අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2016 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2016 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2016

භෞතික විද්‍යාව I பௌதிகவியல் I **Physics I**	**01 E I**	පැය දෙකයි இரண்டு மணித்தியாலம் ***Two hours***

Instructions:

- ✻ *This question paper consists of* **50** *questions in* **10** *pages.*
- ✻ *Answer* ***all*** *the questions.*
- ✻ *Write your* ***Index Number*** *in the space provided in the answer sheet.*
- ✻ *Read the instructions given on the back of the answer sheet carefully.*
- ✻ *In each of the questions* **1** *to* **50**, *pick one of the alternatives from* (1), (2), (3), (4), (5) *which is* ***correct*** *or* ***most appropriate*** *and* ***mark your response on the answer sheet with a cross*** (×) ***in accordance with the instructions given on the back of the answer sheet.***

Use of calculators is not allowed.

(Acceleration due to gravity, $g = 10\,N\,kg^{-1}$)

1. The SI unit used to measure the activity of a radioactive source is
(1) Bq (2) Gy (3) J Bq^{-1} (4) Bq^{-1} (5) Sv

2. The percentage error of a certain length measurement has to be kept below 1%. If the error due to the measuring instrument is 1 mm, the measuring length has to be greater than
(1) 1 mm (2) 1 cm (3) 10 cm (4) 1 m (5) 10 m

3. A certain liquid-in-glass thermometer with a uniform bore radius has been calibrated using the boiling point of water and the melting point of ice. Of the following properties, what is the **most essential** property that a thermometric liquid used in this thermometer must possess?
(1) high volume expansivity
(2) uniform volume expansion
(3) high thermal conductivity
(4) low specific heat capacity
(5) low vapour pressure

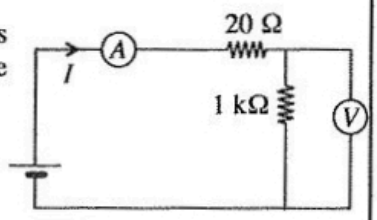
4. Which of the following is **not true** regarding electromagnetic waves?
(1) Directions of electric and magnetic fields are perpendicular to each other.
(2) Speed does not depend on the medium of propagation.
(3) Do not necessarily require a material medium for propagation.
(4) Direction of propagation of the wave is perpendicular to the directions of electric and magnetic fields.
(5) Can be reflected at the boundary between two media.

5. A student has suggested the following three methods (A), (B) and (C) to increase the voltage sensitivity (V/cm) of a potentiometer wire.
(A) Increasing the length of the wire
(B) Connecting a resistor in series with the wire
(C) Increasing the voltage applied across the wire
Of the above three methods,
(1) only A is correct.
(2) only A and B are correct.
(3) only B and C are correct.
(4) only A and C are correct.
(5) all A, B and C are correct.

6. In a certain transformer there are 360 turns in the primary coil and 30 turns in the secondary coil. Which of the following voltage conversions is done using this transformer?
(AC = Alternating current, DC = Direct current)
(1) 240 V AC voltage to 12 V DC voltage.
(2) 240 V AC voltage to 2 880 V AC voltage.
(3) 240 V DC voltage to 20 V DC voltage.
(4) 240 V AC voltage to 20 V AC voltage.
(5) 240 V DC voltage to 2 880 V DC voltage.

[*See page two*

7. Of the following sets of internal resistances given, the set of internal resistances that suits best for an ammeter (A) and a voltmeter (V) to have in order to measure the current I and the voltage across 1 kΩ resistor of the circuit shown is



	Internal resistance of ammeter	Internal resistance of voltmeter
(1)	1 Ω	5 kΩ
(2)	5 Ω	1 kΩ
(3)	1 Ω	20 Ω
(4)	20 Ω	5 kΩ
(5)	5 Ω	50 Ω

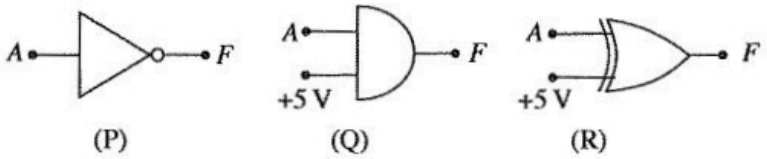
8. Which of the following is **not** a result of surface tension?
   (1) Formation of spherical water droplets
   (2) Capillary rise of water
   (3) Ability of insects to walk on water surfaces without sinking
   (4) The excess pressure inside a soap bubble
   (5) Escaping of water molecules from water surfaces

9. Consider the following statements made about a standing wave on a stretched string.
   (A) The energy does not propagate along the string.
   (B) The position of a node does not vary with time.
   (C) Maximum displacement achieved by each particle in the string depends on its position along the string.

   Of the above statements,
   (1) only A is true.
   (2) only B is true.
   (3) only A and C are true.
   (4) only B and C are true.
   (5) all A, B and C are true.

