01 E I

Department of Examinations, Sri Lanka

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கல்விப் பொதுத் தராதரப் பத்திர(உயர் தர)ப் பரீட்சை, 2005 ஏப்பிரல்
General Certificate of Education (Adv. Level) Examination, April 2005

භෞතික විද්‍යාව I
பௌதிகவியல் I
Physics I

දෙ පැය
இரண்டு மணித்தியாலம்
Two hours

Important : ✻ *This question paper consists of* **60** *questions in* **12** *pages.*
✻ ***Answer all the questions.***
✻ *Write your* ***Index Number*** *in the space provided on the answer sheet, and then indicate your Index Number by* ***shading*** *the appropriate numbers in the grid.*
✻ *Instructions are given on the back of the answer sheet. Follow them carefully.*
✻ *In each of the questions* **1** *to* **60**, *pick one of the alternatives* (1), (2), (3), (4), (5) *which is* ***correct or most appropriate*** *and mark your response on the answer sheet* ***in accordance with the instructions given therein.***

Use of calculators is not allowed.

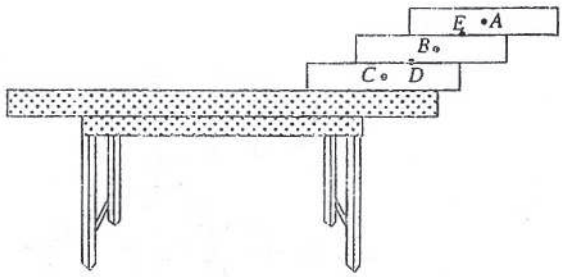
(g = 10 N kg^{-1})

1. The variation of rate of decay (A) of a radioactive sample with time (t) is given by the relationship $A = A_0 e^{-\lambda t}$. The dimensions of λ is
   (1) T (2) T^{-1} (3) MT. (4) $M^{-1}T$ (5) MT^{-1}

2. In the equation $C = \sqrt{\frac{k}{\rho}}$, C is speed and ρ is density. The units of k are
   (1) kg m s^{-2} (2) kg$^{1/2}$s (3) kg m s^{-1} (4) kg m^{-1} s^{-2} (5) kg m$^{1/2}$s

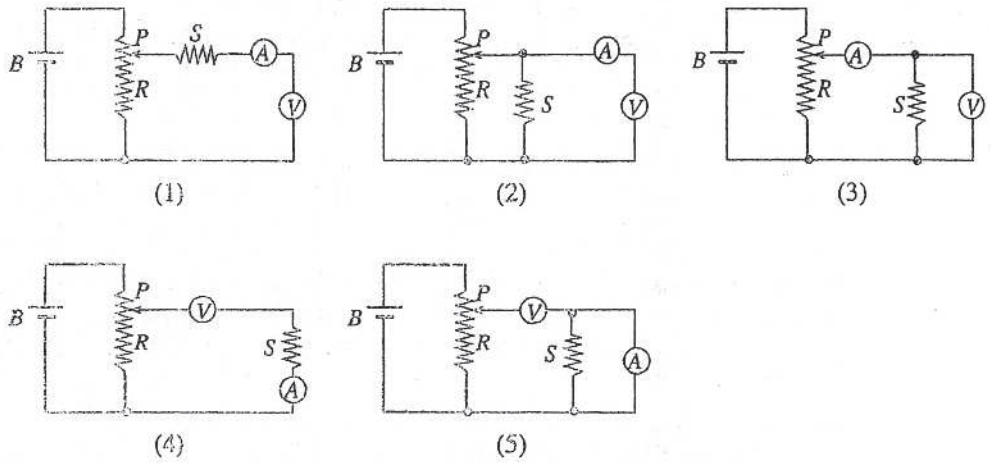
3. The capillary rise of water, in a certain glass capillary tube is h. The angle of contact between glass and water is zero. Another capillary tube having the same dimensions as the glass tube is made with a material for which the angle of contact with water is 90°. The capillary rise of water in the second tube is
   (1) 0 (2) $\frac{h}{4}$ (3) $\frac{h}{2}$ (4) h (5) $2h$

4. Three identical uniform books are placed on each other as shown in the figure. The centre of gravity of the set of books is likely to be found at
   (1) A. (2) B. (3) C.
   (4) D. (5) E.



5. A violin string of length of 0.5 m is tuned to a fundamental frequency of 440 Hz. To obtain a fundamental frequency of 550 Hz, from this string, at what distance the finger be placed from the sound box end?
   (1) 0.1 m (2) 0.2 m (3) 0.3 m (4) 0.4 m (5) 0.5 m

6. In the circuits shown B is a battery, R is a variable resistor with a sliding contact P, and S is a fixed resistor. Which of the following circuits is most suitable to verify Ohm's law.



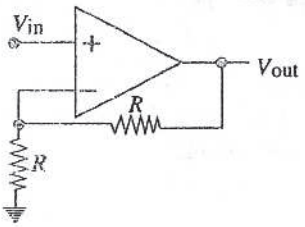
(1) (2) (3) (4) (5)

7. Hydrogen gas is introduced into a container having Helium gas, until the pressure is doubled while keeping the volume and the temperature of the container constant. The ratio $\frac{\text{number of Helium atoms}}{\text{number of Hydrogen molecules}}$ in the container is

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

8. A given parallel plate capacitor is connected to a battery. When the e.m.f. of the battery is doubled, the electric field between the plates
(1) remains unchanged.
(2) is halved.
(3) is doubled.
(4) is quadrupled.
(5) is trebled.

