NEET(UG)
03/05/2026

MATRIX

Paper Code
13

Question Paper with Solutions & Answer Keys

for

NEET (UG)-2026

Time : 3 hrs. **M.M. : 720**

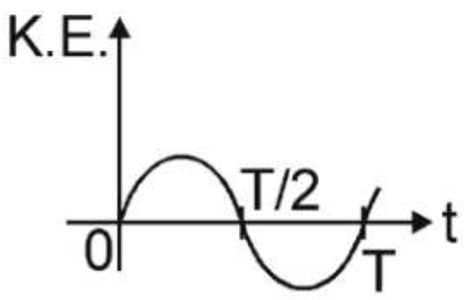
Read carefully the Instructions on the Cover of this Test Booklet.

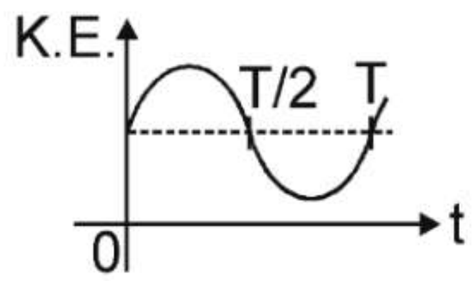
Important Instructions :

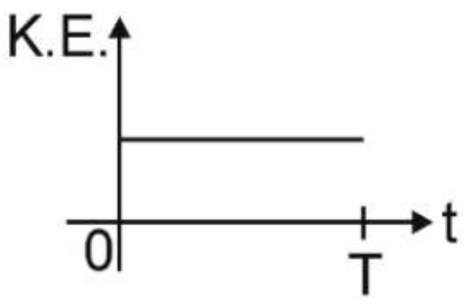
1. The test is of 3 hours duration and the Test Booklet contains 180 multiple choice questions (Four options with a single correct answer) from **Physics**, **Chemistry** and **Biology** (**Botany** and **Zoology**).
2. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For every wrong response 1 mark shall be deducted from the total scores. The maximum marks are 720.
3. Use Blue / Black Ball point Pen only for writing particulars on this page / marking responses on Answer Sheet.
4. Rough work is to be done in the space provided for this purpose in the Test Booklet only.
5. On completion of the test, the candidate must handover the Answer Sheet to the Invigilator before leaving the Room / Hall. The candidates are allowed to take away this Test Booklet with them.
6. The CODE for this Booklet is 47.
7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet. Use of white fluid for correction is NOT permissible on the Answer Sheet.
8. Each candidate must show on-demand his/her Admission Card to the Invigilator.
9. No candidate, without special permission of the Centre Superintendent or Invigilator, would leave his/her seat.
10. Use of Electronic/Manual Calculator is prohibited.
11. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
12. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
13. The candidates will write the Correct Test Booklet Code as given in the Test Booklet / Answer Sheet in the Attendance Sheet.

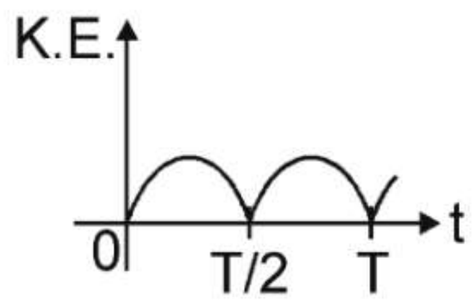
SUBJECT : PHYSICS

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

(1) 

(2) 

(3) 

(4) 

Ans. (4)

Sol. K.E. always positive.

Time period of kinetic energy is $\frac{T}{2}$.

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

(1) 400 W (2) 121 W]

(3) 331 W (4) 200 W

Ans. (3)

Sol. $P_c = \left(\frac{V_s}{V_r}\right)^2 \times P_r$

$P_c = \left(\frac{200}{220}\right)^2 \times 400 = 331\ W$

3. The angular speed of a flywheel is increased from 600 rpm to 1200 rpm in 10 s. The number of revolutions completed by the flywheel during this time is -

(1) 600 (2) 300 (3) 900 (4) 150

Ans. (4)

Sol. $\omega_i = 600 \text{ rpm} = \frac{600 \times 2\pi}{60} = 20\pi \text{ rad/s}$

$\omega_f = 1200 \text{ rpm} = \frac{1200 \times 2\pi}{60} = 40\pi \text{ rad/s}$

Angular acceleration $(\alpha) = \frac{\omega_f - \omega_i}{t} = 2\pi \text{ rad/s}^2$

$\omega_f^2 = \omega_i^2 + 2\alpha\theta$

$\theta = \frac{1600\pi^2 - 400\pi^2}{2(2\pi)} = 300\pi$

No. of rotation $= \frac{\theta}{2\pi} = 150$

4. 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)

(1) 2.0 m/s (2) 0.2 m/s (3) 14.1 m/s (4) 1.41 m/s

Ans. (4)

Sol. $\frac{1}{2}mv_{max}^2 = \text{Total energy}$

$\frac{1}{2} \times 20 \times 10^{-3} \times v_{max}^2 = 0.02$

$v_{max} = 1.414 \text{ m/s}$

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

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

(1) 2.5 A, 20 A m^2

(2) 2 A, 4 A m^2

(3) 2.5 A, 2 A m^2

(4) 2 A, 10 A m^2

Ans. (3)