10. Which of the following gates operate/s according to the truth table given?

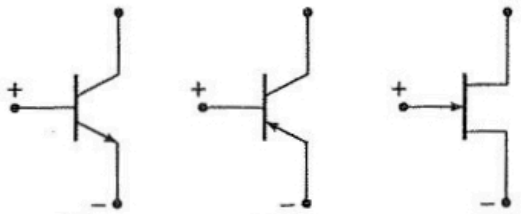
A	F
0	1
1	0



(P) (Q) (R)

   (1) P only
   (2) P and Q only
   (3) Q and R only
   (4) P and R only
   (5) All P, Q and R

11. Which of the figures shown correctly indicate/s the polarities of potential difference that have to be applied across the junctions shown in order to operate the transistor properly and obtain a suitable current?
   (1) in A only
   (2) in B only
   (3) in C only
   (4) in A and C only
   (5) in B and C only



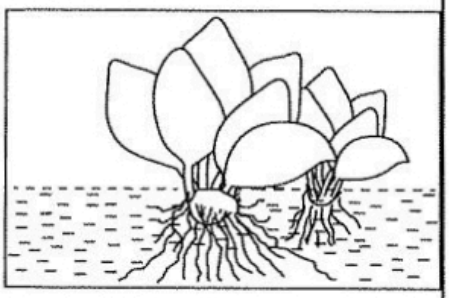
(A) (B) (C)

12. When the body temperature of a person is 35 °C, the peak wavelength of the radiation emitted from the body occurs at 9.4 μm. If his body temperature increases to 39 °C, the peak wavelength will be (Assume that the black body radiation conditions can be applied)
   (1) $\frac{35}{39} \times 9.4\ \mu m$
   (2) $\frac{39}{35} \times 9.4\ \mu m$
   (3) $\frac{77}{78} \times 9.4\ \mu m$
   (4) $\frac{78}{77} \times 9.4\ \mu m$
   (5) $\left(\frac{78}{77}\right)^4 \times 9.4\ \mu m$

13. A moving jet plane can create a maximum sound intensity level of 150 dB. Take the sound intensity at the threshold of hearing as 10^{-12} W m^{-2}. The maximum intensity of the sound that can be created by the jet plane in W m^{-2} is
   (1) 100
   (2) 200
   (3) 400
   (4) 800
   (5) 1 000

[See page three

14. When wind blows over the surface of a still lake, a bunch of water hyacinth floating on water as shown in figure is observed to move in the direction of the wind with a velocity v. Consider the following statements made about v.

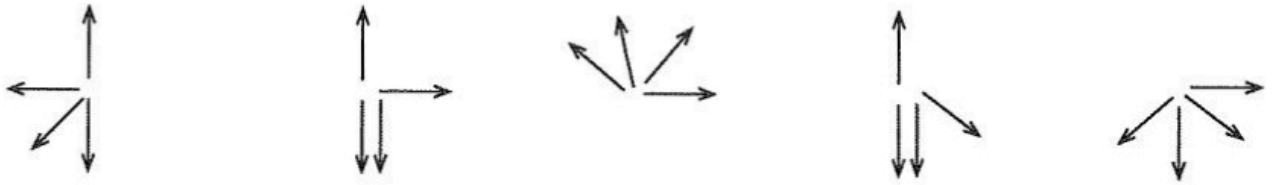


(A) Magnitude of v depends on the rate at which the momentum is transferred from air molecules to the bunch.
(B) Magnitude of v depends on the viscosity of water.
(C) Magnitude of v depends on the mass of the bunch.

Of the above statements,

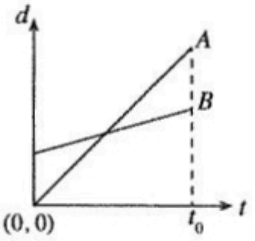
(1) only C is true.
(2) only A and B are true.
(3) only B and C are true.
(4) only A and C are true.
(5) all A, B and C are true.

15. An object falling down vertically in air suddenly explodes into four pieces. Which of the following diagrams shows the possible **directions** of motion of the pieces immediately after the explosion? (↓ - direction of the object before explosion)



(1) (2) (3) (4) (5)

16. The two straight lines shown in the displacement (d) – time (t) graph represent the motions of two objects A and B started from rest at time $t = 0$ and moving along the positive x-direction. Which of the following statements made about the motions of the objects is true?



(1) The object A has travelled for a longer time than B.
(2) When $t = t_0$ object B has made a displacement greater than A.
(3) Object A has a greater velocity than B.
(4) Object A has a greater acceleration than B.
(5) Both objects have the same velocity at the point where the two straight lines cross each other.

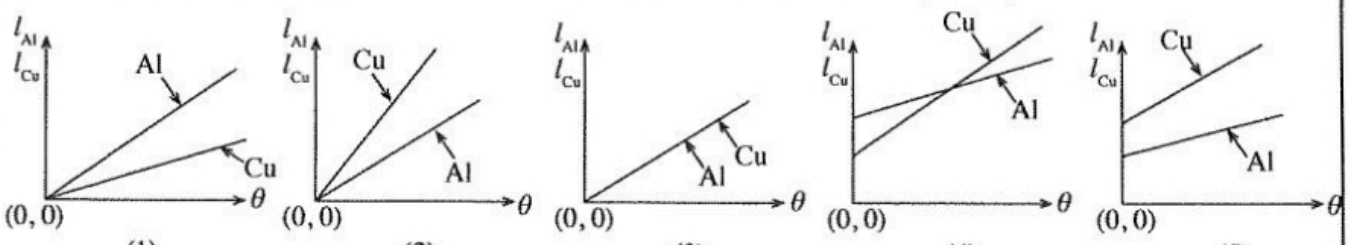
17. An elevator of weight 5000 N carries a load of 5 000 N. While moving vertically upwards in a building, it travels at constant velocity from 2nd floor to 12th floor in 20 seconds. The height of each floor is 4 m. If only 80% of the power generated by the motor is consumed to lift the elevator and the load against gravity while moving at constant velocity, the power of the motor is

