KCET 2025 Physics Question Paper

Time Allowed :1 Hour 20 minutes	**Maximum Marks :**180	**Total Questions :**60

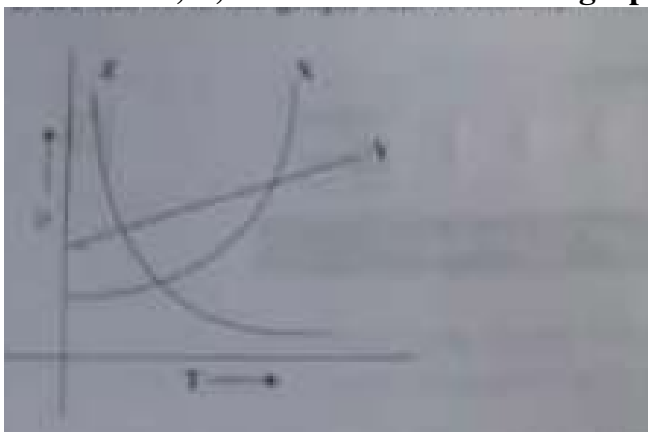
General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 1 hours 20 minutes duration.
2. The question paper consists of 60 questions. The maximum marks are 180.
3. There are in the question paper consisting of Physics, having 60 questions of equal weightage.

1 PHYSICS

1. The variations of resistivity ρ with absolute temperature T for three different materials X, Y, and Z are shown in the graph below. Identify the materials X, Y, and Z.



(1) X = nichrome, Y = copper, Z = semiconductor

(2) X = copper, Y = nichrome, Z = semiconductor

(3) X = copper, Y = semiconductor, Z = nichrome

(4) X = semiconductor, Y = nichrome, Z = copper

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2. Given, a current carrying wire of non-uniform cross-section, which of the following is constant throughout the length of the wire?

(1) Current only

(2) Current, electric field, and drift speed

(3) Drift speed

(4) Current and drift speed

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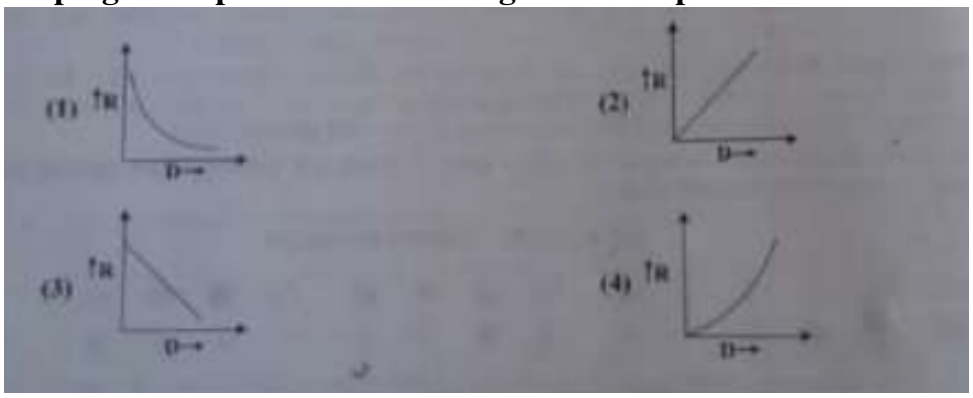
3. The graph between variation of resistance of a wire as a function of its diameter keeping other parameters like length and temperature constant is



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4. Two thin long parallel wires separated by a distance r from each other in vacuum carry a current of 1 ampere in opposite directions. Then, they will

(1) Repel each other with a force per unit length of $\frac{\mu_0 I^2}{2\pi r}$

(2) Attract each other with a force per unit length of $\frac{\mu_0 I^2}{2\pi r}$

(3) Attract each other with a force per unit length of $\frac{\mu_0 I^2}{\pi r}$

(4) Repel each other with a force per unit length of $\frac{\mu_0 I^2}{\pi r}$

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5. A solenoid is 1 m long and 4 cm in diameter. It has five layers of windings of 1000 turns each and carries a current of 7 A. The magnetic field at the centre of the solenoid is

(1) $43.96 \times 10^{-3}\,\mathrm{T}$

(2) $49.6\,\mathrm{T}$

(3) $43.96 \times 10^{-2}\,\mathrm{T}$

(4) $4.396 \times 10^{-2}\,\mathrm{T}$

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6. Two similar galvanometers are converted into an ammeter and a millammeter. The shunt resistance of ammeter as compared to the shunt resistance of millammeter will be

(1) Less

(2) Equal

(3) Zero

(4) More

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7. Which of the following statements is true in respect of diamagnetic substances?

(1) Susceptibility decreases with temperature.

(2) Susceptibility is small and negative.

(3) They are feebly attracted by magnets.

(4) Permeability is greater than 1000

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8. Identify the correct statement:

(1) The direction of magnetic field due to a current element is given by Fleming's Left Hand

Rule.

(2) The magnetic field inside a solenoid is non-uniform.

(3) A current carrying conductor produces an electric field around it.

(4) A straight current carrying conductor has circular magnetic field lines around it.