Sol. Magnetic field $B = \frac{\mu_0 NI}{2R}$

$$I = \frac{2BR}{\mu_0 N} = \frac{2 \times 3.14 \times 10^{-3} \times 5 \times 10^{-2}}{4 \times 3.14 \times 10^{-7} \times 100} = 2.5 \text{ A}$$

Magnetic moment $M = NIA = 100 \times 2.5 \times \pi \times 25 \times 10^{-4}$

$M \approx 2$ A m^2

6. 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 = 1×10^5 Pa and gravitational acceleration g = 10 m/s^2)

(1) 9900 m

(2) 990 m

(3) 9000 m

(4) 99 m

Ans. (2)

Sol. $\Delta P = \rho gh$

$\Rightarrow 99 \text{ atm} = \rho_w gh$

$\Rightarrow h = 990$ m

7. Match List-I with List-II -

List-I	**List-II**
A. $E = h\nu$	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 -

(1) A-IV, B-III, C-II, D-I (2) A-IV, B-III, C-I, D-II

(3) A-I, B-IV, C-III, D-II (4) A-IV, B-I, C-II, D-III

Ans. (2)

Sol. $E = h\nu$ (Energy of photon)

Diffraction and Interference are associated with wave nature of light

$\lambda = h/p$ (de-Broglie wavelength)

Compton effect involves the scattering of a photon by an electron (Particle nature of light)

8. 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 -

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

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

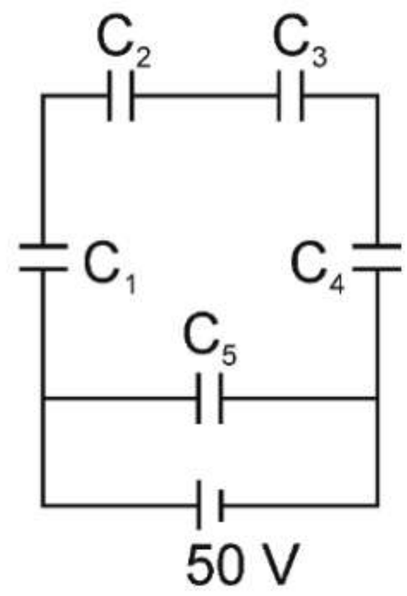
(3) A-I, B-IV, C-III, D-II

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

Ans. (2)

Sol. Formula based

9. 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 -

(1) 4 μF, 250 μC on C_1 to C_4 and 125 μC on C_5

(2) 5 μF, 250 μC on all capacitors

(3) 5 μF, 125 μC on C_1 to C_4 and 25 μC on C_5

(4) 5 μF, 125 μC on all capacitors

Ans. (4)

Sol. $C_{eq} = 2.5\ \mu F + 2.5\ \mu F$

$C_{eq} = 5\ \mu F$

$Q = 2.5 \times 50 = 125\ \mu C$ on each

10. 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 -

(1) $mg\frac{R}{2}$ (2) mgR (3) $mg\frac{R}{4}$ (4) $2mgR$

Ans. (1)

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

11. When a ruler falls vertically, 5 different persons catch it with different reaction times.

($g = 9.8\ m\ s^{-2}$)

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 -

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

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

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

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

Ans. (4)

Sol. More reaction time $\Rightarrow$ more travelled distance

12. The power of a crane, which lifts a mass of 1000 kg to a height of 20 m in 10 s is -

($g = 9.8\ m/s^2$)

(1) 19.6 kW (2) 19.6 W (3) 39.2 kW (4) 39.2 W

Ans. (1)

Sol. $\text{Power} = \frac{mgh}{t} = \frac{1000 \times 9.8 \times 20}{10} = 19.6\ kW$

13. Consider two uncharged capacitors of equal capacitance 200 pF. One of them is charged by a 100 V supply and disconnected. Now this capacitor is connected to the uncharged capacitor. The amout of electrostatic energy lost in the porcess is -

(1) 0.5 J

(2) 1.0×10^{-6} J

(3) 0.5×10^{-6} J

(4) 1.0 J

Ans. (3)

Sol. Energy loss $\Delta U = \frac{1}{2}\frac{C_1C_2}{(C_1 + C_2)}(V_1 - V_2)^2$

$= \frac{1}{4}CV^2 = 0.5 \times 10^{-6}$ J

14. An ac circuit contains a resistance of 1 kΩ, a capacitor of 0.1 μF and an inductor of 1 mH connected in series. The resonance frequency of the circuit is approximately -

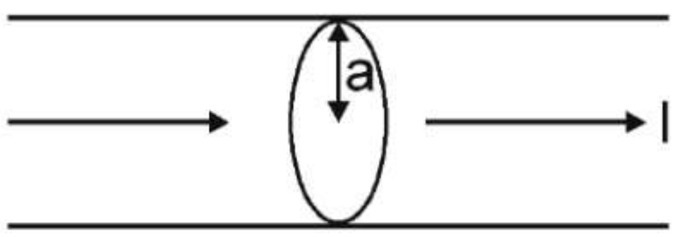
(1) 15.9 kHz (2) 20.7 kHz (3) 10.1 kHz (4) 13.5 kHz