(1) 20 kW (2) 25 kW (3) 40 kW (4) 60 kW (5) 1 000 kW

18. Three monochromatic light beams A, B and C have the same intensities (i.e. energy flow through unit area per second). However, the wavelength associated with beam A is longer than that of B, and the frequency associated with beam C is smaller than that of A. The photon flux (number of photons crossing a unit area per second) of three beams when written in the ascending order, it will be

(1) C, A, B (2) B, A, C (3) A, B, C (4) B, C, A (5) C, B, A

19. l_{Al} and l_{Cu} respectively represent **fractional increase** in the original lengths of two rods of aluminium (Al) and copper (Cu) when their temperature is increased by an amount of θ °C from the room temperature. Which of the following graphs best represents the variations of l_{Al} and l_{Cu} with θ °C? (Linear expansivities of aluminium and copper are 2.3×10^{-5} °C^{-1} and 1.7×10^{-5} °C^{-1} respectively.)



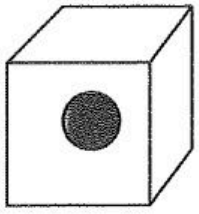
(1) (2) (3) (4) (5)

[See page four

20. During the recent hot season, the night time temperature of a certain room with closed windows in a house made of bricks was observed to be 35 °C. A person opened the windows of the room for a few minutes at night and allowed the room to be filled with cooler air at 27 °C which was present outside the house. Once the windows were closed again, he observed that the temperature of the room had returned almost to 35 °C in a quick time. Which of the following reasons he had proposed to explain the observed effect is most **unlikely** to be accepted?

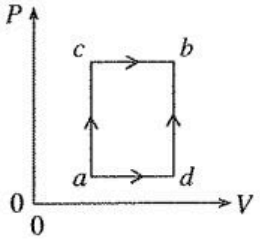
(1) Rapid movement of air molecules inside the room
(2) Collision of air molecules with the walls
(3) Low specific heat capacity of air
(4) Low thermal conductivity of air
(5) High specific heat capacity of brick walls

21. A cube of ice of mass 1 kg at 0 °C has a small metal sphere trapped inside as shown in the figure. It was found that this ice cube requires 300 kJ of heat energy to completely melt and form water at 0 °C. Specific latent heat of fusion of ice is 330 kJ/kg. The mass of the metal sphere in grams is approximately



(1) 30 (2) 33 (3) 91
(4) 110 (5) 333

22. An ideal gas is taken from state a to state b through two paths acb and adb as shown in the $P - V$ diagram. When going through path acb, 100 J of heat is absorbed and 50 J of work is done by the gas. If the work done by the gas, when taking the path adb is 10 J, the amount of heat absorbed by the gas during the path adb is



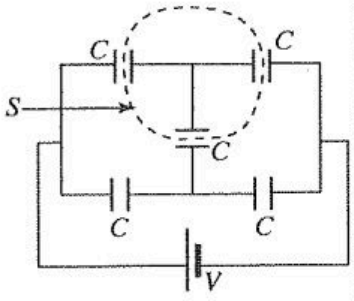
(1) 40 J (2) 50 J (3) −50 J
(4) 60 J (5) −60 J

23. If the ratio, $\frac{\text{mass of the planet}}{\text{radius of the planet}}$ for planet A is four times that of planet B, then the ratio

$\frac{\text{Escape velocity at the surface of Planet } A}{\text{Escape velocity at the surface of Planet } B}$ is

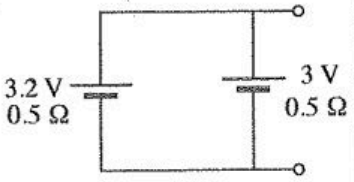
(1) $\sqrt{2}$ (2) 2 (3) 4 (4) 8 (5) 12

24. A network consisting of five identical parallel plate capacitors of capacitance C each, is connected to a cell of voltage V as shown in the figure. Assume that the capacitor plates are in free space. The net electric flux through the enclosed surface S is



(1) $\frac{CV}{2\epsilon_0}$ (2) $\frac{3CV}{5\epsilon_0}$ (3) $\frac{CV}{\epsilon_0}$
(4) $\frac{3CV}{\epsilon_0}$ (5) 0

25. Two cells having e.m.f.s of 3 V and 3.2 V and equal internal resistances of 0.5 Ω are connected in parallel as shown in figure.



Power dissipation by the cell combination is

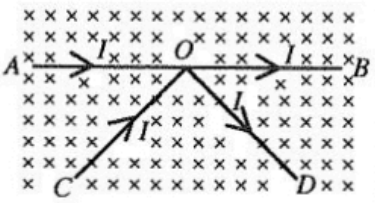
(1) 0.01 W (2) 0.02 W (3) 0.03 W
(4) 0.04 W (5) 0.05 W

26. Nine identical wires made of a certain metal, each of diameter d and length L, are connected in parallel to form a single resistor. The resistance of this resistor is equal to the resistance of a single wire of length L and diameter D made of the same metal if D is equal to

(1) $\frac{d}{3}$ (2) $3d$ (3) $6d$ (4) $9d$ (5) $18d$

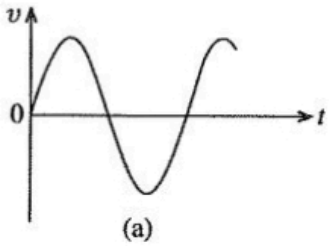
[See page five

27. A structure consisting of straight wire sections of AO, OB, CO and OD of equal lengths arranged so that $A\hat{O}C = B\hat{O}D$, carry currents I along the directions shown. When this structure is placed perpendicular to a magnetic field as shown in the figure, due to magnetic field it will experience

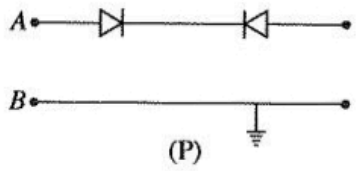


(1) a resultant force along the plane of the paper in the upward direction.
(2) a resultant force along the plane of the paper in the downward direction.
(3) a resultant force along the plane of the paper to the right.
(4) a resultant force along the plane of the paper to the left.
(5) no resultant force.