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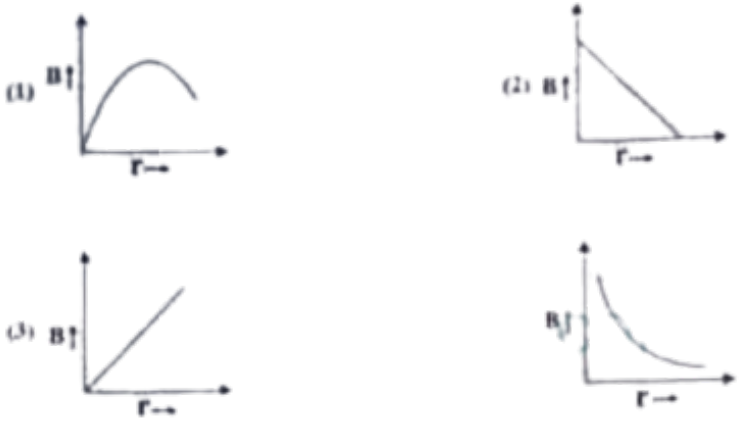
9. Which of the following graphs represent the variation of magnetic field B with perpendicular distance r from an infinitely long, straight conductor carrying current?



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10. If we consider an electron and a photon with the same de-Broglie wavelength, then they will have the same

(1) Velocity

(2) Momentum

(3) Angular momentum

(4) Energy

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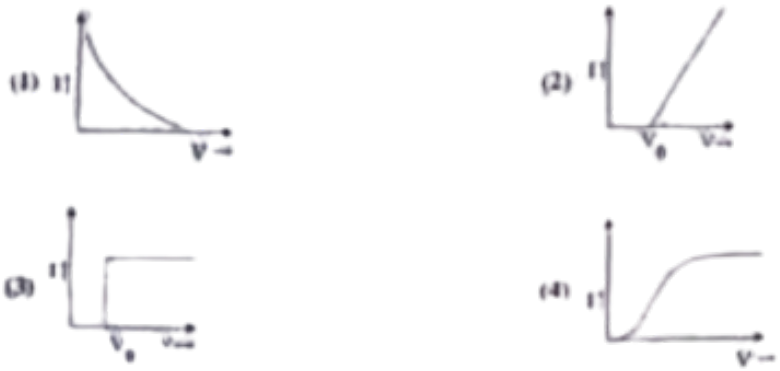
11. The anode voltage of a photocell is kept fixed. The frequency of the light falling on the cathode is gradually increased. Then the correct graph which shows the variation of photo current I with the frequency f of incident light is



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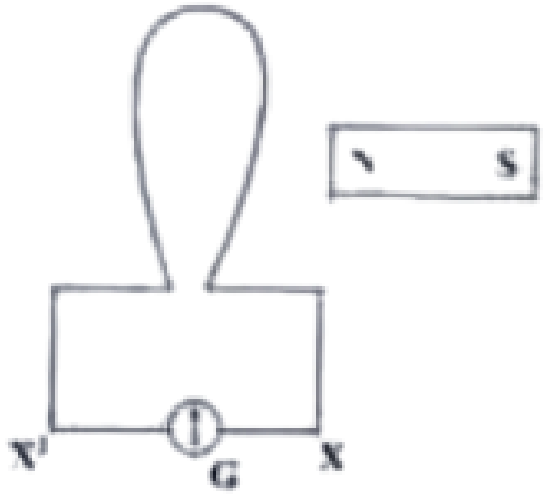
12. When a bar magnet is pushed towards the coil, along its axis, as shown in the figure, the galvanometer pointer deflects towards X. When this magnet is pulled away from the coil, the galvanometer pointer



(1) oscillates

(2) deflects towards X

(3) deflects towards X'

(4) does not deflect

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13. A square loop of side 2 m lies in the Y-Z plane in a region having a magnetic field $\mathrm{B} = (5\hat{i} - 3\hat{j} - 4\hat{k})$ **T. The magnitude of magnetic flux through the square loop is**

(1) 16 Wb

(2) 10 Wb

(3) 20 Wb

(4) 12 Wb

15. A sinusoidal voltage produced by an AC generator at any instant t is given by an equation $V = 311\sin(314t)$. The rms value of voltage and frequency are respectively

(1) 220 V, 50 Hz

(2) 200 V, 100 Hz

(3) 220 V, 100 Hz

(4) 220 V, 50 Hz

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16. A series LCR circuit containing an AC source of 100V has an inductor and a capacitor of reactances 24Ω and 16Ω respectively. If a resistance of 6Ω is connected in series, then the potential difference across the series combination of inductor and capacitor will be

(1) 8 V

(2) 40 V

(3) 80 V

(4) 400 V

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17. Match the following types of waves with their wavelength ranges

i. Microwave (a) 700 nm to 400 nm

ii. Visible light (b) 1 nm to 10^3 nm

iii. Ultraviolet (c) 0.1 nm to 1 nm

iv. X-rays (d) 400 nm to 1 nm

(1) i – b, ii – a, iii – d, iv – c

(2) i – a, ii – b, iii – c, iv – d

(3) i – b, ii – c, iii – d, iv – a

(4) i – d, ii – b, iii – a, iv – c

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18. A ray of light passes from vacuum into a medium of refractive index n. If the angle of incidence is twice the angle of refraction, then the angle of incidence in terms of refractive index n is

