged conductor having same linear charge density λ is bent into a semicircle of radius 'r'. The electric field at its centre is E_2. Then

(A) $E_2 = \frac{E_1}{r}$ (B) $E_1 = E_2$ (C) $E_1 = \pi r E_2$ (D) $E_2 = \pi r E_1$

29. Five capacitors each of value 1μF are connected as shown in the figure .The equivalent capacitance between A and B is



(A) 1 μF (B) 2 μF (C) 5 μF (D) 3 μF

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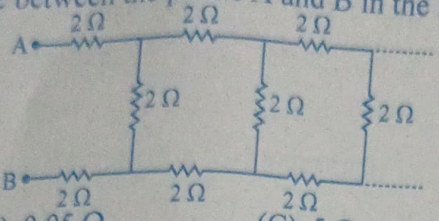
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30. For a given electric current the drift velocity of conduction electrons in a copper wire is v_d and their mobility is μ. When the current is increased at constant temperature
(A) v_d remains the same, μ increases
(B) v_d decreases, μ remains the same
(C) v_d remains the same, μ decreases
(D) v_d increases, μ remains the same

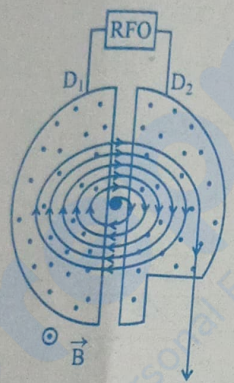
31. Ten identical cells each emf 2 V and internal resistance 1 Ω are connected in series with two cells wrongly connected. A resistor of 10 Ω is connected to the combination. What is the current through the resistor ?
(A) 2.4 A (B) 0.6 A (C) 1.2 A (D) 1.8 A

32. The equivalent resistance between the points A and B in the following circuit is



(A) 5.5 Ω (B) 0.05 Ω (C) 5 Ω (D) 0.5 Ω

33. A charged particle is subjected to acceleration in a cyclotron as shown. The charged particle undergoes increase in its speed



(A) Only inside D_2
(B) Inside D_1, D_2 and the gaps
(C) Only inside D_1
(D) Only in the gap between D_1 and D_2

34. The resistance of a carbon resistor is 4.7 kΩ ± 5%. The colour of the third band is
(A) red (B) violet (C) orange (D) gold

35. The four bands of a colour coded resistor are of the colours gray, red, gold and gold. The value of the resistance of the resistor is
(A) 82Ω ± 10% (B) 8.2Ω ± 5% (C) 82Ω ± 5% (D) 5.2Ω ± 5%

36. A wire of resistance R is connected across a cell of emf ε and internal resistance r. The current through the circuit is I. In time t, the work done by the battery to establish the current I is
(A) $\frac{\varepsilon^2 t}{R}$ (B) IRt (C) I^2Rt (D) εIt

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37. The Curie temperatures of Cobalt and iron are 1400 K and 1000 K respectively. At T = 1600 K, the ratio of magnetic susceptibility of Cobalt to that of iron is

(A) 3 (B) $\frac{7}{5}$ (C) $\frac{5}{7}$ (D) $\frac{1}{3}$

38. The torque acting on a magnetic dipole placed in uniform magnetic field is zero, when the angle between the dipole axis and the magnetic field is _____.

(A) 45° (B) 60° (C) 90° (D) zero

39. The horizontal component of Earth's magnetic field at a place is 3×10^{-5} T. If the dip at that place is 45°, the resultant magnetic field at that place is

(A) $\frac{3}{\sqrt{2}} \times 10^{-5}$ T (B) $\frac{3}{2}\sqrt{3} \times 10^{-5}$ T (C) $3\sqrt{2} \times 10^{-5}$ T (D) 3×10^{-5} T