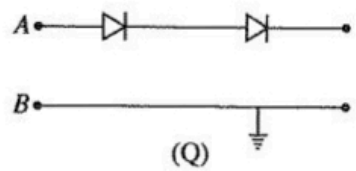
28. The waveform shown in figure (a) is applied across the input terminals A, B of the circuits P, Q, R and S shown below.



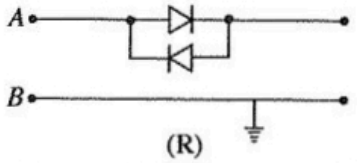
(a)



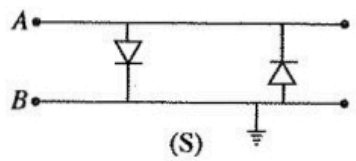
(P)



(Q)



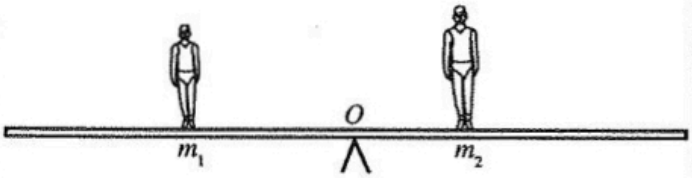
(R)



(S)

If the potential drops across the diodes are negligible, the input waveform will travel unaffected through
(1) the circuit P only. (2) the circuit Q only. (3) the circuit R only.
(4) the circuit S only. (5) the circuits R and S only.

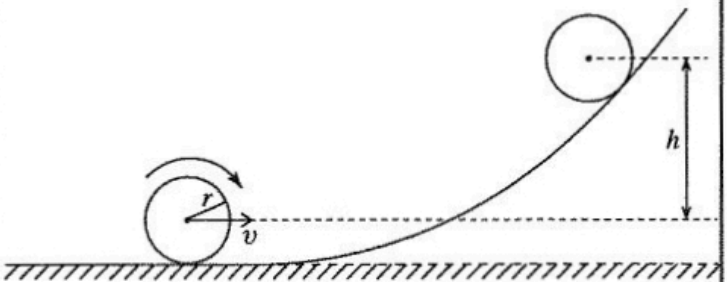
29. Two children of masses m_1 and m_2 are standing in equilibrium as shown in figure, on a uniform rod which is balanced at its centre of gravity O. Then they start moving simultaneously on the rod at constant speeds v_1 and v_2 respectively while maintaining the horizontal equilibrium of the rod. Consider the following statements made about the motion of the two children.



For the equilibrium to be maintained at any time t,
(A) they should always move in opposite directions.
(B) they should move keeping their total linear momentum always equal to zero.
(C) they should move so that the moment produced by one child about O is always equal and opposite to the moment produced by the other child about O.

Of the above statements,
(1) only A is true. (2) only B is true.
(3) only A and B are true. (4) only B and C are true.
(5) all A, B and C are true.

30. A uniform disc of mass m and radius r rolls without slipping, initially along a horizontal surface, and subsequently starts to climb up a ramp as shown in the figure. The disc has a linear velocity v on the horizontal surface. The moment of inertia of the disc about the axis through its centre and normal to the plane of the disc is $\frac{mr^2}{2}$. What is the maximum height h to which the centre of mass of the disc climb?



(1) $\frac{v^2}{2g}$ (2) $\frac{3v^2}{2g}$ (3) $\frac{3v^2}{4g}$ (4) $\frac{v^2}{g}$ (5) $\frac{2v^2}{g}$

[See page six

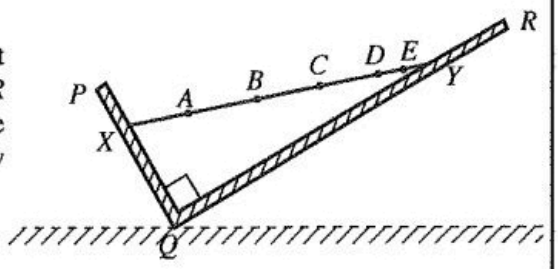
31. A glass of fresh orange solution of volume 500 cm^3 contains a few orange seeds at its bottom. It was observed that the seeds just began to float at the bottom when 10 grams of sugar was dissolved in the solution. Assume that the addition of sugar does not alter the volume of the solution. If the density of the orange solution before adding sugar was 1 000 kg m^{-3}, the density of orange seeds (in kg m^{-3}) is approximately equal to

(1) 1 020 (2) 1 040 (3) 1 060 (4) 1 080 (5) 1 100

32. A boy, sitting on a smooth turntable with a weight in his each extended hand, is rotating with an angular velocity ω_0. When he bends his hands towards his body, the angular velocity becomes ω_1. If I_0 and I_1 are the moments of inertia of rotating systems when the hands are extended, and bent towards his body respectively, then