9. The voltage gain of the circuit shown is
(1) +2
(2) −2
(3) +1
(4) −1
(5) +4



10. Consider the following statements made regarding the refraction of light.
(A) Refractive index of a medium is equal to the ratio, $\frac{\text{speed of light in a vacuum}}{\text{speed of light in the medium}}$.
(B) As light travels from one medium to another, its frequency does not change.
(C) The wavelength of light is reduced when it passes from vacuum to a medium.
Of the above statements
(1) only (A) and (B) are true.
(2) only (A) is true.
(3) only (B) is true
(4) only (B) and (C) are true.
(5) all (A),(B) and (C) are true.

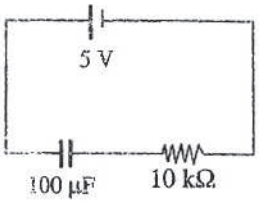
11. The period of an object performing a simple harmonic motion depends on
(A) the amplitude of the oscillation.
(B) the speed of the object at the equilibrium point.
(C) the initial position of the object.
Of the above statements
(1) only (A) is true.
(2) only (B) is true.
(3) only (C) is true.
(4) only (A) and (B) are true.
(5) all (A), (B) and (C) are not true.

12. A glass vessel of volume V is completely filled with a liquid of volume expansivity γ_l. The volume expansivity of glass is γ_g ($\gamma_l > \gamma_g$). If the temperature of the glass vessel is increased by an amount θ, the volume of liquid that expels from the vessel is

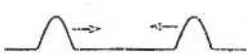
(1) $V(\gamma_l - \gamma_g)\theta$ (2) $V(\gamma_l + \gamma_g)\theta$ (3) $V\gamma_l\theta$ (4) $V\gamma_g\theta$ (5) zero

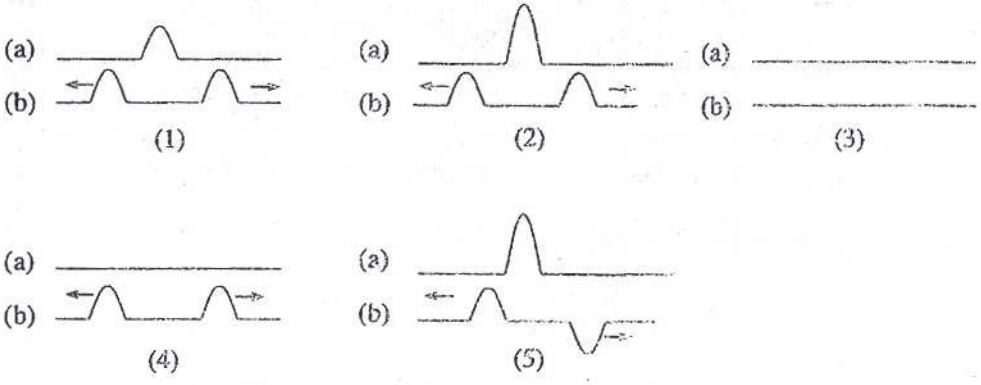
13. A 100 μF capacitor connected in series with a 10 kΩ resistor is connected to a 5 V battery as shown in the figure. The charge stored in the capacitor in this circuit at the steady state is

(1) $5{\cdot}0\times10^{-5}$ C (2) $5{\cdot}0\times10^{-4}$ C (3) $5{\cdot}0\times10^{-3}$ C
(4) $5{\cdot}0\times10^{-2}$ C (5) $5{\cdot}0\times10^{-1}$ C



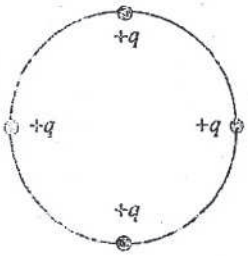
14. Figure shows two identical pulses moving towards each other along a string. The two instants where (a), the two pulses overlap completely, and (b), some time after the overlapping occurs are best represented by





15. Four point charges, each having charge q are fixed to the circumference of an insulating disk of radius r as shown in figure. When the disk is rotating about an axis passing through its centre and perpendicular to its plane at n revolutions per second, the mean electric current along the circumference of the disk is

(1) $\frac{4q}{n}$ (2) $8\pi rqn$ (3) $4qn$ (4) $\frac{2qn}{\pi r}$ (5) qn



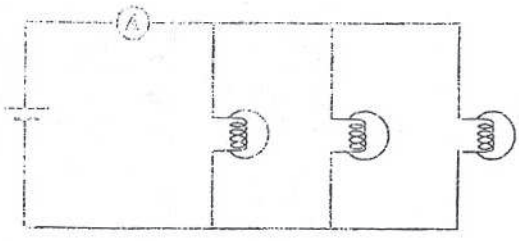
16. The concentration of water vapour inside a closed room at a certain temperature is 24·0 g m^{-3}, and the relative humidity is 60%. If the air inside the room is made to saturate with water vapour at the same temperature, the new water vapour concentration inside the room is

(1) 14·4 g m^{-3} (2) 24·0 g m^{-3} (3) 40·0 g m^{-3} (4) 60·0 g m^{-3} (5) 100·0 g m^{-3}

17. A metal block X of mass m at temperature 0°C is made to contact with another metal block Y of mass $2m$ at temperature 100 °C. Heat transfer takes place between X and Y with no heat loss to the surrounding. The specific heat capacities of the X and Y metals are C_X and C_Y respectively. If the final equilibrium temperature of the metal blocks is 20°C, then