(1) $25\sin^{-1}\left(\frac{1}{n}\right)$

(2) $\cos^{-1}\left(\frac{1}{n}\right)$

(3) $\sin^{-1}\left(\frac{n}{2}\right)$

(4) $2\cos^{-1}\left(\frac{1}{2n}\right)$

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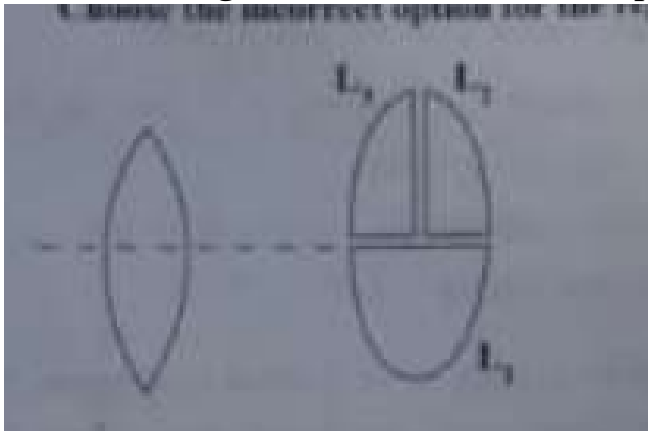
19. A convex lens has power P. It is cut into two halves along its principal axis. Further, one piece (out of two halves) is cut into two halves perpendicular to the principal axis as shown in the figure. Choose the incorrect option for the reported lens pieces.



(1) Power of L_1 is P

(2) Power of L_1 is $\frac{P}{2}$

(3) Power of L_2 is $\frac{P}{2}$

(4) Power of L_2 is P

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20. The image formed by an objective lens of a compound microscope is

(1) Virtual and enlarged

(2) Virtual and diminished

(3) Real and diminished

(4) Real and enlarged

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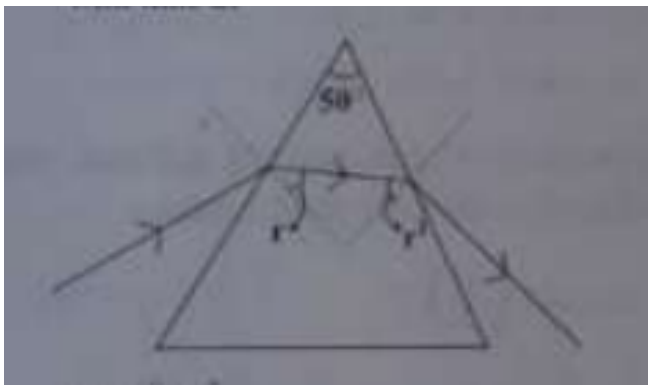
21. If r and r' denote the angles inside the prism having angle of prism $50°$, considering that during the interval of time from $t = 0$ to $t = T$, r varies with time as $r = 10° + t^2$. During this time r' will vary with time as



(1) $50°t^2 + t^2$

(2) $40°t^2 - t^2$

(3) $40°t^2 - t^2$

(4) $50°t^2 - t^2$

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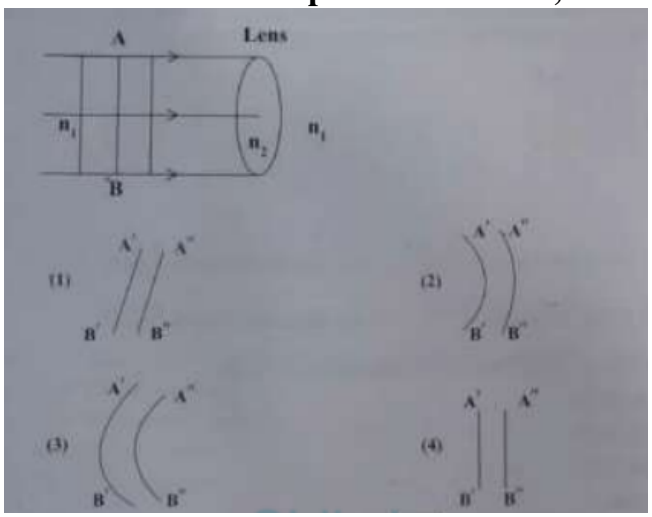
22. If AB is incident plane wave front, then refracted wave front is ($n_1 \rightarrow n_2$)



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23. The total energy carried by the light wave when it travels from a rarer to a non-reflecting and non-absorbing medium

(1) either increases or decreases depending upon angle of incidence

(2) decreases

(3) remains same

(4) increases

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24. If the radius of the first Bohr orbit is r, then the radius of the second Bohr orbit will be

(1) $\frac{3}{2}r$

(2) $2r$

(3) $8r$

(4) $4r$

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25. Match the following types of nuclei with examples shown:

Column-I		Column- II	
(A)	Isotopes	(i)	${}_3Li^7, {}_4Be^7$
(B)	Isobars	(ii)	${}_8O^{16}, {}_9F^{19}$
(C)	Isotones	(iii)	${}_1H^1, {}_1H^2$

(1) A - iii, B - ii, C - i

(2) A - ii, B - iii, C - i

(3) A - ii, B - i, C - iii

(4) A - i, B - iii, C - ii

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26. Which of the following statements is incorrect with reference to 'Nuclear force'?