(1) $\omega_0 > \omega_1$, $I_0 > I_1$ and $\omega_0 I_0 > \omega_1 I_1$ (2) $\omega_0 < \omega_1$, $I_0 > I_1$ and $\omega_0 I_0 < \omega_1 I_1$
(3) $\omega_0 < \omega_1$, $I_0 > I_1$ and $\omega_0 I_0 = \omega_1 I_1$ (4) $\omega_0 > \omega_1$, $I_0 < I_1$ and $\omega_0 I_0 = \omega_1 I_1$
(5) $\omega_0 = \omega_1$, $I_0 = I_1$ and $\omega_0 I_0 = \omega_1 I_1$

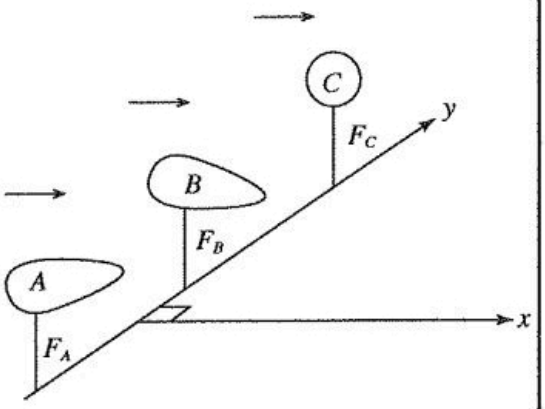
33. A rod XY rests between two smooth boards PQ and QR kept inclined to the horizontal as shown in the figure. Angle PQR is 90° and the surfaces of the boards are normal to the plane of the paper. The centre of gravity of the rod is most likely to be situated at the point



(1) A (2) B (3) C
(4) D (5) E

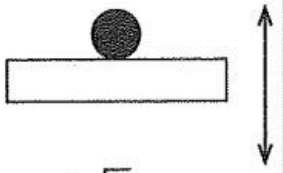
34. Two objects A and B of the shapes shown in the figure, and a spherical object C, all having identical masses, are mounted rigidly on a horizontal surface along the y–axis by three thin rods as shown in the figure. Both x and y axes are located on the horizontal surface.

A stream of air flows through the objects parallel to the surface and along x-direction. (Assume that the air flow causes no turbulence around the objects.) The magnitudes of the forces F_A, F_B and F_C exerted by the objects and the sphere on the mounted rods, when written in the ascending order, it will be



(1) F_B, F_A, F_C (2) F_B, F_C, F_A (3) F_C, F_A, F_B
(4) F_A, F_C, F_B (5) F_C, F_B, F_A

35. A mass is resting on a horizontal surface which moves up and down performing simple harmonic motion with amplitude A as shown in figure. The maximum frequency with which the surface can move while keeping the mass always in contact with the surface is

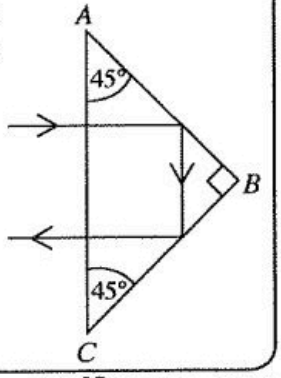


(1) $2\pi\sqrt{\frac{g}{A}}$ (2) $\sqrt{\frac{g}{A}}$ (3) $\frac{1}{2}\sqrt{\frac{g}{A}}$ (4) $\frac{1}{2\pi}\sqrt{\frac{g}{A}}$ (5) $\frac{1}{\pi}\sqrt{\frac{g}{A}}$

36. A whistle emitting a sound of frequency f moves along the circumference of a circle of radius r at a constant angular velocity ω. v is the velocity of sound in air. The highest frequency of sound heard by a listener, who is at rest outside the circle is

(1) $f\left(\frac{v}{v-r\omega}\right)$ (2) $f\left(\frac{v-r\omega}{v}\right)$ (3) $f\left(1-\frac{v}{r\omega}\right)$ (4) $f\left(\frac{v}{r\omega}\right)$ (5) $f\left(\frac{v}{v+r\omega}\right)$

37. A ray of light is incident perpendicular to the surface AC of a right angled glass prism as shown in the figure. Minimum value of the refractive index of the material of the prism for which the ray will follow the path shown is



(1) 1.22 (2) 1.41 (3) 1.58
(4) 1.73 (5) 1.87

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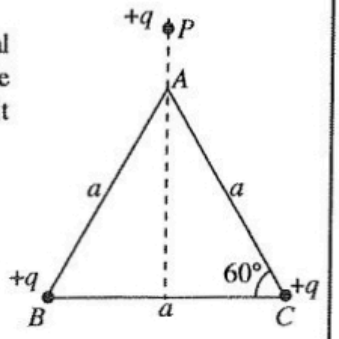
38. When an object is placed on the principal axis of a thin convex lens of focal length f_1, it forms a real image at a distance V_1 with a linear magnification of m_1. When this lens is replaced by another thin convex lens of focal length f_2, $(f_2 < f_1)$, being kept at the same position the new image distance V_2 and the magnification m_2 will satisfy the conditions,