Ans. (1)

Sol. Resonant frequency in RLC series A.C. current

$$f_0 = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{10^{-3}\times10^{-7}}} \approx 15.9 \text{ kHz}$$

15. The figure given below shows a long straight solid wire of circular corss-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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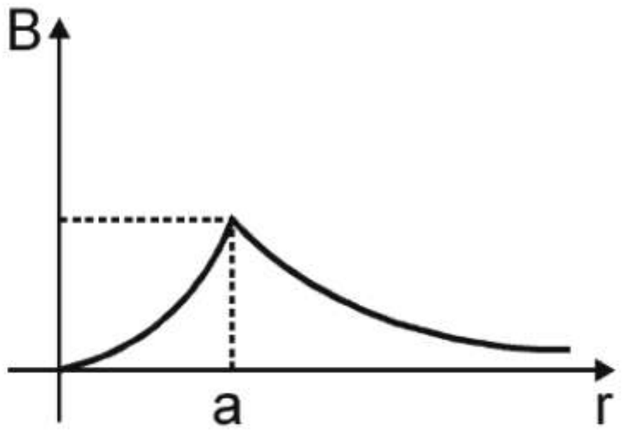

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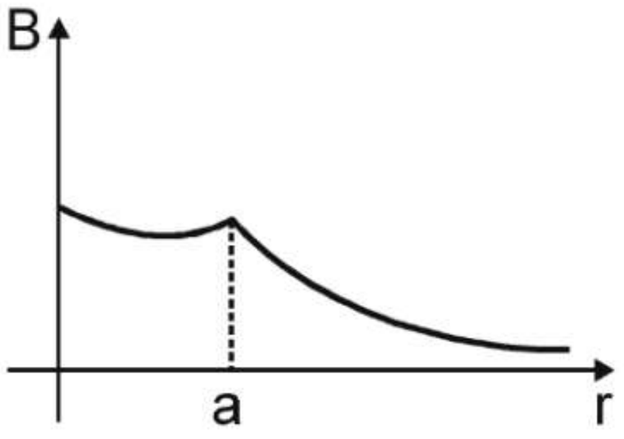

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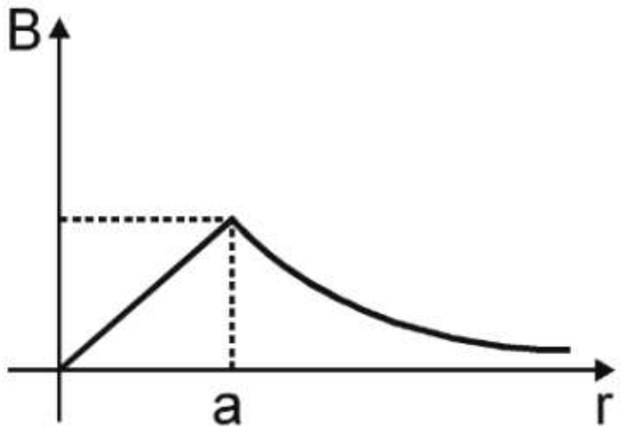

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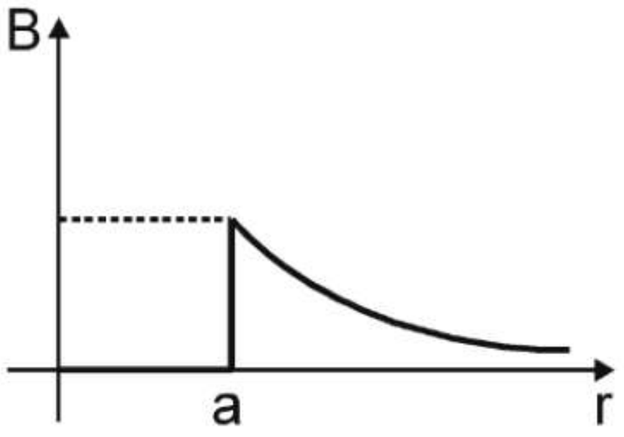


Ans. (3)

Sol. When $r < a \Rightarrow B_{in} = \frac{\mu_0 I r}{2\pi R^2}$ $(B_{in} \propto r)$

$$r > a \Rightarrow B_{out} = \frac{\mu_0 I}{2\pi r} \left(B_{out} \propto \frac{1}{r}\right)$$

16. 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 -

(1) 75 W (2) 25 W (3) 100 W (4) 125 W

Ans. (2)

Sol. $Q_{in} = W + \Delta U$

$100 = 75 + \Delta U$ (All data is for one second)

17. 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 -

(1) $\frac{1}{120}$ s (2) $\frac{1}{240}$ s (3) $\frac{1}{30}$ s (4) $\frac{1}{60}$ s

Ans. (2)

Sol. Time taken to reach from zero to peak value $\Rightarrow t = \frac{T}{4} = \frac{1}{4f} = \frac{1}{240}$ sec.