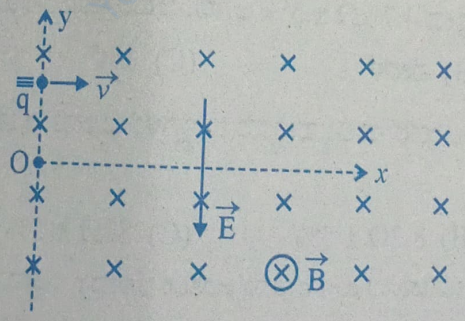
40. A proton and an alpha-particle moving with the same velocity enter a uniform magnetic field with their velocities perpendicular to the magnetic field. The ratio of radii of their circular paths is

(A) 1 : 4 (B) 4 : 1 (C) 1 : 2 (D) 2 : 1

41. A moving coil galvanometer is converted into an ammeter of range 0 to 5 mA. The galvanometer resistance is 90 Ω and the shunt resistance has a value of 10 Ω. If there are 50 divisions in the galvanometer-turned-ammeter on either sides of zero, its current sensitivity is

(A) 1×10^5 A/div (B) 2×10^4 A/div (C) 1×10^5 div/A (D) 2×10^4 div/A

42. A positively charged particle of mass m is passed through a velocity selector. It moves horizontally rightward without deviation along the line $y = \frac{2mv}{qB}$ with a speed v. The electric field is vertically downwards and magnetic field is into the plane of the paper. Now, the electric field is switched off at t = 0. The angular momentum of the charged particle about origin O at $t = \frac{\pi m}{qB}$ is



(A) $\frac{2mE^2}{qB^3}$ (B) zero (C) $\frac{mE^3}{qB^2}$ (D) $\frac{mE^2}{qB^3}$

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43. In series LCR circuit at resonance, the phase difference between voltage and current is

(A) π (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) zero

44. An ideal transformer has a turns ratio of 10. When the primary is connected to 220 V, 50 Hz ac source, the power output is

(A) $\frac{1}{10}^{th}$ the power input (B) equal to power input

(C) zero (D) 10 times the power input

45. The current in a coil changes from 2A to 5A in 0.3s. The magnitude of emf induced in the coil is 1.0 V. The value of self-inductance of the coil is

(A) 100 mH (B) 0.1 mH (C) 10 mH (D) 1.0 mH

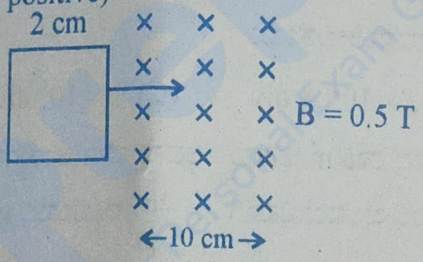
46. A metallic rod of length 1 m held along east-west direction is allowed to fall down freely. Given horizontal component of earth's magnetic field $B_H = 3 \times 10^{-5}$ T. The emf induced in the rod at an instant t = 2s after it is released is

(Take g = 10 ms^{-2})

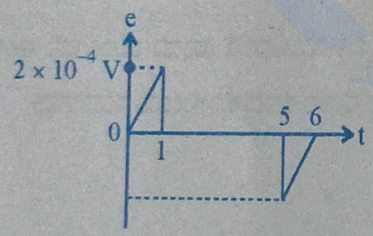
(A) 3×10^{-3} V (B) 3×10^{-4} V (C) 6×10^{-3} V (D) 6×10^{-4} V

47. A square loop of side 2 cm enters a magnetic field with a constant speed of 2 cm s^{-1} as shown. The front edge enters the field at t = 0s. Which of the following graph correctly depicts the induced emf in the loop ?