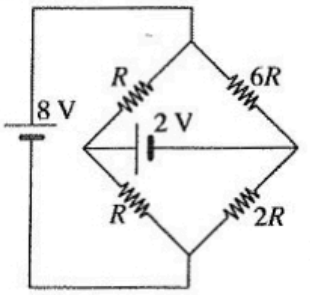
(1) $V_2 > V_1$ and $m_2 > m_1$
(2) $V_2 > V_1$ and $m_1 > m_2$
(3) $V_2 < V_1$ and $m_2 > m_1$
(4) $V_2 < V_1$ and $m_1 > m_2$
(5) $V_2 < V_1$ and $m_1 = m_2$

39. Two point charges of $+q$ each, are held at vertices B and C of an equilateral triangle ABC of side length a, and another point charge of $+q$ is held at the point P as shown in the figure. A zero resultant force will act on a positive unit charge placed at point A when the distance AP is equal to



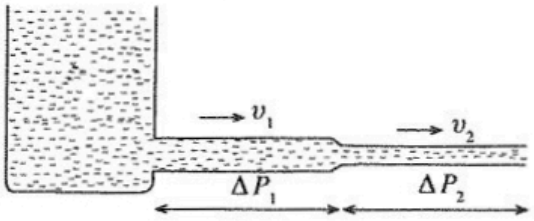
(1) $\sqrt{2}a$
(2) $\frac{a}{2}$
(3) $\frac{a}{\sqrt{(\sqrt{3})}}$
(4) $\frac{a}{4}$
(5) a

40. In the circuit shown, the two cells have negligible internal resistances. In the circuit,



(1) a current of $\frac{3}{2R}$ passes through the 2 V cell.
(2) a current of $\frac{6}{R}$ passes through the 2 V cell.
(3) a current of $\frac{10}{R}$ passes through the 2 V cell.
(4) a current of $\frac{3}{R}$ passes through the 2 V cell.
(5) a current does not pass through the 2 V cell.

41. Two narrow tubes of equal lengths but different radii of cross-section are connected end to end, and water is allowed to flow through it as shown in the figure.

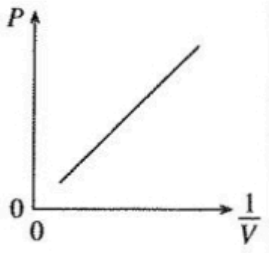


If v_1 and v_2 are the average velocities with which water flows through cross-sections of the tubes, and ΔP_1 and ΔP_2 are the pressure differences built up across the tubes as shown, then the ratio, $\frac{\Delta P_1}{\Delta P_2}$ is equal to

(1) $\left(\frac{v_1}{v_2}\right)^{\frac{1}{4}}$
(2) $\frac{v_1}{v_2}$
(3) $\left(\frac{v_1}{v_2}\right)^2$
(4) $\left(\frac{v_1}{v_2}\right)^3$
(5) $\left(\frac{v_1}{v_2}\right)^4$

42. A student performed an experiment to verify the Boyle's Law using a constant mass m_0 of an ideal gas at the room temperature of 27 °C and obtained the graph given in the figure. Here P is the pressure and V is the volume of the gas.

He then removed a certain amount of gas from the volume V and repeated the experiment at a temperature 100 °C above the room temperature. If the new graph he obtained has the same gradient as the graph shown in the figure, the mass of the gas that he had removed is



(1) $\frac{27}{100}m_0$
(2) $\frac{73}{100}m_0$
(3) $\frac{1}{4}m_0$
(4) $\frac{1}{2}m_0$
(5) $\frac{3}{4}m_0$

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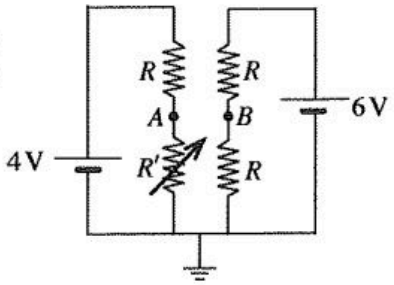
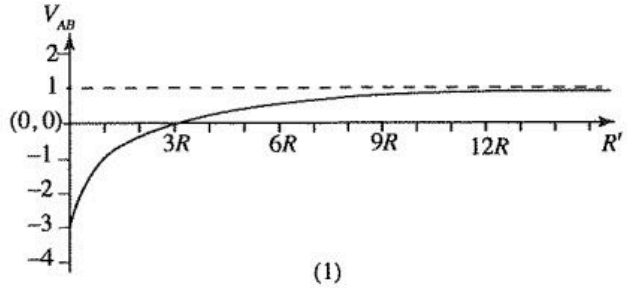
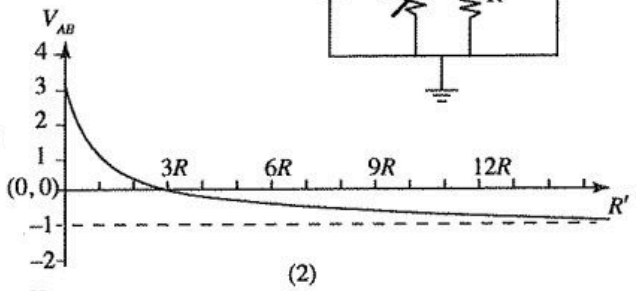
43. In the circuit shown, both cells have negligible internal resistances. R' is the value of a variable resistor. Variation of the voltage V_{AB} $(= V_A - V_B)$ across the points A and B with R' is best represented by

