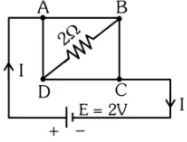


NEET 2026 Paper-(PCB)

1. A uniform metallic wire having resistance 4Ω is bent to form a square loop (ABCD) (see figure). A resistance of 2Ω is connected between points B and D and a battery of 2 V is connected across points A and C as shown in the figure. Now the value of current (I) is :



- (A) 4 A (B) 4.5 A (C) 8 A (D) 2 A

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Correct Option: D**Solution:**

Resistance of each wire of

$$W.S.B. = \frac{4}{4} = 1\Omega$$

This is balance W.S.B.

$$\text{So, } R_{Net} = 1\Omega$$

So, current

$$I = \frac{E}{R_{Net}} = \frac{2}{1} = 2\text{ A}$$

2. In the first excited state of hydrogen atom, the energy of its electron is -3.4 eV . The radial distance of the electron from the hydrogen nucleus in this case is approximately:
(Take $1\text{ eV} = 1.6 \times 10^{-19}\text{ J}$, $e = 1.6 \times 10^{-19}\text{ C}$ and $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9\text{ N m}^2/\text{C}^2$)
- (A) $2.1 \times 10^{-8}\text{ m}$ (B) $2.1 \times 10^{-10}\text{ m}$
(C) $2.1 \times 10^{-11}\text{ m}$ (D) $2.1 \times 10^{-9}\text{ m}$

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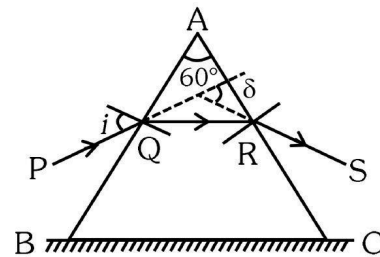
Correct Option: B**Solution:**

$$E = \frac{kq_1 q_2}{2r}$$

$$3.4 = \frac{9 \times 10^9 \times (1.6 \times 10^{-19})^2}{2 \times r}$$

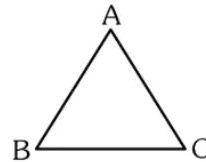
$$r = 2.1 \times 10^{-10}\text{ m}$$

3. A ray of monochromatic light is passing through an equilateral prism (ABC) as shown in the figure. The refracted ray (QR) is parallel to its base (BC) and the angle of incidence (i) is 50° . Then the angle of deviation (δ) is :



- (A) 45° (B) 55°
(C) 35° (D) 40°

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Correct Option: D**Solution:**For an equilateral prism $\angle A = 60$

since refracted ray is parallel to base so it is condition of minimum deviation.

$$r = \frac{A}{2} = \frac{60}{2} = 30^\circ$$

$$\text{and } i = e = 50^\circ$$

But

$$\begin{aligned}\delta &= i + e - A \\ &= 50 + 50 - 60 \\ &= 40^\circ\end{aligned}$$

4. Each side of a metallic cube of mass 5.580 kg is measure to be 9.0 cm . Keeping the significant figures in view, the density of the material of the cube can be best expressed as $X \times 10^3\text{ kg m}^{-3}$, where the value of X is:

- (A) 7.654 (B) 7.7 (C) 7.65 (D) 7.6

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Correct Option: B**Solution:**

$$\begin{aligned}\text{Density} &= \frac{\text{mass}}{\text{volume}} = \frac{5.580\text{ kg}}{(9.0 \times 10^{-2})^3} \\ &= 7.654 \times 10^3\text{ kg/m}^3\end{aligned}$$

Rounding off to 2 significant digits

$$\text{Result} = 7.7 \times 10^3$$

$$\Rightarrow x = 7.7$$

5. In a vernier callipers, 20 VSD coincide with 16 MSD (each division of length 1 mm). The least count of the vernier callipers is :

(A) 0.2 cm (B) 0.1 cm (C) 0.02 cm (D) 0.01 cm

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Correct Option: C

Solution:

$$20\text{VSD} = 16\text{MSD}$$

$$\text{VSD} = \frac{16}{20}(1 \text{ mm})$$

$$= 0.8 \text{ mm}$$

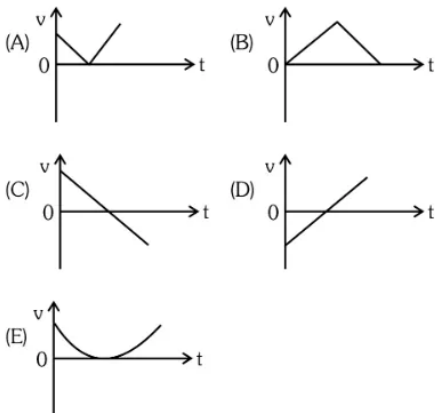
$$\text{LC} = \text{MSD} - \text{VSD}$$

$$= 1 - 0.8$$

$$= 0.2 \text{ mm}$$

$$= 0.02 \text{ cm}$$

6. The following plots show variation of velocity (v) with time (t), of a ball thrown vertically upward, and falling back. Which of the following plots is/are correct?



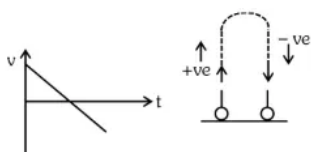
(A) B only (B) A and E only
(C) C only (D) D only

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Correct Option: C

Solution:

Taking upward direction as positive



- Initially velocity decreases in upward direction then speed increases in downward direction.

- Best suitable answer is option (3).