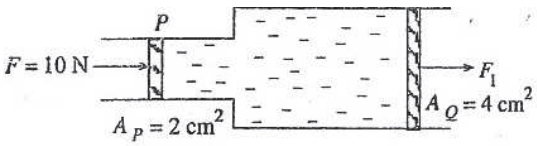
(1) $C_X = 8C_Y$ (2) $C_X = 4C_Y$ (3) $C_X = 2C_Y$ (4) $C_X = \frac{1}{2}C_Y$ (5) $C_X = \frac{1}{4}C_Y$

18. The figure shows three identical bulbs which are being lit by a battery with zero internal resistance. The ammeter has a negligible internal resistance. If the filament of one bulb breaks,



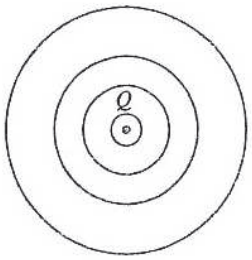
(1) ammeter reading decreases and brightness of each remaining bulb increases.
(2) ammeter reading decreases and brightness of each remaining bulb decreases.
(3) ammeter reading increases and brightness of each remaining bulb increases.
(4) ammeter reading increases and brightness of each remaining bulb decreases.
(5) ammeter reading decreases and brightness of each remaining bulb remains the same.

19. A force $F = 10$N is applied to the smaller piston P of area 2 cm^2 of the hydraulic system shown in the figure to produce a force F_1 on the larger piston Q of area 4 cm^2. When the surrounding temperature is decreased the liquid inside is solidified. The solidified block moves freely inside the system and the new force produced on Q due to the force $F = 10$N becomes F_2. The respective values of F_1 and F_2 are



(1) 20 N, 20 N (2) 20 N, 10 N (3) 5 N, 10 N (4) 5 N, 20 N (5) 20 N, 5 N

20. The figure shows a set of circles centred on a stationary point charge Q. The circles could be used to represent



(1) the electric field lines. (2) the magnetic field lines.
(3) the magnetic equipotential lines. (4) the gravitational field lines.
(5) the electric equipotential lines.

21. A small ball starting from rest rises through a viscous liquid and reaches its terminal velocity. Consider the following statements,

(A) The upthrust on the ball is greater than the weight of the ball.
(B) At the initial moment of the motion the viscous force on the ball is zero.
(C) The acceleration of the ball remains constant until the ball reaches the terminal velocity.

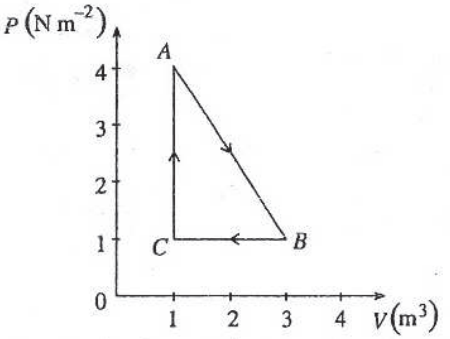
Of the above statements

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

22. Ten persons are standing on a circle. When one of them shouts, the intensity level at the centre of the circle is 50 dB. If all ten persons shout at the same time each producing the above sound level, the intensity level at the centre becomes

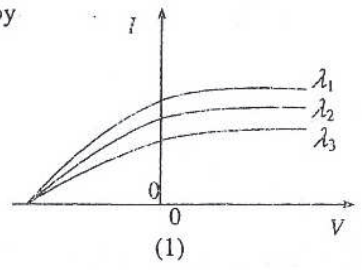
(1) 40 dB. (2) 50 dB. (3) 60 dB. (4) 80 dB. (5) 90 dB.

23. Figure shows a PV diagram of a perfect gas subjected to a cyclic process $ABCA$. In this process

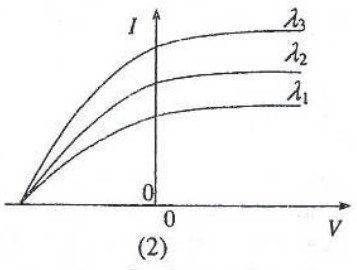


(1) 3 J of heat is absorbed by the system.
(2) 3 J of heat is removed from the system.
(3) 6 J of heat is absorbed by the system.
(4) 6 J of heat is removed from the system.
(5) no heat is absorbed or removed from the system.

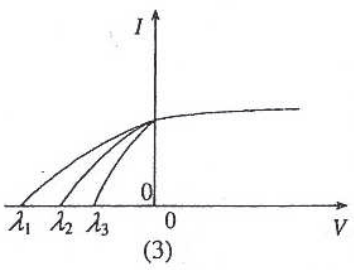
24. A photosensitive surface is illuminated separately by light of wavelengths λ_1, λ_2 and λ_3 ($\lambda_1 > \lambda_2 > \lambda_3$). On all three occasions the intensity (number of photons incident per second) of the light used is kept at the same value. The current-voltage characteristics of the photo electrons for the three situations are best represented by



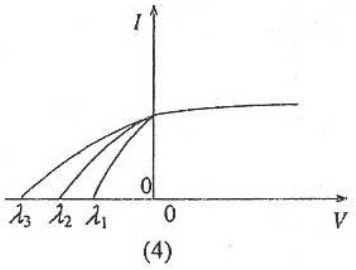
(1)



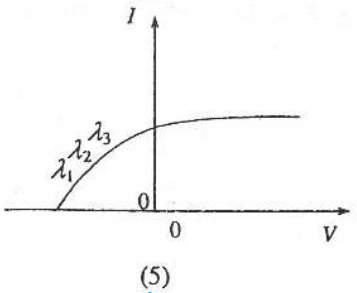
(2)