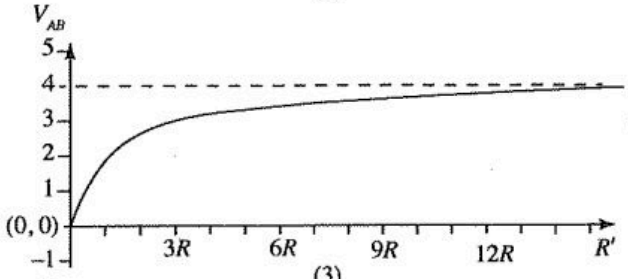




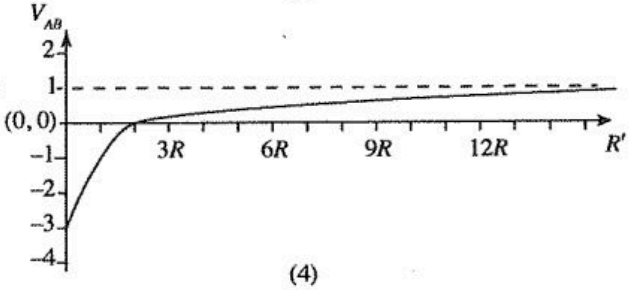
(1)



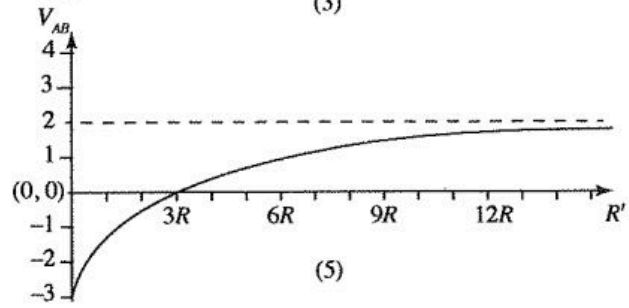
(2)



(3)

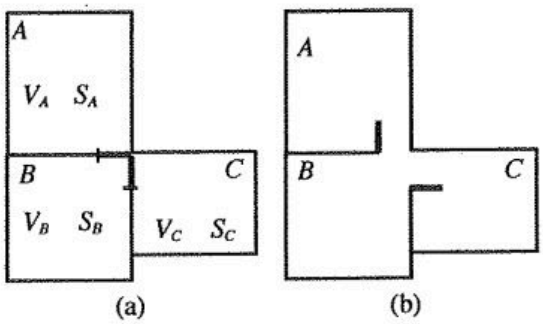


(4)



(5)

44. Absolute humidities of air inside three closed rooms A, B and C of volumes V_A, V_B and V_C at atmospheric pressure are S_A, S_B and S_C respectively. [See figure (a)]. The dew point of air in room A is T_0. When the doors are opened as shown in figure (b) and the air in three rooms are allowed to mix, the common dew point of the three rooms will remain at T_0 if



(a)

(b)

(1) $S_A = \dfrac{V_B S_B + V_C S_C}{V_B + V_C}$

(2) $S_A = \dfrac{S_B + S_C}{2}$

(3) $V_A S_A = V_B S_B + V_C S_C$

(4) $\dfrac{S_A}{V_A} = \dfrac{S_B}{V_B} + \dfrac{S_C}{V_C}$

(5) $S_A = \sqrt{S_B S_C}$

45. A 2 μF capacitor and a 1 μF capacitor are connected in series and charged by a battery. Then the stored energies of the capacitors are E_1 and E_2 respectively. When they are disconnected, allowed to discharge, and charged again **separately** using the same battery, the stored energies of the two capacitors are E_3 and E_4 respectively. Then

(1) $E_3 > E_1 > E_4 > E_2$
(2) $E_1 > E_2 > E_3 > E_4$
(3) $E_3 > E_1 > E_2 > E_4$
(4) $E_1 > E_3 > E_4 > E_2$
(5) $E_3 > E_4 > E_2 > E_1$

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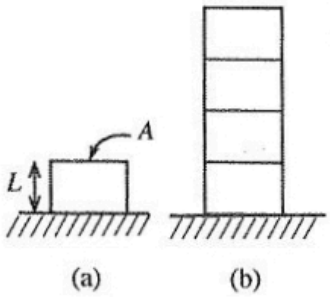
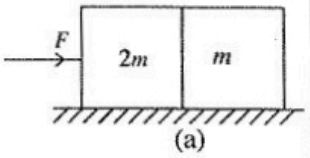
46. The height of a rectangular heavy metal block of mass M, area of cross-section A, and made of a material of Young's modulus Y, when placed on a horizontal surface as shown in figure (a) is L. If four blocks identical to the above mentioned block are stacked together as shown in figure (b), the overall height of the four blocks will be

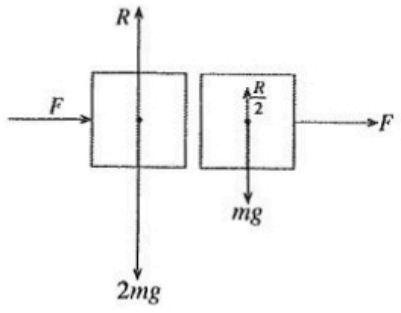


(1) $L\left(4-\frac{2Mg}{YA}\right)$ (2) $L\left(4-\frac{8Mg}{YA}\right)$ (3) $L\left(4-\frac{7Mg}{YA}\right)$

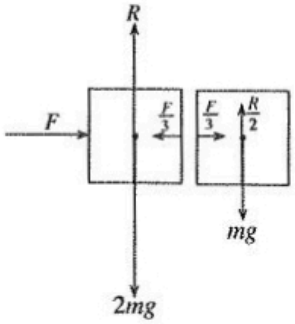
(4) $L\left(4-\frac{6Mg}{YA}\right)$ (5) $L\left(4-\frac{4Mg}{YA}\right)$

47. Two blocks of mass $2m$ and m are placed in contact on a smooth surface as shown in the figure (a). If an external horizontal force F is applied on the block of mass $2m$, which of the following figures shows the forces acting on the two blocks correctly?