(1) Nuclear force is always attractive

(2) Potential energy is minimum if the separation between the nucleons is 0.8 fm

(3) Nuclear force becomes attractive for nucleon distances larger than 0.8 fm

(4) Nuclear force becomes repulsive for nucleon distances less than 0.8 fm

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27. The range of electrical conductivity σ and resistivity ρ for metals, among the following, is:

(1) $\rho = 10^{-3} - 10^{8}\,\Omega\,\mathrm{m}$, $\sigma = 10^{-2} - 10^{5}\,\Omega^{-1}\,\mathrm{m}^{-1}$

(2) $\rho = 10^{-6} - 10^{3}\,\Omega\,\mathrm{m}$, $\sigma = 10^{2} - 10^{5}\,\Omega^{-1}\,\mathrm{m}^{-1}$

(3) $\rho = 10^{-6} - 10^{3}\,\Omega\,\mathrm{m}$, $\sigma = 10^{-10} - 10^{5}\,\Omega^{-1}\,\mathrm{m}^{-1}$

(4) $\rho = 10^{-10} - 10^{6}\,\Omega\,\mathrm{m}$, $\sigma = 10^{-10} - 10^{6}\,\Omega^{-1}\,\mathrm{m}^{-1}$

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28. Which of the following statements is correct for an n-type semiconductor?

(1) The donor energy level does not exist.

(2) The donor energy level lies just below the bottom of the conduction band.

(3) The donor energy level lies closely above the top of the valence band.

(4) The donor energy level lies at the halfway mark of the forbidden energy gap.

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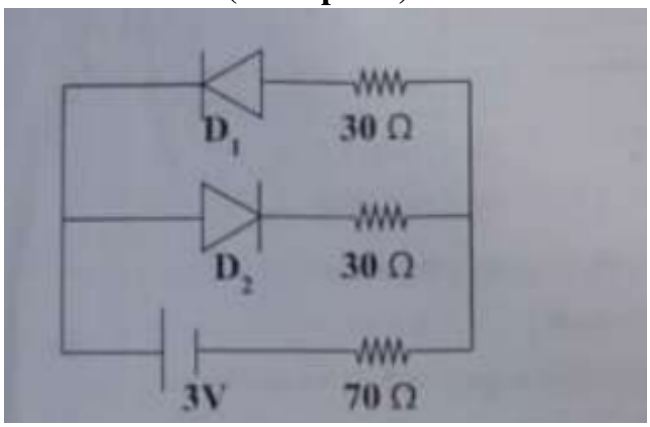
29. The circuit shown in the figure contains two ideal diodes D_1 and D_2. If a cell of emf 3V and negligible internal resistance is connected as shown, then the current through $70\,\Omega$ resistance (in amperes) is:



(1) 0.03 A

(2) 0.06 A

(3) 0.01 A

(4) 0.02 A

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30. In determining the refractive index of a glass slab using a travelling microscope, the following readings are tabulated:

(a) Reading of travelling microscope for ink = 8.123 cm

(b) Reading of travelling microscope for ink through glass slab = 6.123 cm

(c) Reading of travelling microscope for chalk dust on glass slab = 8.123 cm

From the data, the refractive index of a glass slab is:

(1) 1.199

(2) 1.398

(3) 1.500

(4) 1.569

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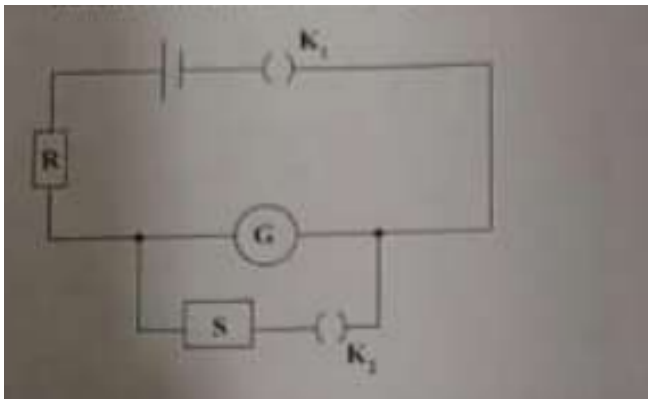
31. In an experiment to determine the figure of merit of a galvanometer by half deflection method, a student constructed the following circuit. He applied a resistance of $520\,\Omega$ in R. When K_1 is closed and K_2 is open, the deflection observed in the

galvanometer is 20 div. When K_1 is also closed and a resistance of $90\,\Omega$ is removed in S, the deflection becomes 13 div. The resistance of galvanometer is nearly:



(1) 54.6 Ω

(2) 116.0 Ω

(3) 45.0 Ω

(4) 103.0 Ω

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32. While determining the coefficient of viscosity of the given liquid, a spherical steel ball sinks by a distance $x = 0.8$ m. The radius of the ball is 2.5×10^{-3} m. The time taken by the ball to sink in three trials are tabulated as shown:

Trial No.	Time taken by the ball to fall by h (in second)
1.	2.75
2.	2.65
3.	2.70

(1) 14 Pa.s

(2) 0.28 Pa.s

(3) 1.5 Pa.s

(4) 0.14 $\times 10^3$ Pa.s

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33. Which of the following expressions can be deduced on the basis of dimensional analysis? (All symbols have their usual meanings)

(1) $F = \epsilon r\, v$

(2) $s = ut + \frac{1}{2}at^2$

(3) $x = A\cos\omega t$

(4) $N = N_0 2^t$

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34. Two stones begin to fall from rest from the same height, with the second stone starting to fall t_1 seconds after the first falls from rest. The distance of separation between the two stones becomes H after the first stone starts its motion. Then t_1 is equal to:

(1) $\frac{H}{2g}$

(2) $\frac{H}{g}$

(3) $\frac{H}{3g}$

(4) $\frac{H}{4g}$

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35. In the projectile motion of a particle on a level ground, which of the following remains constant with reference to time and position?