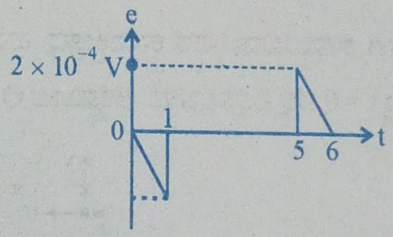
(Take clockwise direction positive)



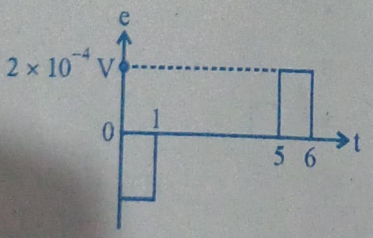
(A)



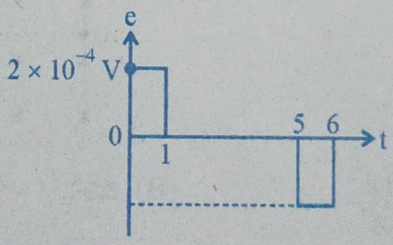
(B)



(C)



(D)





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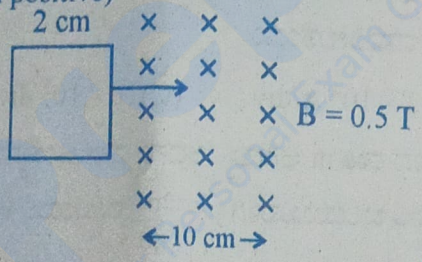
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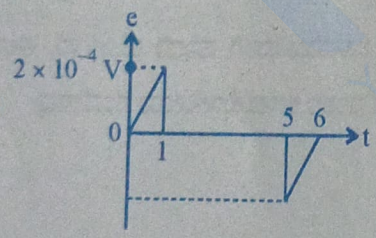
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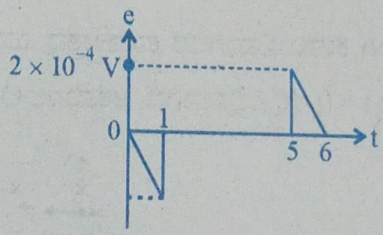
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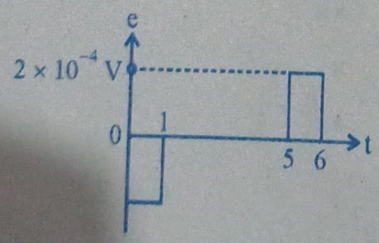
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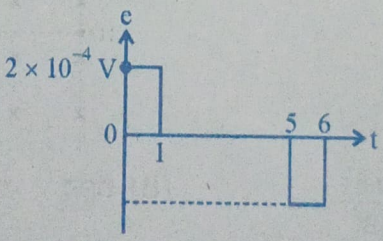
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(Take clockwise direction positive)



(A)


(B)


(C)


(D)


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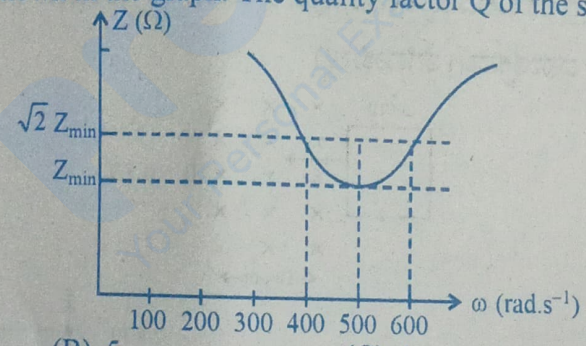
48. For a given pair of transparent media, the critical angle for which colour is maximum ?
(A) Red (B) Blue (C) Violet (D) Green

49. An equiconvex lens made of glass of refractive index $\frac{3}{2}$ has focal length f in air. It is completely immersed in water of refractive index $\frac{4}{3}$. The percentage change in the focal length is
(A) 300% decrease (B) 400% decrease (C) 300% increase (D) 400% increase

50. A point object is moving at a constant speed of 1 ms^{-1} along the principal axis of a convex lens of focal length 10 cm. The speed of the image is also 1 ms^{-1}, when the object is at _____ cm from the optic centre of the lens.
(A) 15 (B) 20 (C) 5 (D) 10

51. When light propagates through a given homogeneous medium, the velocities of
(A) primary wavefronts are lesser than those of secondary wavelets.
(B) primary wavefronts are greater than or equal to those of secondary wavelets.
(C) primary wavefront and wavelets are equal.
(D) primary wavefront are larger than those of secondary wavelets.