(3)

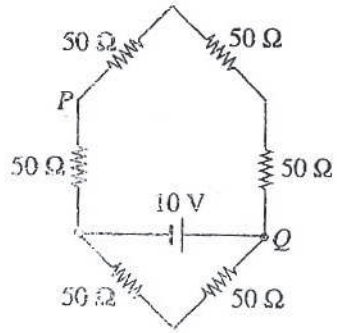


(4)



(5)

25. Six resistors each of value 50 Ω are connected in a circuit as shown in the figure. The 10 V battery has negligible internal resistance. The potential difference between P and Q is



(1) 0·5 V (2) 2·5 V (3) 5·0 V
(4) 7·5 V (5) 10 V

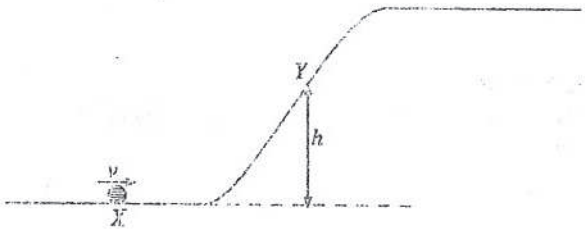
26. Consider the following statements regarding α and β particles.
(A) Both α and β particles travel with the speed of light.
(B) Generally α particles penetrate deeper into materials than β particles.
(C) Both α and β particles can ionize atoms when they travel through materials.
Of the above statements
(1) only (A) is true. (2) only (C) is true.
(3) only (B) and (C) are true. (4) only (A) and (C) are true.
(5) only (A) and (B) are true.

27. Which of the following figures shows the directions of the frictional forces acting on the two tyres of a bicycle when it is paddled by a rider on a surface with friction?



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

28. An object of mass m moving on a frictionless plane passes a point X with a velocity v and rises up a frictionless inclined plane to a point Y that is at a height h above X as shown in the figure. If a second object of mass $\frac{m}{2}$ passes the point X with a velocity $\frac{v}{2}$, the height to which the second object will rise is



(1) $\frac{h}{8}$ (2) $\frac{h}{4}$ (3) $\frac{h}{2}$ (4) h (5) $2h$

29. Figure 1 shows a book A placed on top of a box B which rests on the floor. Figure 2 shows the free body force diagram for the box. P, Q, and R indicate the forces acting on the box.
Which of the following statements is true?
(1) $Q > P + R$
(2) Force on the floor exerted by the box is indicated by P
(3) Force on the floor exerted by the box is indicated by Q
(4) Force exerted on the box by the book is indicated by R
(5) $Q < P + R$

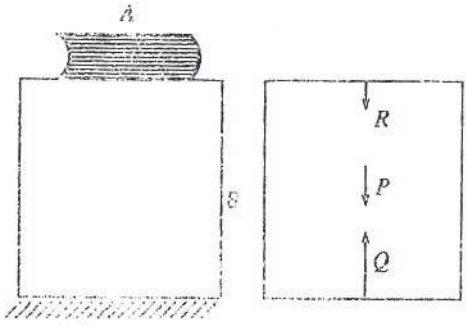
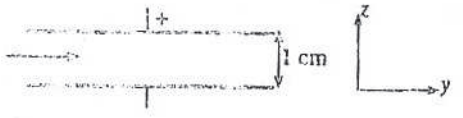


Figure 1 Figure 2

30. A beam of electrons enters the region between two charged parallel plates with speed $10^6\ m\,s^{-1}$ as shown in the figure. The potential difference across the plates is 200 V. Magnetic field required to keep the beam along the y direction is



(1) $2{\cdot}0 \times 10^{-4}$ T along the direction of the beam.
(2) $2{\cdot}0 \times 10^{-4}$ T into the paper.
(3) $2{\cdot}0 \times 10^{-2}$ T along the direction of the beam.
(4) $2{\cdot}0 \times 10^{-2}$ T into the paper.
(5) $2{\cdot}0 \times 10^{-2}$ T out of the paper.

31. An alarm is to be sounded in a car at least when the car is started while a door is open or the car is started while the driver is not wearing seat belt. Three sensors A, B and C provide signals such that $A = 1$ when at least one door is open, $B = 1$ when the engine is running and $C = 1$ when the driver is not wearing seat belt. If the alarm is activated when $F = 1$, the correct truth table for F is

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

(1)

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

(2)

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

(3)

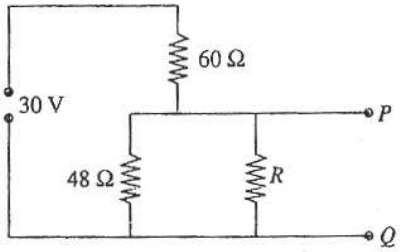
A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

(4)

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

(5)

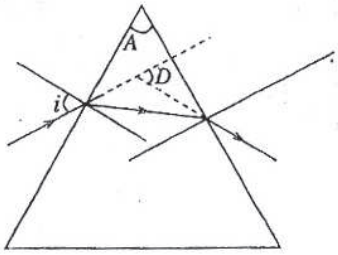
32. The potential divider circuit shown is powered by a 30 V d.c. supply of negligible internal resistance. The potential difference across P and Q is 5 V. The value of the resistance R is



(1) 10 Ω (2) 12 Ω (3) 16 Ω
(4) 24 Ω (5) 28 Ω

33. The image of an erect virtual object which is situated between the lens and its focus, formed by a diverging lens is
(1) real, erect and larger than the object.
(2) real, inverted and larger than the object.
(3) real, erect and smaller than the object.
(4) virtual, erect and smaller than the object.
(5) virtual, inverted and smaller than the object.