(1) Angle between the instantaneous velocity with the horizontal

(2) Vertical component of the velocity of the projectile

(3) Average velocity between any two points on the path

(4) Horizontal component of velocity

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36. A particle is in uniform circular motion. The equation of its trajectory is given by $x = 2t^2 - 3t + 5$, where x and y are in meters. The speed of the particle is 2 m/s. When the particle attains the lowest y-coordinate, the acceleration of the particle is (in m/s^2):

(1) $0.8\hat{i}$

(2) $0.4\hat{j}$

(3) $0.4\hat{i}$

(4) $0.8\hat{j}$

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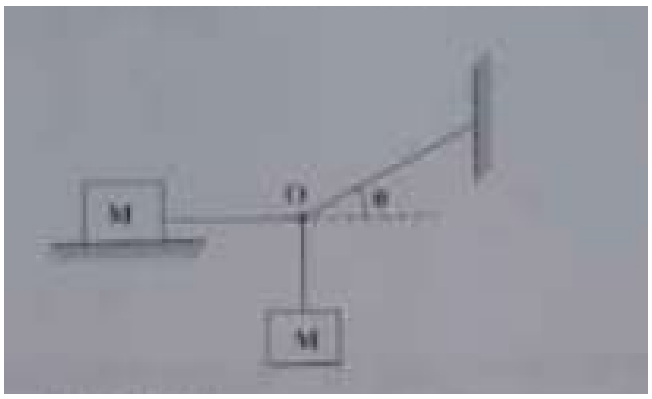
37. A wooden block of mass M lies on a rough floor. Another wooden block of the same mass is hanging from the point O through strings as shown in the figure. To achieve equilibrium, the coefficient of static friction between the block on the floor and the floor itself is



(1) $\mu = \tan\theta$

(2) $\mu = \cos\theta$

(3) $\mu = \sin\theta$

(4) $\mu = \tan\theta$

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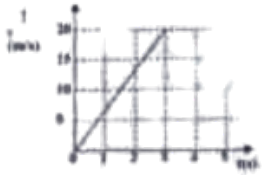
38. A block of certain mass is placed on a rough floor. The coefficients of static and kinetic friction between the block and the floor are 0.4 and 0.25 respectively. A constant horizontal force $F = 20$ N acts on it so that the velocity of the block varies with time according to the following graph. The mass of the block is nearly (Take $g = 10$ m/s^2):



(1) 1.0 kg

(2) 2.2 kg

(3) 4.4 kg

(4) 1.2 kg

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39. A body of mass 0.25 kg travels along a straight line from $x = 0$ to $x = 2$ m with a speed $v = kx^2$ where $k = 2$ m^{-1}. The work done by the net force during this displacement is

(1) 32 J

(2) 4 J

(3) 1 J

(4) 16 J

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40. During an elastic collision between two bodies, which of the following statements are correct?

(1) I, II, and III

(2) I and II only

(3) II and III only

(4) I and III only

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41. Three particles of mass 1 kg, 2 kg, and 3 kg are placed at the vertices A, B and C respectively of an equilateral triangle ABC of side 1 m. The centre of mass of the system from vertices A (located at origin) is

(1) $\left(\frac{7}{12}, 0\right)$

(2) $(0, 0)$

(3) $\left(\frac{7}{12}, \frac{3\sqrt{3}}{12}\right)$

(4) $\left(\frac{9}{12}, \frac{3\sqrt{3}}{12}\right)$

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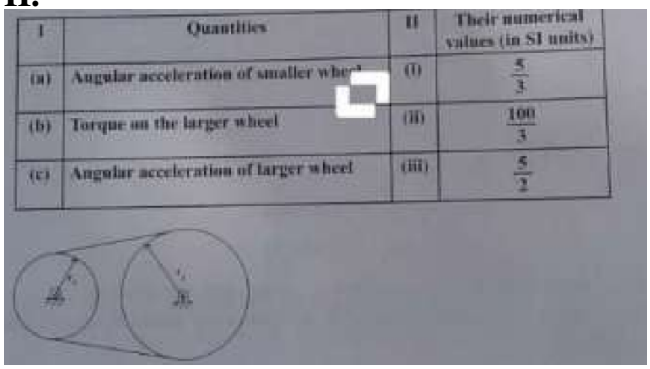
42. Two flywheels are connected by a non-slipping belt as shown in the figure.