18. In Young's double slip 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 $\frac{\lambda}{3}$ will be -

(1) K (2) 2 K (3) $\frac{K}{2}$ (4) $\frac{K}{4}$

Ans. (4)

Sol. $\Delta\phi = \frac{2\pi}{\lambda} \times \Delta x = \frac{2\pi}{\lambda} \times \frac{\lambda}{3} = \frac{2\pi}{3}$

$$I = K\cos^2\left(\frac{\Delta\phi}{2}\right)$$

$$I = K\cos^2\left(\frac{\pi}{3}\right) = \frac{K}{4}$$

19. 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 -

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

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

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

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

Ans. (2)

Sol. $r = r_0 A^{1/3}$

$V \propto r^3 \propto A$

The difference in mass of a nucleus and its constituents is called the mass defect.

20. 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 -

(1) A is false, but B is true

(2) A is true, but B is false

(3) A is true and B is also true

(4) Both A and B are false

Ans. (2)

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

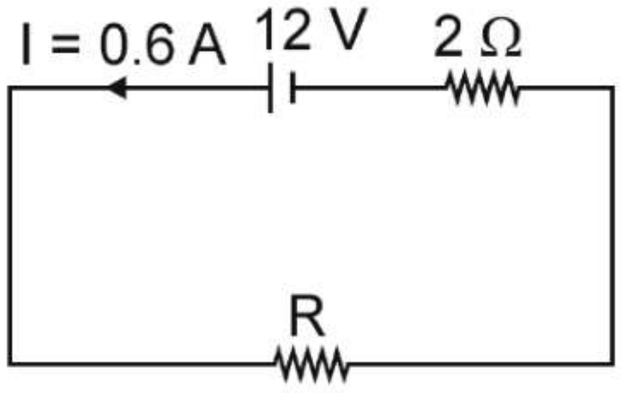
Diffraction and interference are characteristics exhibited by all types of waves.

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

(1) 12 V (2) 1.2V (3) 10 V (4) 10.8 V

Ans. (4)

Sol.



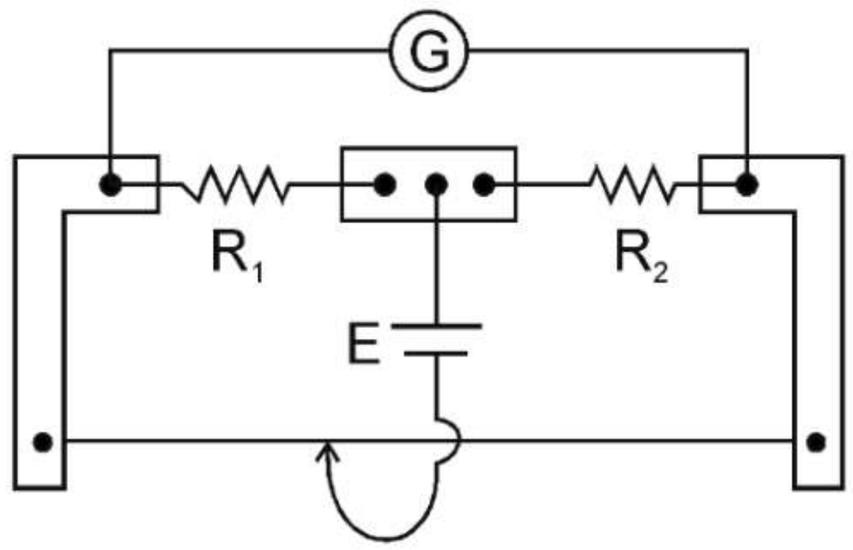
Terminal voltage

$V = E - Ir$

$V = 12 - 0.6(2)$

$V = 10.8$ volt

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



(1) Only the right-sided deflection

(2) Only the left-sided deflection

(3) There will be no deflection irrespective of the position of the jockey

(4) Both right-sided and left-sided deflection and at balance point, no deflection

Ans. (4)

Sol. If metre bridge is unbalanced then galvanometer can show deflection in any side and if metre bridge is balanced then null deflection.

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 $g = 9.8\ m/s^2$)

(1) 0.75 m

(2) 1 m

(3) 1.5 m

(4) 2 m

Ans. (2)

Sol. $T = 2\pi\sqrt{\frac{l}{g}}$

$$l = \frac{T^2 g}{4\pi^2} = \frac{T^2}{4}; \{T = 2\ sec\}$$

$$= \frac{4}{4} = 1\ m$$

24. Which of the following statements are **correct** -

A. Inside a 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 a charged conductor.

Choose the **correct** answer from the options given below -

(1) A, C and D only

(2) A, C and E only

(3) C, D and E only

(4) A, B and D only

Ans. (1)

Sol. Conceptual

25. 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 -

(1) Both Statements A and B are true

(2) Both Statements A and B are false

(3) Statement A is true, but Statement B is false

(4) Statement A is false, but Statement B is true

Ans. (3)

Sol. In forward bias of diode, below knee voltage no current flows.

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

(1) passes through the second principal focus.

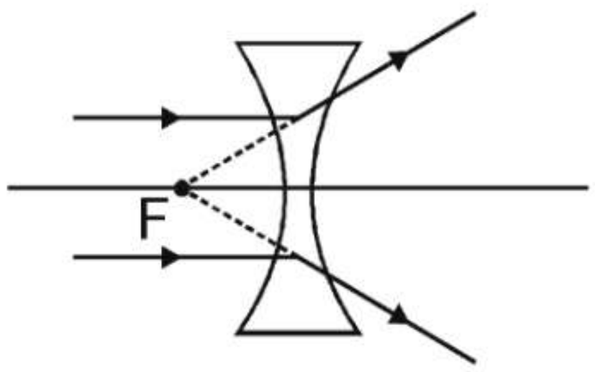
(2) appears to diverge from the first principal focus.