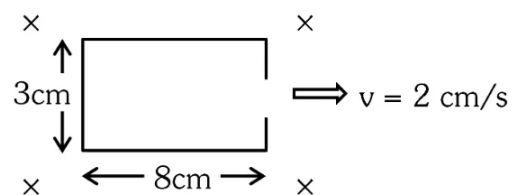
7. A rectangular wire loop of sides 8 cm and 3 cm with small cut, is moving out of a region of uniform magnetic field of magnitude 0.3 T directed normal to the plane of the loop. The emf developed across the cut, if the velocity of the loop is 2 cm s^{-1} , in a direction normal to the shorter side of the loop, will be :

(A) 1.8×10^{-4} volt (B) 1.3×10^{-4} volt
(C) 1.2×10^{-4} volt (D) 4.8×10^{-4} volt

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Correct Option: A

Solution:



$$\begin{aligned} e &= \ell BV \\ &= 3 \times 10^{-2} \times 0.3 \times 2 \times 10^{-2} \\ &= 1.8 \times 10^{-4} \text{ volt} \end{aligned}$$

8. The speed of light in vacuum is taken as unity. If light takes 6 min 40 s to reach the Earth from the Sun, the distance between the Sun and the Earth in new unit is :

(A) 3×10^8 (B) 500
(C) 3×10^{10} (D) 400

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Correct Option: D

Solution:

$$\text{Distance} = (\text{speed})(\text{time})$$

$$= 1(400 \text{ s})$$

$$= 400 \text{ units}$$

9. For a metal of work function 6.6 eV, which of the following wavelengths of incident radiation does not give rise to the photoelectric effect? (Take Planck's constant as $6.6 \times 10^{-34} \text{ J s}$)

(A) 200 nm (B) 100 nm (C) 50 nm (D) 150 nm

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Correct Option: A

Solution:

$$\phi = 6.6 \text{ eV}$$

$$\frac{hc}{\lambda} = 6.6 \text{ eV}$$

$$\lambda_0 = \frac{12400}{6.6}$$

$$\lambda_0 = 1878.7 \text{ \AA}$$

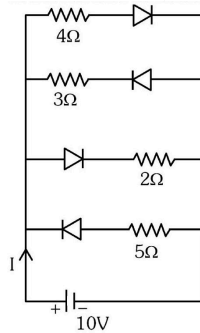
$$= 187.87 \text{ nm}$$

For photo electric effect

$$\lambda \leq \lambda_0$$

$\therefore$ The wavelength of radiation does not give rise to photoelectric effect is 200 nm .

10. The current I in the circuit shown below is :
(All diodes are ideal and identical)

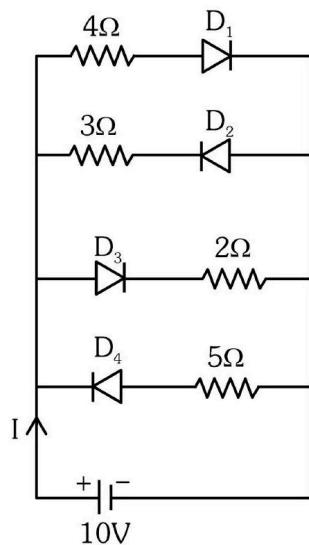


- (A) $\frac{1}{3}$ A (B) $\frac{15}{2}$ A
(C) $\frac{5}{3}$ A (D) $\frac{5}{9}$ A

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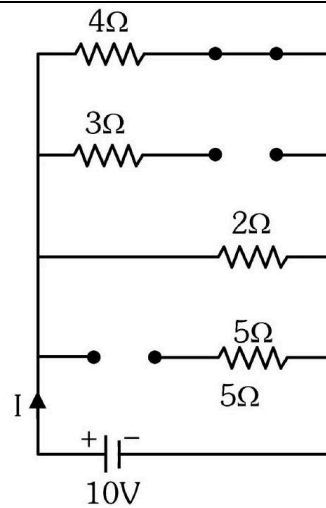
Correct Option: B

Solution:



Here D_1 and D_3 are F.B and D_2 and D_4 are R.B.

then equivalent circuit



$$R_{eq} = \frac{4 \times 2}{4 + 2} = \frac{4}{3} \Omega$$

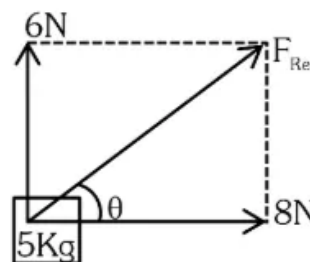
$$I = \frac{V}{R_{eq}} = \frac{10}{4/3} = \frac{15}{2} \text{ A}$$

11. The magnitude and direction of the acceleration produce in a body of mass 5 kg when two mutually perpendicular forces 8 N and 6 N act on it, are respectively :
- (A) 2 ms^{-2} ; $\tan^{-1}(3/4)$ with 8 N force
(B) 2 ms^{-2} ; $\tan^{-1}(4/3)$ with 8 N force
(C) 2 ms^{-2} ; $\tan^{-1}(3/4)$ with 6 N force
(D) 20 ms^{-2} ; $\tan^{-1}(4/3)$ with 8 N force

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Correct Option: A

Solution:



$$F_{Res} = \sqrt{6^2 + 8^2}$$

$$F_{Res} = 10 \text{ N}$$

$$a = \frac{F_{Res}}{m} = \frac{10}{5} = 2 \text{ m/s}^2$$

$$\tan \theta = \frac{6}{8} = \frac{3}{4}$$

$$a = 2 \text{ m/s}^2 \tan^{-1}\left(\frac{3}{4}\right) \text{ with 8 N force}$$

12. Match List I with List II :

List I (Electromagnetic wave)	List II (Production)
-------------------------------	----------------------