$m_1 = 4$ **kg,** $r_1 = 20$ **cm,** $m_2 = 20$ **kg,** $r_2 = 30$ **cm. A torque of 10 Nm is applied on the smaller wheel. Then match the entries of column I with appropriate entries of column II.**



I	Quantities	II	Their numerical values (in SI units)
(a)	Angular acceleration of smaller wheel	(i)	$\frac{5}{3}$
(b)	Torque on the larger wheel	(ii)	$\frac{100}{3}$
(c)	Angular acceleration of larger wheel	(iii)	$\frac{5}{2}$

(1) $a \to iii, b \to i, c \to ii$

(2) $a \to iii, b \to ii, c \to i$

(3) $a \to ii, b \to iii, c \to i$

(4) $a \to ii, b \to iii, c \to ii$

43. If r_1, v_1, L_1 and r_2, v_2, L_2 are radii, velocities, and angular momenta of a planet at perihelion and aphelion of its elliptical orbit around the Sun respectively, then

(1) $r_1 v_1 = r_2 v_2,\ L_1 = L_2$

(2) $r_1 v_1 = r_2 v_2,\ L_1 \neq L_2$

(3) $r_1 v_1 \neq r_2 v_2,\ L_1 = L_2$

(4) $r_1 v_1 \neq r_2 v_2,\ L_1 \neq L_2$

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44. The total energy of a satellite in a circular orbit at a distance $(R + h)$ from the center of the Earth varies as

(1) $\frac{1}{(R+h)^2}$

(2) $\frac{1}{(R+h)}$

(3) $\frac{1}{(R+h)^3}$

(4) $\frac{1}{(R+h)^2}$

---

45. Two wires A and B are made of the same material. Their diameters are in the ratio 1:2 and lengths are in the ratio 1:3. If they are stretched by the same force, then increase in their lengths will be in the ratio of

(1) 3 : 2

(2) 4 : 3

(3) 3 : 4

(4) 2 : 3

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46. A horizontal pipe carries water in a streamlined flow. At a point along the pipe, where the cross-sectional area is $10\,\text{cm}^2$, the velocity of water is 1 m/s and the pressure is 2000 Pa. What is the pressure of water at another point where the cross-sectional area is $5\,\text{cm}^2$? [Density of water = 1000 kg/m^3]

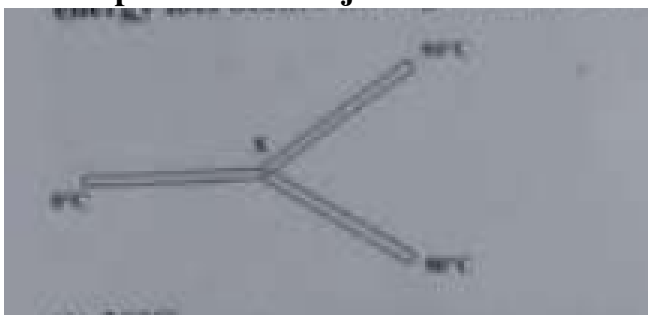
(1) 500 Pa

(2) 200 Pa

(3) 300 Pa

(4) 400 Pa

47. Three metal rods of the same material and identical in all respects are joined as shown in the figure. The temperatures at the ends of these rods are maintained as indicated. Assuming no heat energy loss occurs through the curved surfaces of the rods, the temperature at the junction is



(1) 20°C

(2) 45°C

(3) 60°C

(4) 30°C

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48. A gas is taken from state A to state B along two different paths 1 and 2. The heat absorbed and work done by the system along these two paths are Q_1 and W_1, and Q_2 and W_2, respectively. Then

(1) $Q_1 - W_1 = Q_2 - W_2$

(2) $Q_1 = Q_2$

(3) $W_1 = W_2$

(4) $W_1 - W_2 = Q_1 - Q_2$

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49. At 27°C temperature, the mean kinetic energy of the atoms of an ideal gas is E_1. If the temperature is increased to 327°C, then the mean kinetic energy of the atoms will be

(1) $2E_1$

(2) $\frac{E_1}{2}$

(3) $\frac{3}{2}E_1$

(4) $\sqrt{2}E_1$

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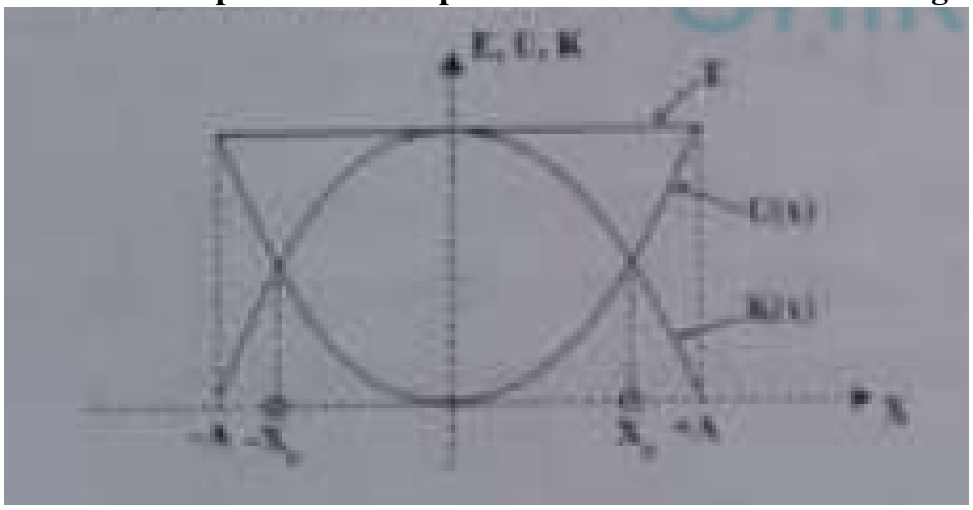
50. The variations of kinetic energy K, potential energy U, and total energy E as a

function of displacement of a particle in SHM is shown in the figure. The value of x_3 is