(3) passes through 2F, which is the radius of curvature of the lens.

(4) emerges parallel to the principal axis.

Ans. (2)

Sol.



27. An unknown nucleus has a nuclear density of 2.29×10^{17} kg/m^3 and mass of 19.926×10^{-27} kg. Its mass number A is approximately -

(Take $R_0 = 1.2 \times 10^{-15}$ m, $4\pi = 12.56$)

(1) 16 (2) 20 (3) 12 (4) 19

Ans. (3)

Sol. $V = \frac{m}{\rho} = \frac{4}{3}\pi R_0^3 A$

$$A = \frac{3m}{4\pi R_0^3 \rho} = \frac{3 \times 19.926 \times 10^{-27}}{4\pi \times 2.29 \times 10^{17} \times (1.2)^3 \times 10^{-45}}$$

$A = 12$

28. A galvanometer of resistance 100 Ω 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 -

(1) 0.001 Ω (2) 0.10 Ω (3) 1.0 Ω (4) 0.01 Ω

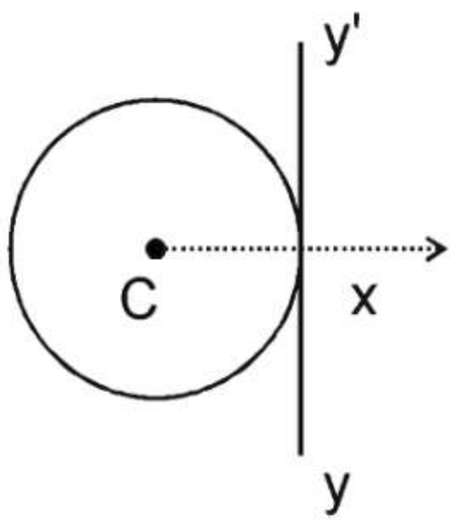
Ans. (4)

Sol. $I_g = 1$ mA ; main current $I = 10\,A = 10^4 I_g$

$(I = NI_g)$

$$\text{Shunt } S = \frac{R_g}{N} = \frac{100}{10^4} = 0.01\ \Omega$$

29. 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 -



(1) $\frac{3mL^3}{8\pi}$ (2) $\frac{3mL^2}{8\pi^2}$ (3) $\frac{3mL^3}{8\pi^2}$ (4) $\frac{3mL^2}{8\pi}$

Ans. (3)

Sol. $L = 2\pi r$

$$r = \frac{L}{2\pi}$$

$$\text{MOI about yy'} = \frac{3}{2}mLr^2 = \frac{3}{2}mL\left(\frac{L^2}{4\pi^2}\right) = \frac{3mL^3}{8\pi^2}$$

30. For a travelling harmonic wave

$y(x, t) = 2.0 \cos 2\pi (10t - 0.0080 x + 0.35)$ 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 -

(1) 0.08 π rad (2) 0.008 π rad (3) 0.8 π rad (4) 8 π rad

Ans. (3)

Sol. $\phi = K\Delta x$

$= (0.0080 \times 2\pi) \times 0.5 \times 100$ $\because$ Put Δx in cm

$= 0.8\pi$ radian

31. 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 ms^{-2} is ($g = 10\ ms^{-2}$)

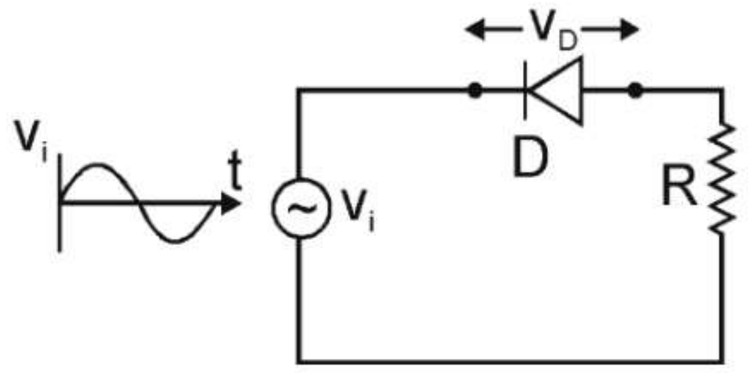
(1) 1.8 (2) 1.2 (3) 1.5 (4) 2.1

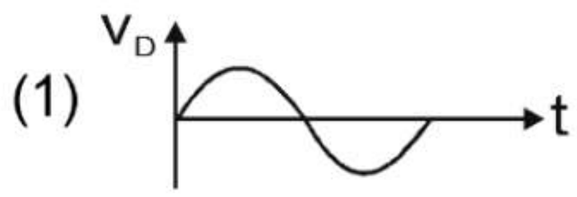
Ans. (2)