A.	Microwave	I.	Electrons in atoms emit light when they move from a higher energy level to a lower energy level
B.	Visible light	II.	Radioactive decay of nucleus
C.	Gamma rays	III.	Vibration of atoms and molecules
D.	Infra-red rays	IV.	Klystron valve or magnetron valve

Choose the correct answer from the options given below:

- (A) A-IV, B-III, C-II, D-I (B) A-III, B-IV, C-I, D-II
 (C) A-III, B-I, C-II, D-IV (D) A-IV, B-I, C-II, D-III

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Correct Option: D

Solution:

A.	Microwaves	IV.	Klystron valve or magnetron valve
B.	Visible light	I.	Electrons in atoms emit light when they move from a higher energy level to a lower energy level
C.	Gamma rays	II.	Radioactive decay of nucleus
D.	Infra-red rays	III.	Vibration of atoms and molecules

A → IV; B → I; C → II; D → III

13. A flask contains argon and chlorine in the ratio of 2 : 1 by mass. The temperature of the mixture is 27°C. The ratio of root mean square speed of the molecules of the two gases ($\frac{v_{rms}^{Ar}}{v_{rms}^{Cl}}$) is :

(Atomic mass of argon = 40.0u and molecular mass of chlorine = 70.0u)

- (A) $\frac{7}{4}$ (B) $\frac{2}{\sqrt{7}}$
 (C) $\frac{\sqrt{7}}{2}$ (D) $\frac{7}{2}$

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Correct Option: C

Solution:

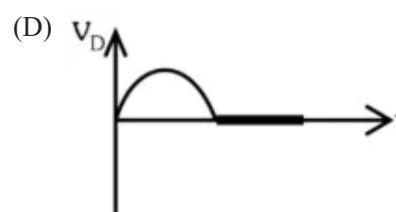
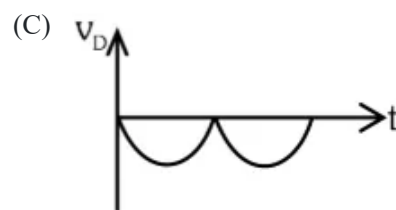
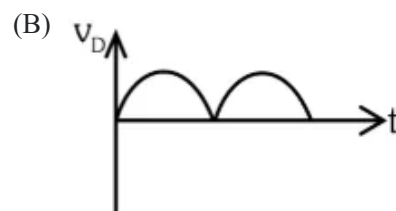
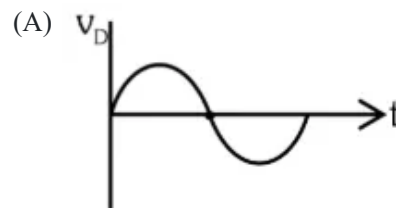
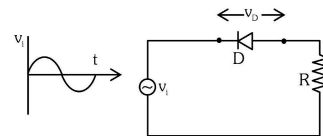
$$\text{As } V_{RMS} = \sqrt{\frac{3RT}{M_w}}$$

Given temperature → constant

$$\text{Then } V_{RMS} \propto \frac{1}{\sqrt{M_w}}$$

$$\Rightarrow \frac{V_{RMS}^{Ar}}{V_{RMS}^{Cl}} = \sqrt{\frac{M_{wCl}}{M_{wAr}}} = \sqrt{\frac{70}{40}} = \frac{\sqrt{7}}{2}$$

14. In the circuit shown below, the voltage appearing across the diode D will be of the form :



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Correct Option: D

Solution:

In +1/2 cycle diode is reverse biased so diode replaced by open circuit and input voltage obtained across diode.

In -1/2 cycle diode is forward biased so diode replaced by wire and input voltage obtained across R.

15. A box of mass 15 kg is kept on the floor of a stationary trolley. The coefficient of static friction between the box and the trolley is 0.12. Keeping the box in stationary state over the trolley, the maximum acceleration with which the trolley can be moved horizontally in $m s^{-2}$ is :
 ($g=10 m / s^2$)

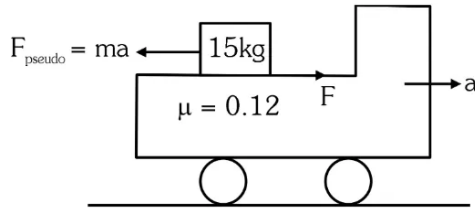
(A) 1.8

(B) 1.2

(C) 1.5

(D) 2.1

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Correct Option: B**Solution:**

$$ma_{\max} = F_{\lim}$$

$$\cancel{m}a_{\max} = \mu \cancel{m}g$$

$$a_{\max} = \mu g = 1.2 \text{ m/s}^2$$

16. For a travelling harmonic wave $y(x, t) = 2.0 \cos 2\pi(10t - 0.0080x + 0.35)$, where x and y are in cm and t in s. The phase difference between oscillatory motion of two points separated by a distance of 0.5 m is:

- (A) $0.08\pi\text{rad}$ (B) $0.008\pi\text{rad}$
(C) $0.8\pi\text{rad}$ (D) $8\pi\text{rad}$

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Correct Option: C**Solution:**