(1) $\frac{A}{2}$

(2) $\frac{A}{\sqrt{2}}$

(3) A

(4) $\frac{A}{3}$

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51. The angle between the particle velocity and wave velocity in a transverse wave is (except when the particle passes through the mean position)

(1) π radian

(2) $\frac{\pi}{2}$ radian

(3) Zero radian

(4) $\frac{\pi}{4}$ radian

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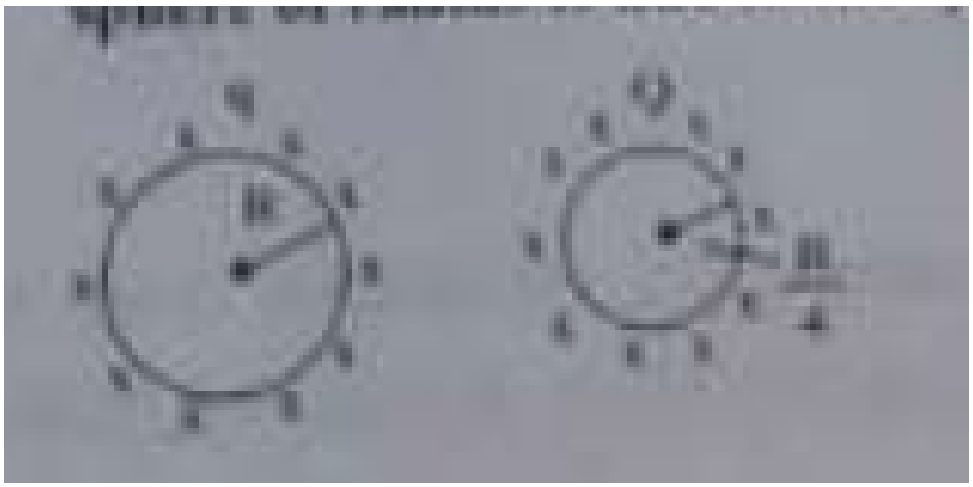
52. A metallic sphere of radius R carrying a charge q is kept at a certain distance from another metallic sphere of radius R_4 carrying a charge Q. What is the electric flux at any point inside the metallic sphere of radius R due to the sphere of radius R_4?



(1) $\frac{Q}{4\pi\epsilon_0 R^2}$

(2) $\frac{Q}{\epsilon_0}$

(3) $\frac{Q}{4\pi\epsilon_0 R_4^2}$

(4) Zero

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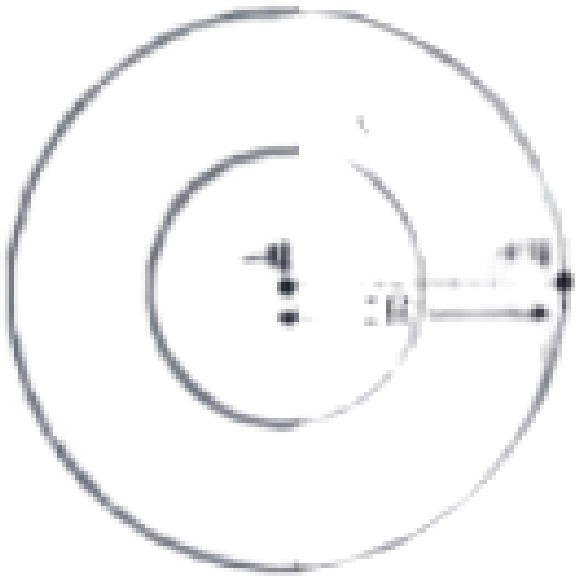
53. You are given a dipole of charge $+q$ and $-q$ separated by a distance $2l$. A sphere 'A' of radius R passes through the centre of the dipole as shown below and another sphere 'B' of radius $2R$ passes through the charge $+q$. Then the electric flux through the sphere A is



(1) $\frac{2q}{\epsilon_0}$

(2) $\frac{q}{\epsilon_0}$

(3) $\frac{q}{2\epsilon_0}$

(4) Zero

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54. A potential at a point A is 3 V and that at another point B is 5 V. What is the work done in carrying a charge of 5 mC from B to A?