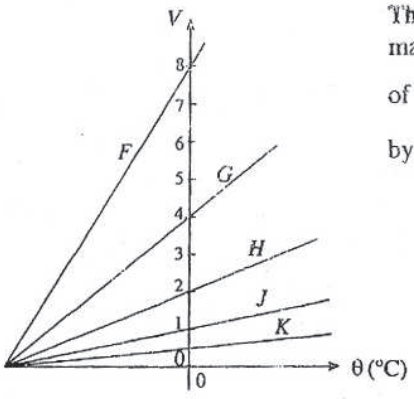
34. A monochromatic ray of light is incident upon a prism of refracting angle A and emerges as shown in the diagram. Consider the following statements made about the angle of deviation D.



(A) As the angle i is increased from zero the value of D passes through a minimum.
(B) D is zero when the ray enters the prism normally.
(C) For a given value of i, D does not depend on A.

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

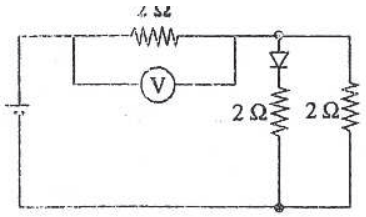
35.



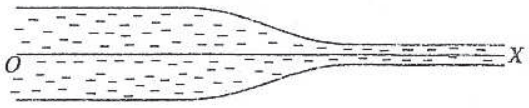
The variation of the volume V with the temperature θ of an ideal gas of mass m at a constant pressure P is shown by the line H of the graph. The variation of V with θ of the same ideal gas of mass $2m$ at constant pressure $\frac{P}{2}$ is shown by

(1) F. (2) G. (3) H.
(4) J. (5) K.

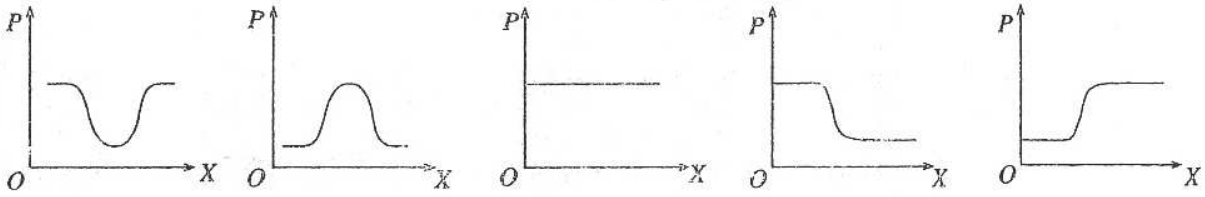
36. The diode in the circuit shown has zero forward bias resistance and a reverse break down voltage of 75 V. Internal resistance of the cell is negligible. The voltmeter reads 12 V. When the terminals of the diode are reversed the voltmeter reading is



(1) 6 V. (2) 8 V. (3) 9 V.
(4) 10 V. (5) 18 V.

37. 

A non viscous and incompressible fluid flows through a tube in which the cross-section is varying as shown in the figure. The variation of pressure P along the axis, OX, is best represented by



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

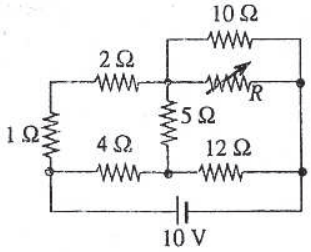
38. A uniform circular disk of radius R and mass M rotates with a uniform angular speed ω in a horizontal plane about an axis passing through its centre perpendicular to its plane. The moment of inertia of the disk about the axis described above is $\frac{1}{2}MR^2$. When a ball of clay of mass $\frac{M}{8}$ is placed gently on the edge of the disk and if it sticks, the new angular speed of the system is

(1) $\frac{2}{5}\omega$ (2) $\frac{8}{9}\omega$ (3) $\frac{4\omega}{5}$ (4) ω (5) $\frac{\omega}{5}$

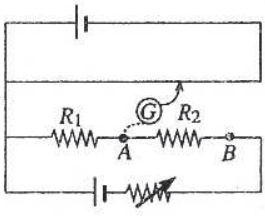
39. A ray of light travelling in water (refractive index n_1) is incident on the air/water boundary at the critical angle. When a layer of oil (refractive index n_2) is floated on the water surface, the angle of refraction of this light ray in oil is

(1) $\sin^{-1}\frac{1}{n_2}$ (2) $\sin^{-1}\frac{1}{n_1}$ (3) $\sin^{-1}\frac{n_1}{n_2}$ (4) $\sin^{-1}\frac{n_2}{n_1}$ (5) 90°

40. The value of the variable resistor R that minimizes the heat generated in the 5Ω resistor is

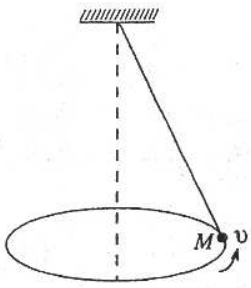


(1) 6 Ω (2) 9 Ω (3) 15 Ω
(4) 45 Ω (5) 90 Ω

41. 