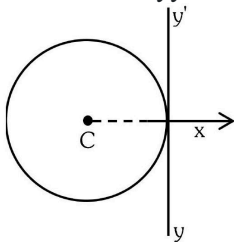
$$\text{Given } k = 2\pi \times 0.008 \text{ rad/cm}$$

$$\Delta\phi = k\Delta x$$

$$= 2\pi \times 0.008 \times 50 \quad [\Delta x = 50 \text{ cm}]$$

$$\Delta\phi = 0.8\pi\text{rad}$$

17. A thin wire of length ' L ' and linear mass density ' m ' is bent into a circular ring (in $x - y$ plane) with centre ' C ' as shown in figure. The moment of inertia of the ring about an axis yy' will be:

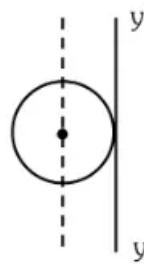


- (A) $\frac{3mL^3}{8\pi}$
(B) $\frac{3mL^2}{8\pi^2}$
(C) $\frac{3mL^3}{8\pi^2}$
(D) $\frac{3mL^2}{8\pi}$

Correct Option: C**Solution:**Let mass of wire is M length = L given m = Linear mass density

$$m = \frac{M}{L} \quad L = 2\pi R$$

$$M = mL \quad R = \frac{L}{2\pi}$$



$$I_{yy} = \frac{MR^2}{2} + MR^2$$

$$= \frac{3}{2}MR^2 = \frac{3}{2}(mL)\left(\frac{L^2}{4\pi^2}\right)$$

$$I_{yy} = \frac{3}{8} \frac{mL^3}{\pi^2}$$

18. A galvanometer of resistance 100Ω gives full scale deflection for a current of 1 mA. It is converted into an ammeter of range 0 – 10 A. The shunt required is:

- (A) 0.001Ω (B) 0.10Ω
(C) 1.0Ω (D) 0.01Ω

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Correct Option: D**Solution:**

Given that

$$R_g = 100\Omega$$

$$I_g = 1 \text{ mA}$$

$$I = 10 \text{ A}$$

$$S = \frac{I_g R_g}{(I - I_g)} = \frac{10^{-3}(100)}{(10 - 10^{-3})}$$

$$\text{Since } I_g \ll I \text{ so } I - I_g \simeq I$$

$$S = 10^{-2} = 0.01\Omega$$

19. An unknown nucleus has a nuclear density of $2.29 \times 10^{17} \text{ kg/m}^3$ and mass of $19.926 \times 10^{-27} \text{ kg}$. Its mass number A is approximately : (Take $R_0 = 1.2 \times 10^{-15} \text{ m}$, $4\pi = 12.56$)

(A) 16 (B) 20 (C) 12 (D) 19

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Correct Option: C**Solution:**

$$Mass = Volume \times Density$$

$$M = \left(\frac{4}{3}\pi R^3\right)\rho \quad [\because R = R_0 A^{1/3}]$$

$$M = \left(\frac{4}{3}\pi R_0^3 A\right)\rho$$

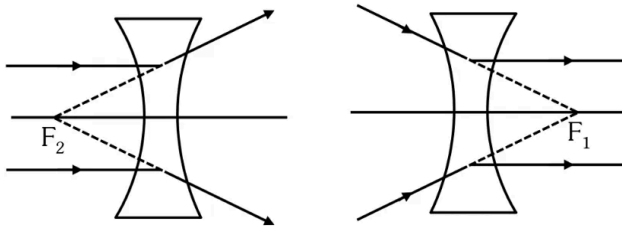
$$\Rightarrow A = \frac{3M}{4\pi R_0^3 \rho}$$

$$\Rightarrow A = \frac{3 \times 19.926 \times 10^{-27}}{12.56 \times (1.2 \times 10^{-15})^3 \times 2.29 \times 10^{17}} = 12$$

20. In a concave lens, a ray of light emanating from the object parallel to the principal axis of the lens, after refraction :

- (A) passes through the second principal focus.
- (B) appears to diverge from the first principal focus.
- (C) passes through $2F$, which is the radius of curvature of the lens.
- (D) emerges parallel to the principal axis.

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Correct Option: B**Solution:**

When incident light is parallel to principal axis, after refraction image will be at focus. This focus will be second principal focus (F_2).

In this question as lens is concave (diverging) after refraction light will diverge and appears to be coming from second principal focus (F_2).

The definition of first and second focus given in NCERT book is not correct. "The focus on the side of the original source of light is called first focal point (F_1), whereas the other is called the second focal point (F_2).

According to NCERT answer is (2) But conceptually it should be bonus.

21. Two statements are given below :

- A. When the forward bias voltage across a p – n junction diode increases above a certain threshold voltage, the diode current increases significantly.
 - B. This current is called reverse saturation current.
- Choose the correct answer from the options given below

- (A) Both Statements A and B are true
- (B) Both Statements A and B are false
- (C) Statement A is true, but Statement B is false
- (D) Statement A is false, but Statement B is true

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Correct Option: C**Solution:**

Statement A : True

In forward biased, after threshold voltage current significantly increase

Statement B : False

Reverse saturation current is found in reverse biased not in forward biased.

22. Which of the following statements are correct?

- A. Inside the conductor, the electrostatic field is zero.
- B. Electric field at the surface of a charged conductor does not depend on its surface charge density.
- C. The interior of a charged conductor can have no excess charge in the static situation.
- D. At the surface of a charged conductor, the electrostatic field must be normal to the surface at every point.
- E. The electrostatic potential is zero everywhere inside charged conductor.