(1) 4 J

(2) -40 J

(3) 40 J

(4) -0.4 J

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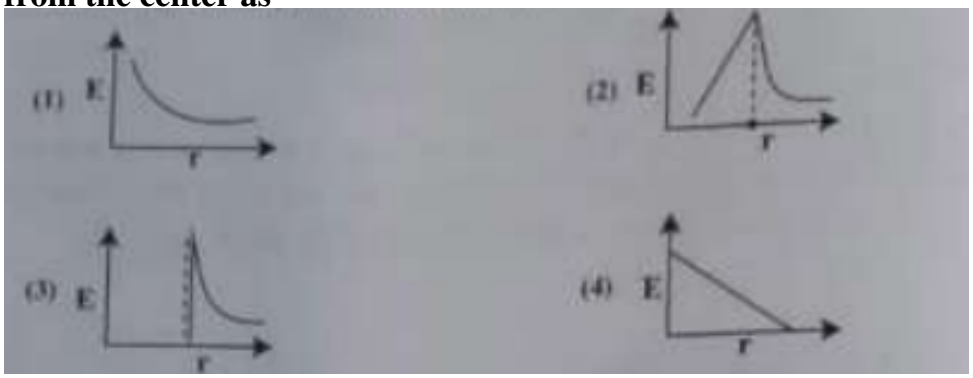
55. Charges are uniformly spread on the surface of a conducting sphere. The electric field from the center of the sphere in a point outside the sphere varies with distance r from the center as



(1) $E \propto r^2$

(2) $E \propto \frac{1}{r^2}$

(3) $E \propto r$

(4) $E \propto \frac{1}{r}$

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56. Match Column-I with Column-II related to an electric dipole of dipole moment $\vec{p}$ that is placed in a uniform electric field $\vec{E}$:

a) Angle between $\vec{p}$ and $\vec{E}$

b) 180°

c) 90°

i) pE

ii) $-pE$

iii) Zero

(1) $a \rightarrow iii, b \rightarrow i, c \rightarrow ii$

(2) $a \rightarrow ii, b \rightarrow iii, c \rightarrow i$

(3) $a \rightarrow i, b \rightarrow ii, c \rightarrow iii$

(4) $a \rightarrow ii, b \rightarrow i, c \rightarrow iii$

---

57. Which of the following statements is not true?

(1) Equipotential surfaces for a uniform electric field are parallel and equidistant from each other.

(2) Electric field is always perpendicular to an equipotential surface.

(3) Work done to move a charge on an equipotential surface is not zero.

(4) Equipotential surfaces are the surfaces where the potential is constant.

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58. Which of the following is a correct statement?

(1) Gauss's law does not hold good for a charge situated outside the Gaussian surface.

(2) Gauss's law is true for any closed surface.

(3) Gauss's law is true for any open surface.

(4) Gauss's law is not applicable when charges are not symmetrically distributed over a closed surface.

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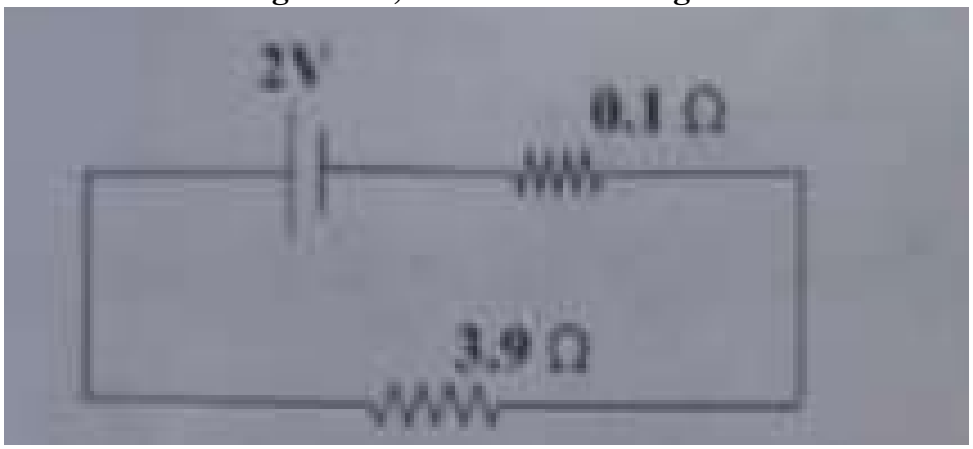
59. In the following circuit, the terminal voltage across the cell is



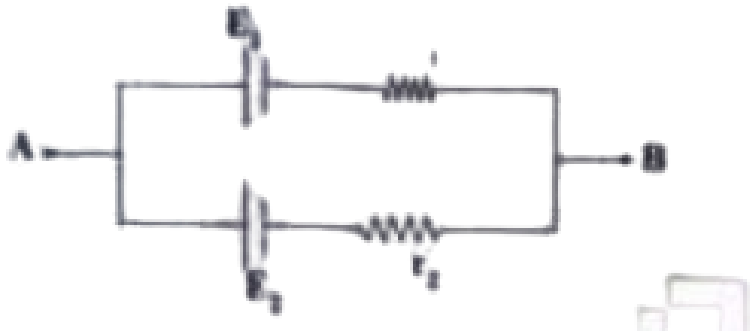
(1) 2.71 V

(2) 0.52 V

(3) 1.50 V

(4) 1.98 V

60. Two cells of emf E_1 and E_2, and internal resistances r_1 and r_2, respectively, are connected in parallel as shown in the figure. The equivalent emf of the combination is E_{eq}. Then



(1) $E_{\text{eq}} < E_1$

(2) $E_{\text{eq}} > E_1$ and E_2 is nearer E_1

(3) $E_{\text{eq}} < E_1$ and E_2 is nearer E_1

(4) $E_{\text{eq}} = E_1$