A potentiometer circuit is set up as shown in the figure. When the galvanometer is connected to point A and to point B respectively, the balance lengths obtained are 75 cm and 300 cm. The ratio of $\frac{R_2}{R_1}$ is

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

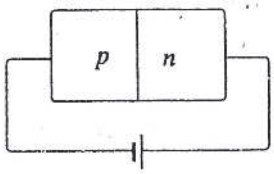
42. 

A sphere M attached to a thread is whirled in a horizontal circle at a constant speed as shown in the figure. The forces acting on the sphere observed by a person who is at rest in the laboratory are best represented by



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

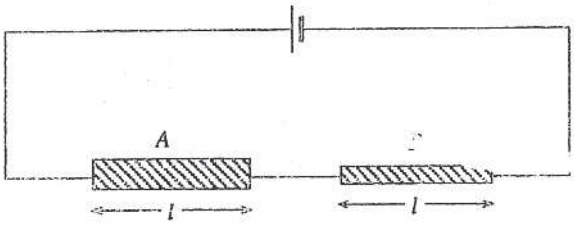
43. A p-n junction is connected to a battery as shown in the figure.



When light is shone on the junction, electron-hole pairs are created due to the absorption of photons. The current in the circuit produced by the incident light is

(1) due to electrons moving in the direction of n to p and holes moving in the opposite direction.
(2) due to electrons moving in the direction of p to n and holes moving in the opposite direction.
(3) due to electrons moving from p to n only.
(4) due to holes moving from n to p only.
(5) zero.

44. A thick wire A and a thin wire B made of the same material are connected to a battery as shown in the figure. The lengths of the two wires are the same. Consider the following statements.

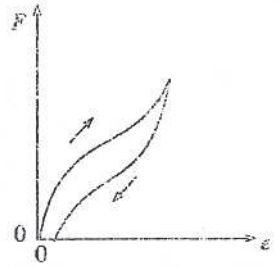


(A) Both A and B have the same resistance.
(B) Drift velocity of electrons in A is smaller than that in B.
(C) Free electron densities in A and B are different.

Of the above statements

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

45. The figure shows a force (F) - extension (e) graph for a rubber band. Consider the following statements.



(A) The rubber band does not return to its original length after stretching.
(B) The magnitude of the total work done during the increase of the length is less than the magnitude of the total work done during the decrease of the length.
(C) Heat can be generated in this process.

Of the above statements

(1) only (A) 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.

46. The filament of a 100 W bulb takes 200 ms to reach its full brightness when the bulb is connected across a constant voltage supply of 230 V.

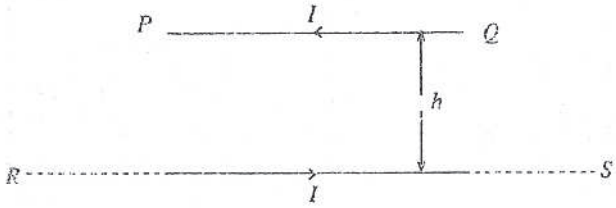
Consider the following statements

(A) During the 200 ms period the resistance of the filament increases.
(B) During the 200 ms period, power drawn from the supply decreases to 100 W, starting from a higher value.
(C) Filament emits energy in the form of electromagnetic radiation.

Of the above statements

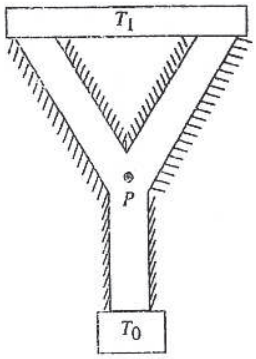
(1) only (A) is true.
(2) only (A), (B) are true.
(3) only (A), (C) are true.
(4) only (B), (C) are true.
(5) all (A), (B) and (C) are true.

47. A thin uniform wire PQ carrying a current I could be held without any mechanical support above an infinitely long horizontal wire RS carrying the same current I. If the mass per unit length of the wire PQ is m, the equilibrium height h of PQ above RS is given by



(1) $h = \dfrac{\mu_0 I^2}{mg}$ (2) $h = \dfrac{\mu_0 I^2}{2mg}$ (3) $h = \dfrac{\mu_0 I^2}{2\pi mg}$ (4) $h = \dfrac{\mu_0 I^2}{\pi mg}$ (5) $h = \dfrac{\mu_0 I^2}{\pi^2 mg}$

48. A well lagged Y-shaped structure made of copper has three thin identical limbs. Free ends of two of the limbs are connected to a metal block which is maintained at temperature T_1 while the free end of the third limb is maintained at a temperature T_0. The steady state temperature of the junction P of the structure is



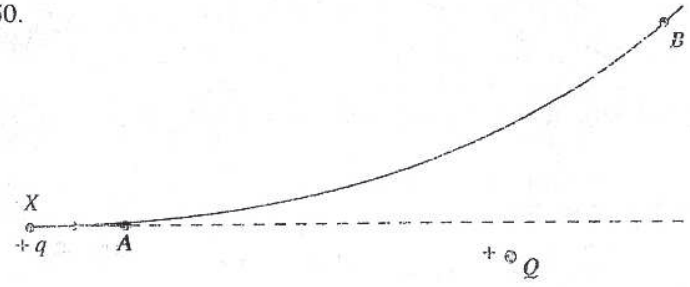
(1) $\frac{T_0+T_1}{2}$ (2) $\frac{3T_0+T_1}{2}$ (3) $\frac{2T_0+T_1}{3}$