Choose the correct answer from the options given below

- (A) A, C and D only
- (B) A, C and E only
- (C) C, D and E only
- (D) A, B and D only

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Correct Option: A**Solution:**

A. Inside conductor, electrostatic field = 0

B. E at the surface of the conductor $E = \frac{\sigma}{\epsilon_0}$ depends on ' σ '

C. E_{interior} excess charge = 0D. At surface of the conductor E is $\perp$ to surface

E. $E_{in} = 0$

So $V_{in} = \text{constant not zero}$

Ans. (A, C, D)

23. Savitha, a XI standard student, while conducting an experiment to determine the effective length of a simple pendulum L, notes down the data of time taken to complete 30 oscillations as 60 s and hence calculates the length of the simple pendulum as :
(Take $\pi^2 = 9.8$, and $g = 9.8 \text{ m/s}^2$)

(A) 0.75 m (B) 1 m (C) 1.5 m (D) 2 m

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Correct Option: B

Solution:

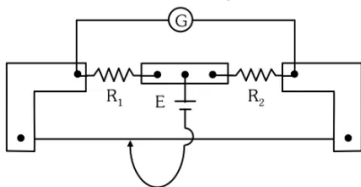
Time period is 2 sec

$$T = 2\pi\sqrt{\frac{\ell}{g}}$$

$$2 = 2\pi\sqrt{\frac{\ell}{9.8}}$$

$$\ell \approx 1 \text{ m}$$

24. In a metre bridge experiment (see figure), the positions of the cell, E, and galvanometer, G, are interchanged. We shall observe in the galvanometer:



- (A) Only the right-sided deflection
(B) Only the left-sided deflection
(C) There will be no deflection irrespective of the position of the jockey
(D) Both right-sided and left-sided deflection and at balance point, no deflection

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Correct Option: D

Solution:

In the given circuit, it is not mentioned whether the meter bridge is balanced or not,

So on interchanging the positions of battery and galvanometer, deflection may or may not be zero. In case

of unbalanced condition, deflection may be left or right sided in galvanometer.

25. A resistor is connected to a battery of 12 V emf and internal resistance 2Ω . If the current in the circuit is 0.6 A, the terminal voltage of the battery is:

(A) 12 V (B) 1.2 V (C) 10 V (D) 10.8 V

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Correct Option: D

Solution:

Given that

$$\text{EMF} = 12 \text{ V}$$

$$r = 2\Omega$$

$$I = 0.6 \text{ A}$$

So terminal voltage

$$V = E - Ir$$

$$= 12 - (0.6)^2$$

$$V = 10.8 \text{ volt}$$

26. In interference and diffraction, the light energy is redistributed. If it reduces in one region, producing a dark fringe, it increases in another region, producing a bright fringe.

A. As there is no gain or loss of energy, these phenomena are consistent with the principle of conservation of energy.

B. Diffraction and interference are characteristics exhibited only by light waves.

Choose the correct answer from the options given below

- (A) A is false, but B is true (B) A is true, but B is false
(C) A is true and B is also true (D) Both A and B are false

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Correct Option: B

Solution:

Statement A is true but B is false.

Statement A : In interference and diffraction, energy remains conserved, only redistribution takes place.

Statement B : These phenomena are exhibited by all types of waves.

27. Four statements are given (A is mass number) :
A. The volume of a nucleus is proportional to $A^{1/3}$.

- B. The volume of a nucleus is proportional to A .
 C. The difference in mass of an atom and its nucleus is called the mass defect.
 D. The difference in mass of a nucleus and its constituents is called the mass defect.
 Choose the correct answer from the options given below:

- (A) A and D are true, but B and C are false
 (B) B and D are true, but A and C are false
 (C) B and C are true, but A and D are false
 (D) A and C are true, but B and D are false

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Correct Option: B**Solution:**A. False, because $V \propto A [R \propto A^{1/3}]$ B. True, because $V \propto A$

C. False, because

(Mass of atom - Mass of nucleus)

 $\approx$ total mass of electrons

D. True, because

 $\Delta m = (\text{Total mass of constituents} - \text{Mass of a nucleus})$ $\Rightarrow -\Delta m = \text{Mass of nucleus} - \text{Total mass of constituents}$

28. In Young's double slit experiment, using monochromatic light of wavelength λ , the intensity of light at a point on the screen where the path difference is λ , is K units. The intensity of light at a point where the path difference is $\frac{\lambda}{2}$ will be :

- (A) K (B) $2K$
 (C) $\frac{K}{2}$ (D) $\frac{K}{4}$

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Correct Option: D**Solution:**

$$K = 4I$$

$$I_R = K \cos^2 \frac{\Delta \phi}{2}$$

$$= K \cos^2 \left(\frac{120^\circ}{2} \right)$$

$$= K \cos^2 60^\circ = \frac{K}{4}$$

29. The peak value of an alternating current is 5 A and frequency is 60 Hz. How long will the current, starting from zero, take to reach the peak value?

- (A) $\frac{1}{120}$ s (B) $\frac{1}{240}$ s
 (C) $\frac{1}{30}$ s (D) $\frac{1}{60}$ s

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Correct Option: B**Solution:**

$$I = I_0 \sin \omega t$$

$$I = I_0, \text{ when } \omega t = \frac{\pi}{2}$$

$$\Rightarrow (2\pi f)t = \frac{\pi}{2} \Rightarrow 2\pi \times 60 \times t = \frac{\pi}{2}$$

$$\Rightarrow t = \frac{1}{240} \text{ sec}$$

30. An electric heater supplies heat to a system at a rate of 100 W. If the system performs work at a rate of 75 J/s, then the rate at which internal energy increases will be:

- (A) 75 W (B) 25 W (C) 100 W (D) 125 W

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Correct Option: B**Solution:**