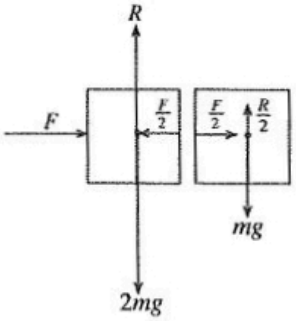




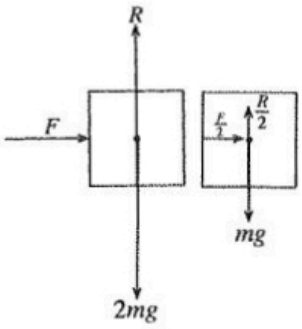
(1)



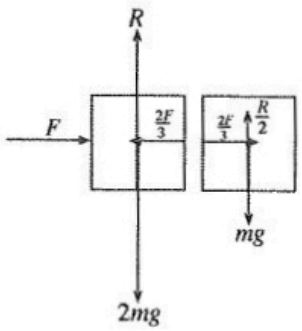
(2)



(3)

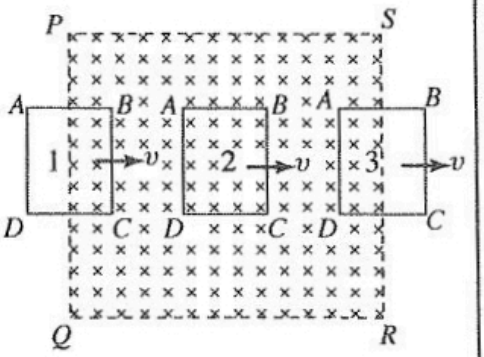


(4)



(5)

48. As shown in the figure, a rectangular wire loop $ABCD$ is inserted perpendicular to a uniform magnetic field confined to a region $PQRS$ from position 1 and taken across the field with a constant velocity v. It passes through position 2 and finally taken out of the magnetic field at position 3 with the same velocity. Which of the following statements is **not true**?



(1) When the loop passes through position 1, a constant e.m.f. will be induced only across section BC of the wire loop.

(2) As the loop passes through position 2, constant e.m.f.s will be induced across AD and BC, and they are equal and opposite to each other.

(3) At position 3, a constant e.m.f. will be induced only across AD.

(4) At position 2, the resultant force on the loop due to magnetic field is zero.

(5) The directions of the forces due to magnetic field on the loop at positions 1 and 3 are opposite to each other.

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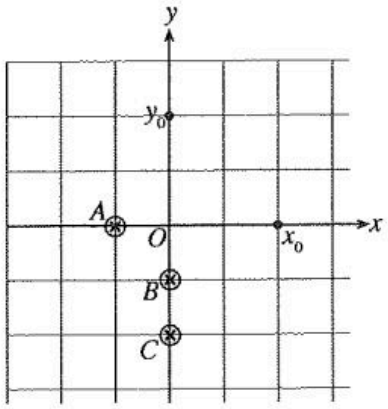
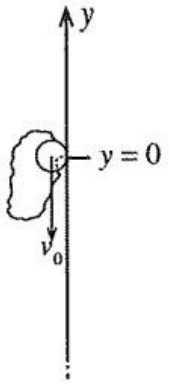
49. Three thin long and straight wires carrying equal currents I are held in fixed positions A, B and C perpendicular to the plane of the paper as shown in the figure, where OA = 1 m, OB = 1 m and OC = 2 m. Two other thin, long and straight wires are also held perpendicular to the plane of the paper, at points x_0 and y_0 where x_0 = 2 m and y_0 = 2 m. Which of the following currents set up in the wires at x_0 and y_0 will produce a resultant magnetic field of magnitude $\frac{\mu_0 I}{2\pi}$ in positive y-direction at the point O.



	Current to be set up in the wire at x_0	Current to be set up in the wire at y_0
(1)	$3I$ ⊙	$4I$ ⊗
(2)	$4I$ ⊙	$6I$ ⊙
(3)	$4I$ ⊗	$3I$ ⊗
(4)	$4I$ ⊗	$4I$ ⊙
(5)	$6I$ ⊙	$4I$ ⊙

50. A particle of mass m is attached to one end of a light elastic string of force constant k and unstreatched length of l_0. The other end of the string is fixed onto a vertical frictionless wall at $y = 0$ as shown in the figure. The particle is then projected vertically downwards from the position $y = 0$ with a velocity $v_0, \left(v_0 < \sqrt{2gl_0}\right)$. Neglect the air resistance.



After passing through its lowest point in the path, the particle will again come to rest momentarily at a point whose y coordinate is

(1) $-\frac{\left[m(v_0^2 + 2gl_0) - kl_0^2\right]}{2gm}$

(2) $-\frac{(v_0^2 + 2gl_0)}{2g}$

(3) $\frac{v_0^2 + 2gl_0}{2g}$

(4) $\frac{mv_0^2 + kl_0^2}{gm}$

(5) $\frac{v_0^2}{2g}$

***