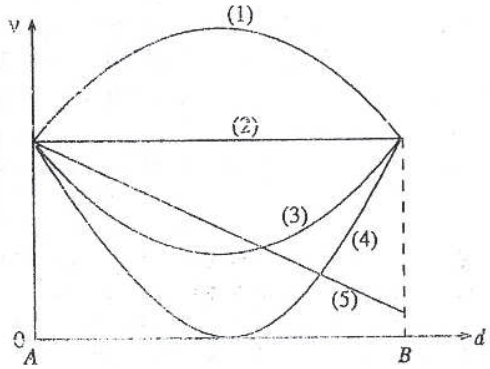
(4) $\frac{T_0+3T_1}{2}$ (5) $\frac{T_0+2T_1}{3}$

49. The oxygen molecule has 16 times the mass of the hydrogen molecule. At room temperature the ratio $\frac{\text{root mean square speed of oxygen molecules}}{\text{root mean square speed of hydrogen molecules}}$ is

(1) 16. (2) 4. (3) 2. (4) $\frac{1}{4}$ (5) $\frac{1}{16}$

50.

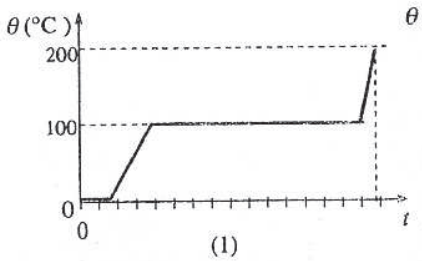




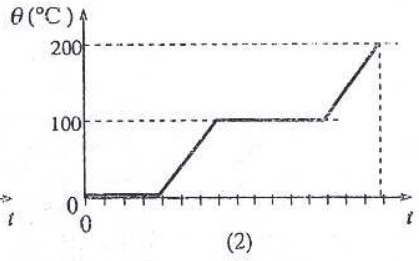
The figure shows the path of a particle X of charge $+q$ moving in the vicinity of another fixed particle of charge $+Q$. Variation of the speed v of the particle X with the distance d travelled from A along the path AB is best represented by the graph

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

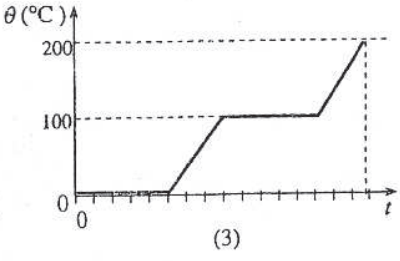
51. Crushed ice pieces at 0°C are kept inside a thermally insulated closed container. Heat is supplied to the container at a constant rate and the pressure inside the container is kept constant. The variation of the temperature inside the container with time is best represented by



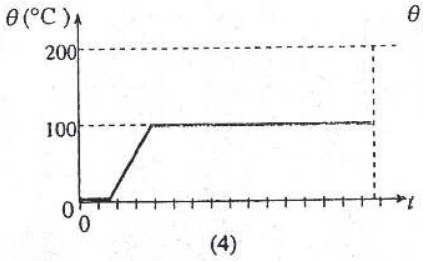
(1)



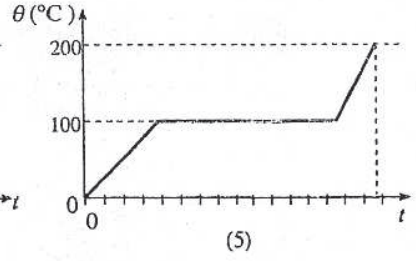
(2)



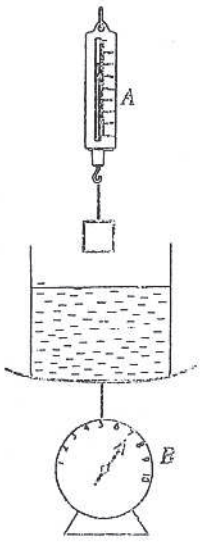
(3)



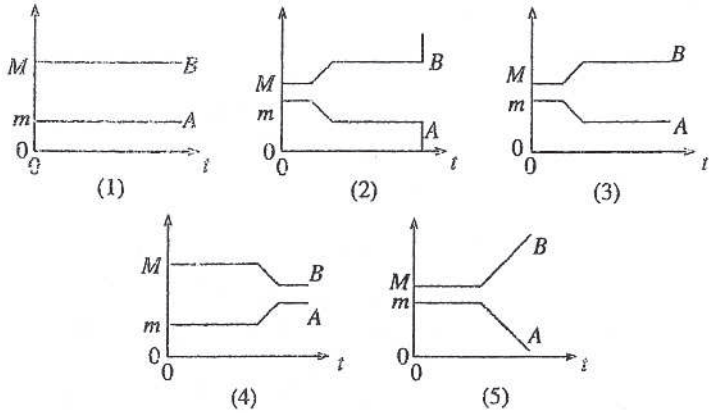
(4)



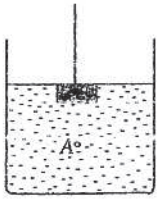
(5)

52. 

A uniform metal cylinder of mass m hangs from a spring balance A and is lowered slowly and steadily into a water container of mass M ($M > m$) until it rests totally submerged on the bottom of the container. The container is placed on the pan of a weighing scale B as shown in the figure. The variations of the readings of A and B with time t are best represented by



53. A metal block is suspended at rest below the surface of water in a tank as shown in the figure. When the block is released it falls to the bottom of the tank.