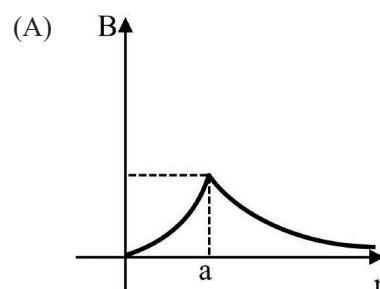
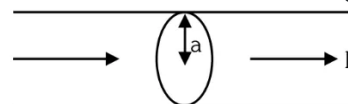
From first law of thermodynamics

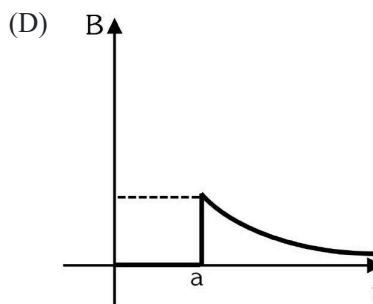
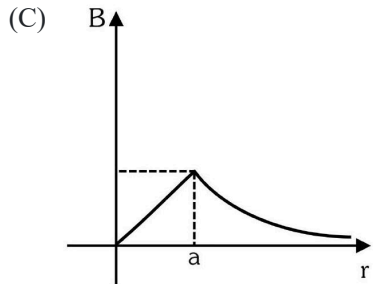
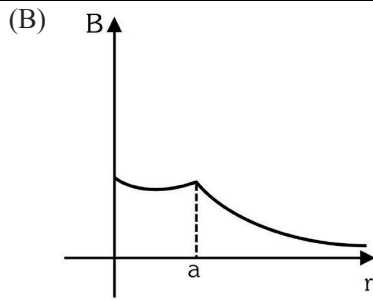
$$\frac{dQ}{dt} = \frac{dU}{dt} + \frac{dW}{dt}$$

$$100 = \frac{dU}{dt} + 75$$

$$\frac{dU}{dt} = 100 - 75 = 25 \text{ Watt}$$

31. The figure given below shows a long straight solid wire of circular cross-section of radius 'a' carrying steady current I . The current I is uniformly distributed across its cross-section. The plot which correctly represents the variation of magnetic field (B) with distance (r) from the axis of the conductor in the region is :



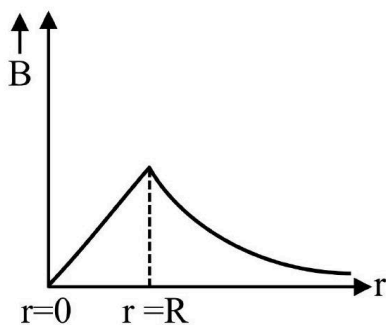


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Correct Option: C**Solution:**

$$B_{in} = \frac{\mu_0 I r}{2\pi R^2} \propto r$$

$$B_{out} = \frac{\mu_0 I}{2\pi r} \propto \frac{1}{r}$$



32. An ac circuit contains a resistance of $1k\Omega$, a capacitor of $0.1\mu F$ and an inductor of $1 mH$ connected in series. The resonance frequency of the circuit is approximately :

(A) 15.9 kHz (B) 20.7 kHz (C) 10.1 kHz (D) 13.5 kHz

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Correct Option: A**Solution:**

$$\begin{aligned} \therefore f_r &= \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{10^{-3} \times 0.1 \times 10^{-6}}} \\ &= \frac{100}{6.28} \times 10^3 \\ f_r &= 15.9\text{kHz} \end{aligned}$$

33. Consider two uncharged capacitors of equal capacitance $200 \mu F$. One of them is charged by a $100 V$ supply and disconnected. Now this capacitor is connected to the uncharged capacitor. The amount of electrostatic energy lost in the process is:

(A) $0.5 J$ (B) $1.0 \times 10^{-6} J$
(C) $0.5 \times 10^{-6} J$ (D) $1.0 J$

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Correct Option: C**Solution:**

$$\begin{aligned} \text{Heat loss } (\Delta H) &= \frac{1}{2} \frac{C_1 C_2}{C_1 + C_2} (V_1 - V_2)^2 \\ &= \frac{1}{2} \left(\frac{200 \times 200}{200 + 200} \right) (100 - 0)^2 \times 10^{-12} J \\ &= 50 \times 10^4 \times 10^{-12} J \\ &= 5 \times 10^{-7} J = 0.5 \times 10^{-6} J \end{aligned}$$

34. The power of a crane, which lifts a mass of 1000 kg to height of 20 m in 10 s is :
($g = 9.8 \text{ m/s}^2$)

(A) 19.6 kW (B) 19.6 W (C) 39.2 kW (D) 39.2 W

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Correct Option: A**Solution:**

$$\begin{aligned} \text{Power of crane} &= \frac{mgh}{t} \\ &= \frac{1000 \times 9.8 \times 20}{10} \\ &= 19.6 \times 1000 \\ &= 19.6 \text{ kW} \end{aligned}$$

35. When a ruler falls vertically, 5 different persons catch it with different reaction times.
($g = 9.8 \text{ ms}^{-2}$)

A. Person A has reaction time of 0.20 s
B. Person B has reaction time of 0.22 s
C. Person C has reaction time of 0.18 s
D. Person D has reaction time of 0.19 s
E. Person E has reaction time of 0.21 s

What is the correct order of the distance travelled by the ruler for each person?