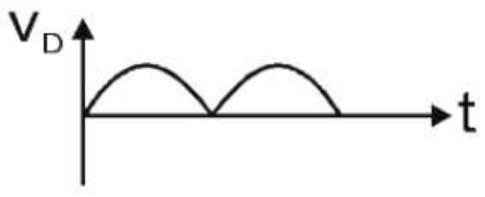
Sol. $\mu mg \geq ma$

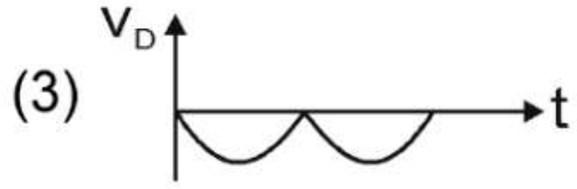
$a \leq 1.2\ m/s^2$

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



(1) 

(2) 

(3) 

(4) 

Ans. (4)

Sol. For positive half cycle diode is in reverse bias hence this applied voltage (positive cycle) will appear across diode.

33. 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 $\left(\frac{V_{rms}^{Ar}}{V_{rms}^{Cl}}\right)$ is (Atomic mass of argon = 40.0 u and molecular mass of chlorine = 70.0 u)

(1) $\frac{7}{4}$ (2) $\frac{2}{\sqrt{7}}$ (3) $\frac{\sqrt{7}}{2}$ (4) $\frac{7}{2}$

Ans. (3)

Sol. $v_{rms} = \sqrt{\frac{3RT}{\text{Molar mass}}}$

$$\frac{v_{Ar}}{v_{Cl}} = \sqrt{\frac{M_{Cl}}{M_{Ar}}} = \sqrt{\frac{70}{40}} = \frac{\sqrt{7}}{2}$$

34. 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 -

(1) A-IV, B-III, C-II, D-I (2) A-III, B-IV, C-I, D-II

(3) A-III, B-I, C-II, D-IV (4) A-IV, B-I, C-II, D-III

Ans. (4)

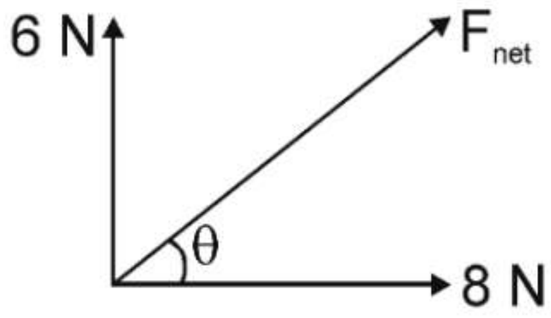
Sol. Theory based

35. The magnitude and direction of the acceleration produced in a body of mass 5 kg when two mutually perpendicular forces 8 N and 6 N act on it, are respectively -

(1) 2 ms^{-2} ; $\tan^{-1}(3/4)$ with 8 N force
(2) 2 ms^{-2} ; $\tan^{-1}(4/3)$ with 8 N force
(3) 2 ms^{-2} ; $\tan^{-1}(3/4)$ with 6 N force
(4) 20 ms^{-2} ; $\tan^{-1}(4/3)$ with 8 N force

Ans. (1)

Sol. $F_{net} = \sqrt{F_1^2 + F_2^2} = \sqrt{6^2 + 8^2} = 10\ N$

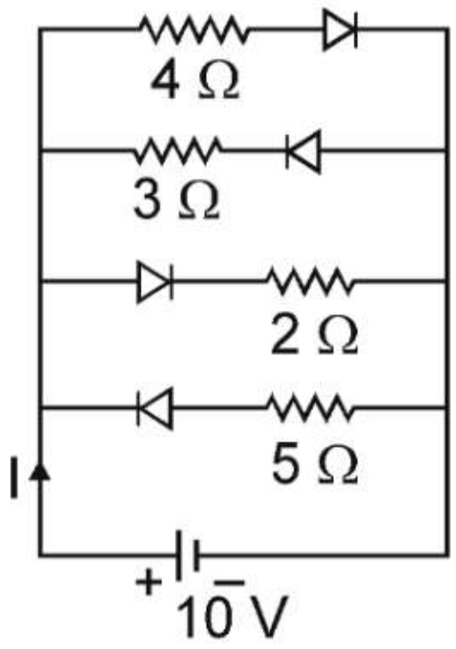


$$a_{net} = \frac{10}{5} = 2\ m/s^2$$

$$\theta = \tan^{-1}\left(\frac{6}{8}\right) = \tan^{-1}\left(\frac{3}{4}\right)$$

36. The current I in the circuit shown below is :

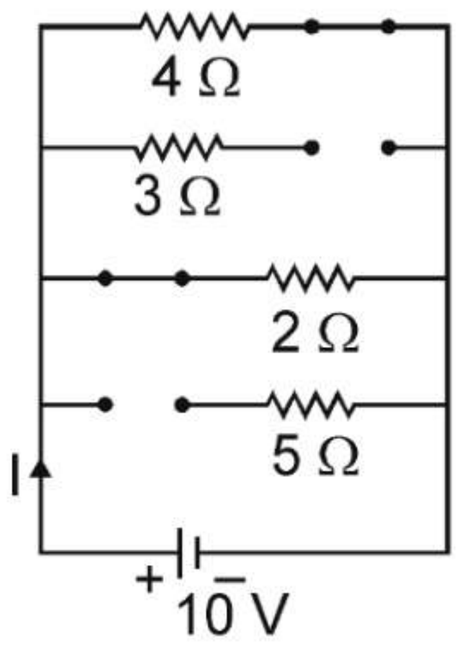
(All diodes are ideal and identical)