52. Total impedance of a series LCR circuit varies with angular frequency of the AC source connected to it as shown in the graph. The quality factor Q of the series LCR circuit is



(A) 2.5 (B) 5 (C) 1 (D) 0.4

53. The ratio of the magnitudes of electric field to the magnetic field of an electromagnetic wave is of the order of
(A) 10^5 ms^{-1} (B) 10^{-5} ms^{-1} (C) 10^8 ms^{-1} (D) 10^{-8} ms^{-1}

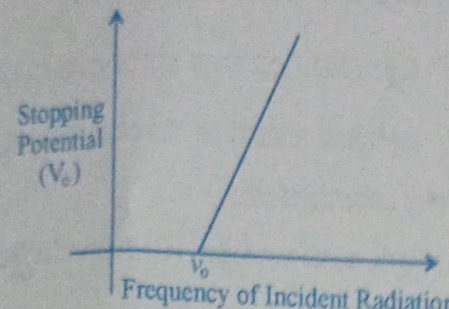
54. For a point object, which of the following always produces virtual image in air ?
(A) Plano-convex lens (B) Convex mirror (C) Biconvex lens (D) Concave mirror

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55. In an experiment to study photo-electric effect the observed variation of stopping potential with frequency of incident radiation is as shown in the figure. The slope and y-intercept are respectively

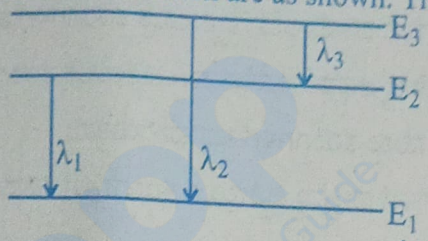


(A) $\frac{h\nu}{e}, \nu_0$ (B) $\frac{h\nu}{e}, -\frac{h}{e}$ (C) $h\nu, -h\nu_0$ (D) $\frac{h}{e}, -\frac{h\nu_0}{e}$

56. In the Rutherford's alpha scattering experiment, as the impact parameter increases, the scattering angle of the alpha particle

(A) is always 90° (B) decreases (C) increases (D) remains the same

57. Three energy levels of hydrogen atom and the corresponding wavelength of the emitted radiation due to different electron transition are as shown. Then.



(A) $\lambda_1 = \frac{\lambda_2\lambda_3}{\lambda_2+\lambda_3}$ (B) $\lambda_2 = \lambda_1 + \lambda_3$ (C) $\lambda_2 = \frac{\lambda_1\lambda_3}{\lambda_1+\lambda_3}$ (D) $\lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$

58. An unpolarised light of intensity I is passed through two polaroids kept one after the other with their planes parallel to each other. The intensity of light emerging from second polaroid is $\frac{I}{4}$. The angle between the pass axes of the polaroids is

(A) 0° (B) 60° (C) 30° (D) 45°

59. In the Young's double slit experiment, the intensity of light passing through each of the two double slits is 2×10^{-2} Wm^{-2}. The screen-slit distance is very large in comparison with slit-slit distance. The fringe width is β. The distance between the central maximum and a point P on the screen is $x = \frac{\beta}{3}$. Then the total light intensity at that point is

(A) 4×10^{-2}Wm^{-2} (B) 2×10^{-2}Wm^{-2} (C) 16×10^{-2}Wm^{-2} (D) 8×10^{-2}Wm^{-2}

60. A 60 W source emits monochromatic light of wavelength 662.5 nm. The number of photons emitted per second is

(A) 2×10^{20} (B) 5×10^{26} (C) 2×10^{29} (D) 5×10^{17}

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