(A) $B > E > A > C > D$
(B) $C > D > A > E > B$

(C) $C > D > A > B > E$ (D) $B > E > A > D > C$

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Correct Option: D**Solution:**

Distance travelled by Ruler :

$$\therefore d = \frac{1}{2}gt^2$$

$$\therefore d \propto t^2$$

Order of distance travelled for person is

 $B > E > A > D > C$

36. The amount of work done to raise a mass ' m ' from the surface of the Earth to a height equal to the radius of the Earth ' R ', will be:

- (A) $mg\frac{R}{2}$ (B) $mg R$
(C) $mg\frac{R}{4}$ (D) $2 mg R$

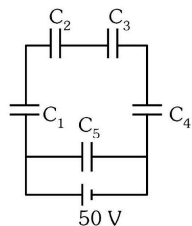
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Correct Option: A**Solution:**

$$W = \frac{mgh}{1 + \frac{h}{R}} = \frac{mgR}{1 + \frac{R}{R}} = \frac{mgR}{2}$$

37. Five capacitors of capacitances

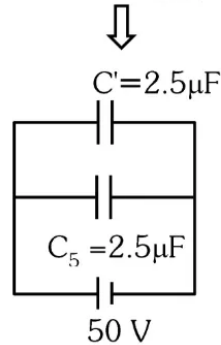
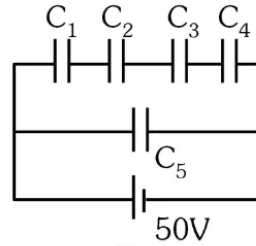
$C_1 = C_2 = C_3 = C_4 = 10\mu F$ and $C_5 = 2.5\mu F$ are connected as shown, along with a battery of 50 V.



The equivalent capacitance and the charges on each capacitor respectively are:

- (A) $4\mu F$, $250\mu C$ on C_1 to C_4 and $125\mu C$ on C_5
(B) $5\mu F$, $250\mu C$ on all capacitors
(C) $5\mu F$, $125\mu C$ on C_1 to C_4 and $25\mu C$ on C_5
(D) $5\mu F$, $125\mu C$ on all capacitors

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Correct Option: D**Solution:**Given $C_1 = C_2 = C_3 = C_4 = 10\mu F$ $C_5 = 2.5\mu F$ 

$$C_{eq} = C' + C_5 = 5\mu F$$

$$q_{C_1} = q_{C_2} = q_{C_3} = q_{C_4} = 50 \times 2.5 = 125\mu C$$

$$q_{C_5} = 50 \times 2.5 = 125\mu C$$

38. Match List I with List II :

List I		List II	
A.	Young's Modulus	I.	$\frac{\Delta d}{\Delta L} \left(\frac{L}{d}\right)$
B.	Compressibility	II.	$\frac{FL}{A(\Delta L)}$
C.	Bulk Modulus	III.	$-\frac{1}{\Delta P} \left(\frac{\Delta V}{V}\right)$
D.	Poisson's Ratio	IV.	$-P \left(\frac{V}{\Delta V}\right)$

Choose the correct answer from the options given below

- (A) A -III, B-II, C-I, D-IV (B) A -II, B-III, C-IV, D-I
(C) A -I, B-IV, C-III, D-II (D) A -IV, B-I, C-II, D-III

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Correct Option: B**Solution:**

$$\text{Young's Modulus } Y = \frac{FL}{A(\Delta L)} \text{ so A} \rightarrow \text{II}$$

$$\text{Compressibility} = \frac{1}{\text{Bulk modulus}} \text{ so B} \rightarrow \text{III}$$

$$\text{Bulk Modulus} = -P \left(\frac{V}{\Delta V}\right) \text{ so C} \rightarrow \text{IV}$$

$$\text{Poisson's ratio} = \frac{\frac{\Delta d}{d}}{\frac{\Delta L}{L}} = \frac{\Delta d}{\Delta L} \left(\frac{L}{d}\right) \text{ so D} \rightarrow \text{I}$$

39. Match List I with List II :

List I		List II	
A.	$E = hv$	I.	de Broglie wavelength

B.	Diffraction and Interference	II.	Particle nature of light
C.	$\lambda = h/p$	III.	Wave nature of light
D.	Compton effect	IV.	Energy of photon

Choose the correct answer from the options given below:

- (A) A -IV, B-III, C-II, D-I (B) A -IV, B-III, C-I, D-II
(C) A -I, B-IV, C-III, D-II (D) A -IV, B-I, C-II, D-III

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Correct Option: B

Solution:

A. $E = h\nu$ is the energy of a photon

B. Diffraction and interference are the characteristics of wave

C. $\lambda = \frac{h}{p}$ is the wavelength proposed by de-Broglie

D. Compton's effect can be explained only by using quantum/ particle nature of light.

so correct choice is

A -IV, B-III, C-I, D -II

40. A submarine is designed to withstand an absolute pressure of 100 atm. How deep can it go below the water surface?

(Consider the density of water = 1000 kg m^{-3} , 1 atm = $1 \times 10^5 \text{ Pa}$ and gravitational acceleration $g = 10 \text{ m/s}^2$)

- (A) 9900 m (B) 990 m (C) 9000 m (D) 99 m

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Correct Option: B

Solution:

Absolute pressure at depth h in water

$$P = P_0 + h\rho g \quad P_0 = \text{atmospheric pressure}$$

$$P - P_0 = h\rho g$$

$$h = \frac{P - P_0}{\rho g} = \frac{(100 - 1) \times 10^5}{10^3 \times 10}$$

$$h = 990 \text{ m}$$

41. A 100-turn closely wound circular coil of radius 5 cm has a magnetic field of $3.14 \times 10^{-3} \text{ T}$ at its centre. The current flowing through the coil, and the magnitude of the magnetic moment of this coil are, respectively :