(1) $\frac{1}{3}$A (2) $\frac{15}{2}$A (3) $\frac{5}{3}$A (4) $\frac{5}{9}$A

Ans. (2)

Sol.



$$I = \frac{10}{4/3} = \frac{15}{2}A$$

37. For a metal of work function 6.6 eV, which of the following wavelength of incident radiation does **not** give rise to the photoelectric effect -

(Take Plank's constant as 6.6×10^{-34} J s)

(1) 200 nm (2) 100 nm

(3) 50 nm (4) 150 nm

Ans. (1)

Sol. Threshold wavelength $\lambda_0 = \frac{1240}{6.6} = 187.87$ nm

For $\lambda \leq \lambda_0 \Rightarrow$ PEE will occur

For $\lambda > \lambda_0 \Rightarrow$ PEE will not occur

38. 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 -

(1) 3×10^8 (2) 500

(3) 3×10^{10} (4) 400

Ans. (4)

Sol. Distance = speed × time = 1 × 400 = 400

39. A rectangular wire loop of sides 8 cm and 3 cm with a 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 -

(1) 1.8×10^{-4} volt

(2) 1.3×10^{-4} volt

(3) 1.2×10^{-4} volt

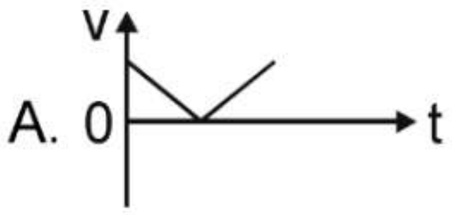
(4) 4.8×10^{-4} volt

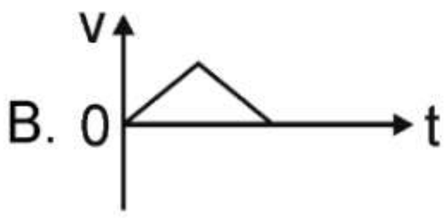
Ans. (1)

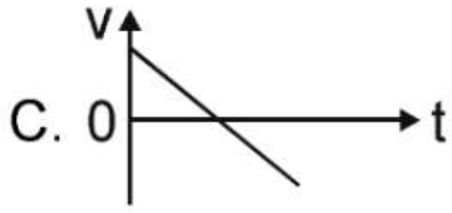
Sol. $\varepsilon = Blv = 0.3 \times 3 \times 10^{-2} \times 2 \times 10^{-2}$

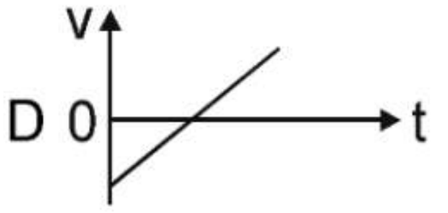
$\varepsilon = 1.8 \times 10^{-4}$ volt

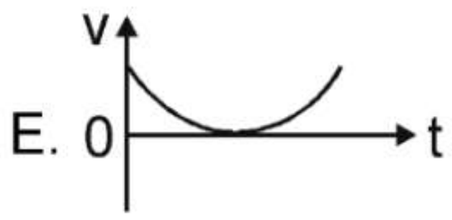
40. The following plots show variation of velocity (v) with time (t), of a ball thrown vertically upward, and falling back. Which of the following plot is/are **correct** -

A. 

B. 

C. 

D 

E. 

(1) B only

(2) A and E only

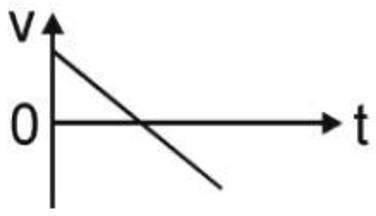
(3) C only

(4) D only

Ans. (3)

Sol. $\vec{v} = \vec{u} + \vec{a}t$

$v = u - gt$



41. In a vernier callipers, 20 VSD coincide with 16 MSD (each division of length 1 mn). The least count of the varnier callipers is -

(1) 0.2 cm

(2) 0.1 cm

(3) 0.02 cm

(4) 0.01 cm

Ans. (3)