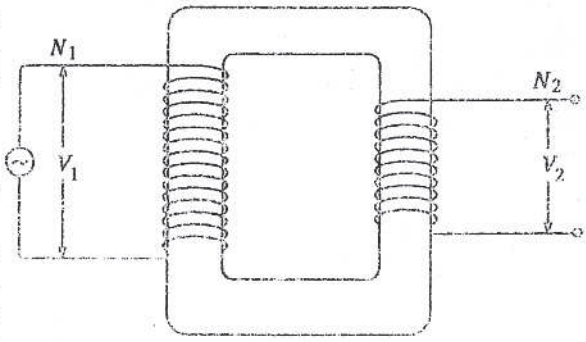
Consider the following statements.

(A) The block gradually losses its gravitational potential energy as it falls.
(B) Although the height of the water level does not change the water gains gravitational potential energy.
(C) If water was not present, the kinetic energy of the block at the point A would be less than that at A when water was present.

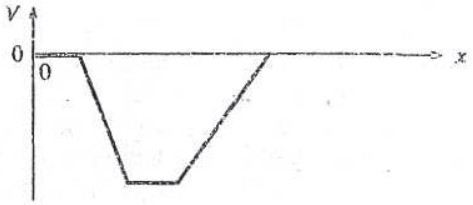
Of the above statements

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

54. The transformer shown in the figure has N_1 turns in the primary and N_2 turns in the secondary. Root mean square voltages across primary and secondary are V_1 and V_2 respectively. The correct statement regarding the transformer is



(1) $V_1N_1 = V_2N_2$
(2) if the A.C. source is replaced by a battery with the same voltage, V_2 will remain the same.
(3) when the secondary is connected to a load, the current in the secondary will not depend on the load.
(4) the only reason why the core becomes warm after sometime is the heat generated due to the resistance of the coils.
(5) if the core is removed, V_2 will decrease.

55. 

The graph shows the variation of electric potential V with distance x in a certain region.

The variation of the force F experienced by a positively charged particle with x is best represented by



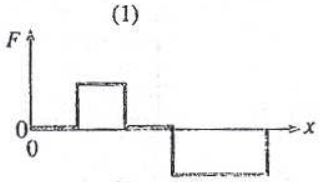
(1)



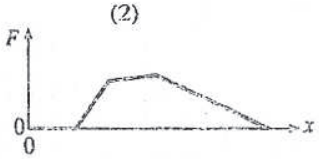
(2)



(3)



(4)



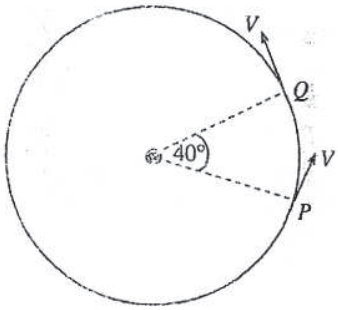
(5)

56. A car travels at a speed of $20\,m\,s^{-1}$ towards a stationary sound source that produces sound at a frequency of 1 kHz. Waves that are reflected from the car and return to the source are used to produce beats with the original waves. The approximate value of the beat frequency is (use the speed of sound in air as $320\,m\,s^{-1}$)

(1) 59 Hz. (2) 62 Hz. (3) 111 Hz. (4) 118 Hz. (5) 133 Hz.

57. A particle is moving in a circle with constant speed V as shown in the figure. The magnitude of the change in velocity of the particle between points P and Q is

(1) 0 (2) $V \sin 40°$ (3) $2V \sin 20°$
(4) $2V \cos 20°$ (5) V



58. The furthest point of distinct vision of a long sighted person is at infinity. This person uses a magnifying lens to view close objects. He finds that he can see a clear magnified image of an object if it is held anywhere between 50 mm and 60 mm from the lens, but nowhere else. His least distance of distinct vision is

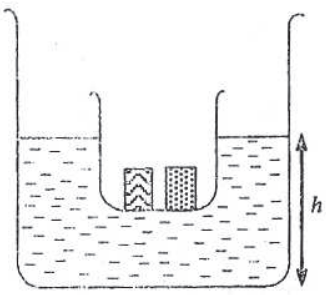
(1) 25 mm. (2) 50 mm. (3) 250 mm. (4) 300 mm. (5) 350 mm.

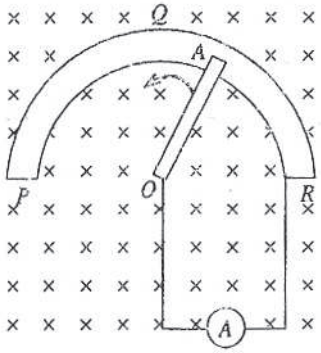
59. As shown in the figure, a small beaker containing a piece of wood and a piece of stone floats in water inside a larger beaker. The density of the stone is larger than that of water and the density of the piece of wood is smaller than that of water. Consider the following statements made about the height h of the water level inside the larger beaker.

(A) When the stone is taken out and dropped in water h decreases.
(B) When the piece of wood is taken out and put in water h remains unchanged.
(C) When the stone and the piece of wood are taken out, tied together and then put in water, if they go to the bottom of the beaker h will increase.

Of the above statements,

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



60. 

A semicircular conductor PQR having a uniform cross-sectional area is placed vertically in a horizontal uniform magnetic field as shown in the figure. A conducting rod OA pivoted at the centre O of the semicircular conductor, rotates with a constant angular speed about a horizontal axis passing through O parallel to the magnetic field. PQR and OA are made of a material with the same resistivity. An ammeter is connected to the two ends O and R. If the end A touches PQR, the variations of the e.m.f. E induced across OA and the current I through the ammeter with time t are best represented by the pair of graphs.