(Take $\mu_0 = 4\pi \times 10^{-7} \text{ Tm/A}$)

- (A) 2.5 A, 20 A m²
(B) 2 A, 4 A m²
(C) 2.5 A, 2 A m²
(D) 2 A, 10 A m²

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Correct Option: C

Solution:

$$B = \frac{\mu_0 NI}{2R} \Rightarrow I = \frac{2BR}{\mu_0 N}$$

$$\text{Current } I = \frac{2 \times 3.14 \times 10^{-3} \times 5 \times 10^{-2}}{4\pi \times 10^{-7} \times 100}$$

$$\text{Current } I = 2.5 \text{ A}$$

$$\text{Magnetic moment } M = NIA$$

$$= 100 \times 2.5 \times \pi r^2$$

$$= 100 \times 2.5 \times 3.14 \times 25 \times 10^{-4}$$

$$= 1.96$$

$$\simeq 2 \text{ A} \times \text{m}^2$$

42. The sum of kinetic energy and potential energy of a simple pendulum bob is 0.02 joule. The speed of the simple pendulum bob at equilibrium position is approximately : (Consider mass of the bob = 20 g)

- (A) 2.0 m/s (B) 4 m/s
(C) $\sqrt{3}$ m/s (D) $\sqrt{2}$ m/s

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Correct Option: D

Solution:

$$\text{Total energy} \Rightarrow \frac{1}{2}KA^2 = 0.02 \text{ J}$$

$$\frac{1}{2}m\omega^2 A^2 = 0.02 \text{ J}$$

$$\frac{1}{2}mV_{\text{max}}^2 = 0.02 \text{ J}$$

$$V_{\text{max}}^2 = \frac{0.04}{20 \times 10^{-3}} = 2$$

$$V_{\text{max}} = 1.41 \text{ m/s}$$

43. The angular speed of a flywheel is increased from 60 rpm to 1200 rpm in 10 s. The number of revolutions completed by the flywheel during this time is:

- (A) 600 (B) 300 (C) 900 (D) 150

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Correct Option: D

Solution:

$$\omega_i = 600\text{rpm} = 20\pi\text{rad/sec}$$

$$\omega_f = 1200\text{rpm} = 40\pi\text{rad/sec}$$

$$t = 10\text{sec}$$

$$\theta = \left(\frac{\omega_i + \omega_f}{2}\right) t$$

$$\theta = \left(\frac{40\pi + 20\pi}{2}\right) 10$$

$$\theta = 300\pi$$

$$\text{number of revolution} = \frac{300\pi}{2\pi} = 150 \text{ rotation}$$

44. A room heater is rated 400 W, 220 V. If the supply voltage drops to 200 V, what will be the power consumed (approximately)?

(A) 400 W (B) 121 W (C) 331 W (D) 200 W

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Correct Option: C

Solution:

Given that

Printed voltage = 220 V

Printed Power = 400 W

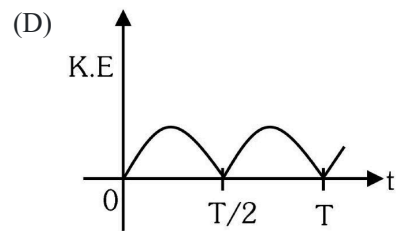
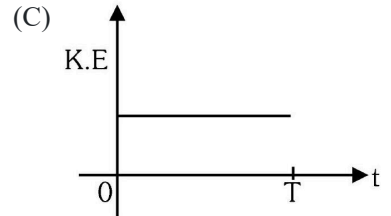
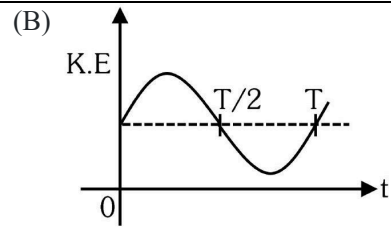
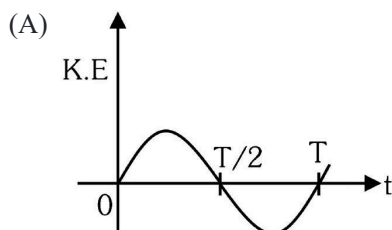
Supply voltage = 200 V

$$\text{Resistance of heater } R_H = \frac{(220)^2}{400}$$

So Actual power gained

$$\begin{aligned} P' &= \frac{V_s^2}{R_H} = \frac{(200)^2}{(220)^2} (400) \\ &= 330.57 \text{ W} \\ &\simeq 331 \text{ W} \end{aligned}$$

45. For a simple pendulum, having time period T , the variation of kinetic energy (K.E) with time (t) is represented by:



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Correct Option: D

Solution:

For a simple pendulum executing SHM:

Velocity varies as

$$v = v_{\max} \sin(\omega t)$$

Kinetic Energy:

$$K \cdot E = \frac{1}{2} m v^2$$

$$\text{So, } K.E \propto \sin^2(\omega t)$$

$$\text{Using identity: } \sin^2(\omega t) = \frac{1 - \cos(2\omega t)}{2}$$

Hence kinetic energy:

is always positive or zero

becomes zero at $t = 0, T/2, T$

has two maxima in one time period T

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	D	B	D	B	C	C	A	D	A	B
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	A	D	C	D	B	C	C	D	C	B
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	C	A	B	D	D	B	B	D	B	B
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	C	A	C	A	D	A	D	B	B	B
Que.	41	42	43	44	45					
Ans.	C	D	D	C	D					