Sol. 20 VSD = 16 MSD

$1\ \text{VSD} = \frac{16}{20} = 0.8\ \text{MSD}$

L.C. = 1 MSD – 1 VSD = 1 mm – 0.8 mm = 0.2 mm = 0.02 cm

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

(1) 7.654

(2) 7.7

(3) 7.65

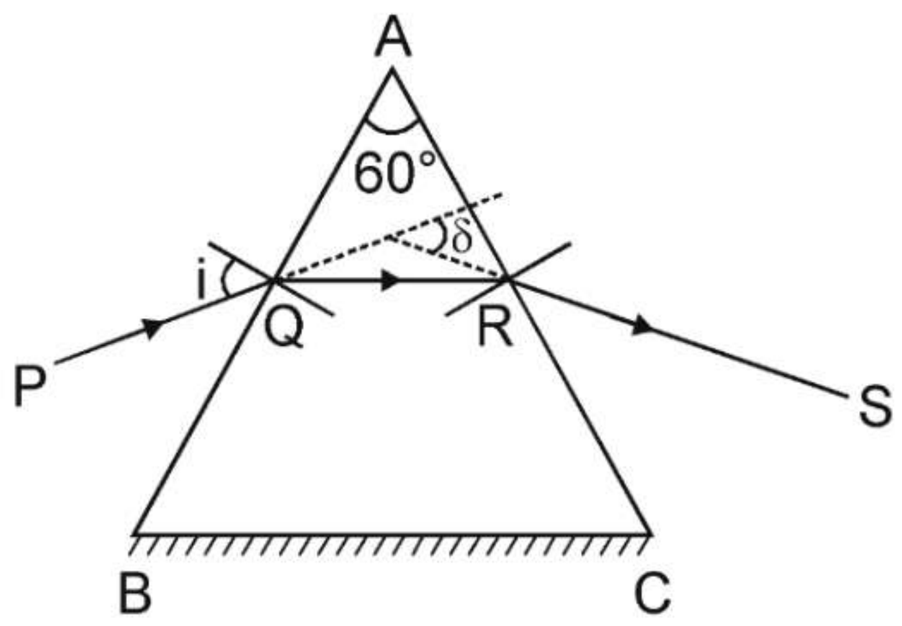
(4) 7.6

Ans. (2)

Sol. $\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{5.580}{\left(9.0 \times 10^{-2}\right)^3} = 7654.32 \text{ kg/m}^3 = 7.65432 \times 10^3 \text{ kg/m}^3$

$X = 7.65432 \Rightarrow$ This rounds up to 7.7

43. 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 -



(1) 45° (2) 55° (3) 35° (4) 40°

Ans. (4)

Sol. $\delta = i + e - A$ (It is case of minimum deviation)

$= 50° + 50° - 60° = 40°$

44. 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 eV = 1.5×10^{-19} J, e = 1.6×10^{-19} J C and $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ N m^2/C^2)

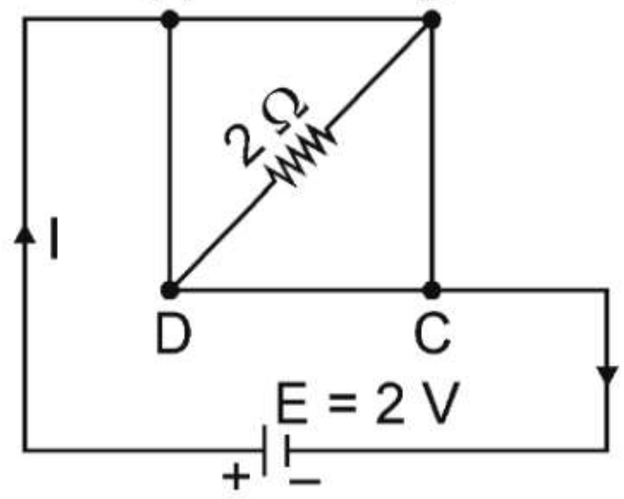
(1) 2.1×10^{-8} m (2) 2.1×10^{-10} m (3) 2.1×10^{-11} m (4) 2.1×10^{-9} m

Ans. (2)

Sol. $r = 0.529\frac{n^2}{Z} = 0.529 \times \frac{4}{1} \times 10^{-10}$

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

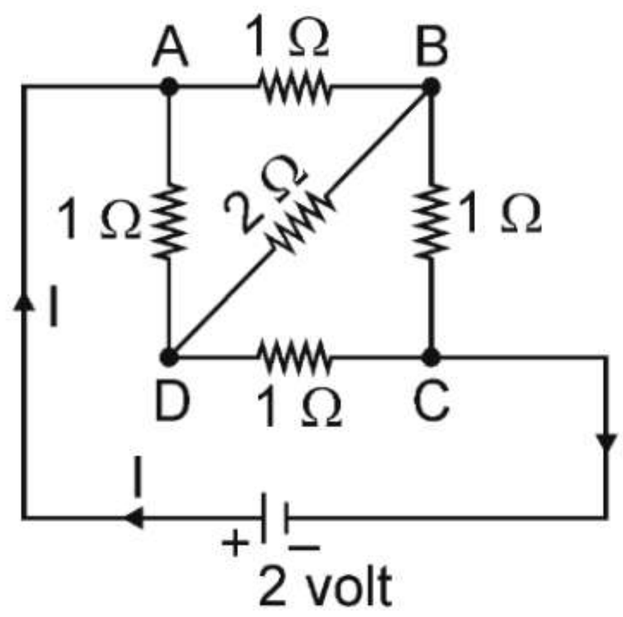
45. A uniform metallic wire having resistance 4 Ω is bent to form a square loop (ABCD) (see figure). A resistance of 2 Ω is connected between points B and D and a battery of 2 V is connected across points A and C as shown in the figure. Now the value of current (I) is -



(1) 4 A (2) 4.5 A (3) 8 A (4) 2 A

Ans. (4)

Sol. Balanced W.S.B.



$R_{eq} = 1\ \Omega$

$I = \frac{V}{R_{eq}} = \frac{2}{1}$

I = 2 A