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Western Provence Education Department

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2026

General Certificate of Education (Adv. Level) Examination, 2026

Final Term Test - Grade 13

භෞතික විද්‍යාව I **Physics I**	**01 E I**	පැය දෙකයි **Two hours**

Instruction :

- *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 alternative from (1), (2), (3), (4), (5) which is **correct** or **most appropriate** and **mark your response on the answer sheet with a cross**.*

Use of calculators is not allowed.

($g = 10\ \text{ms}^{-2}$)

1. Only the physical quantities which do not have units or dimensions are included in,
   (1) plane angle, solid angle
   (2) solid angle, refractive index
   (3) plane angle, efficiency
   (4) plane angle, sound intensity level
   (5) coefficient of friction, refractive index

2. A spherometer has 100 divisions on the circular scale, and 1 mm linear displacement along the vertical scale when the screw head rotates one full turn. Figure 1 shows the vertical and circular scale positions when its three legs and the screw tip touches a plane glass surface. Figure 2 shows the scale positions when it is used to measure the depth of a hole. The depth of the hole is,

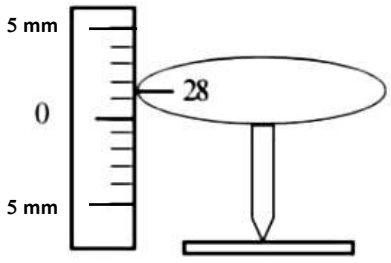


Figure 1

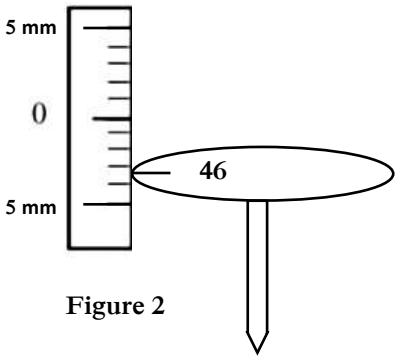


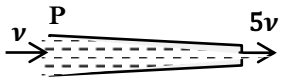
Figure 2

   (1) 1.28 mm (2) 3.46 mm (3) 4.74 mm (4) 4.82 m (5) 4.96 mm

3. An object of mass 5 kg is placed on a horizontal rough surface with a coefficient of static friction of 0.3. A horizontal force of 10 N is applied on the object. The frictional force acts on the object is,

   (1) 2 N (2) 3 N (3) 8 N (4) 10 N (5) 15 N

4. Figure shows a steady flow of a nonviscous fluid of density d in a horizontal pipe of variable cross-section. If the pressure of the fluid at a point with a flow velocity of v is P, then the pressure of the fluid at a point with a flow velocity of $5v$ is,



(1) $\mathrm{P} - 2\mathrm{d}v^2$ (2) $\mathrm{P} + 2\mathrm{d}v^2$ (3) $\mathrm{P} - 12\mathrm{d}v^2$ (4) $\mathrm{P} + 12\mathrm{d}v^2$ (5) $\mathrm{P} - 24\mathrm{d}v^2$

5. If a rigid body is in equilibrium under a system of coplanar forces ,
   A. The algebraic sum of the moments of forces about any point in the system is zero.
   B. The algebraic sum of the resolute components of the forces along a direction inclined θ to the horizontal is **not** zero.
   C. The resultant force on the system is zero and is equal to a couple of force.

   From 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 false.

6. Which of the following two-inputs logic gates can be used to determine whether two binary numbers are identical?

   (1) AND gate (2) EX-OR gate (3) OR gate (4) NOR gate (5) NAND gate

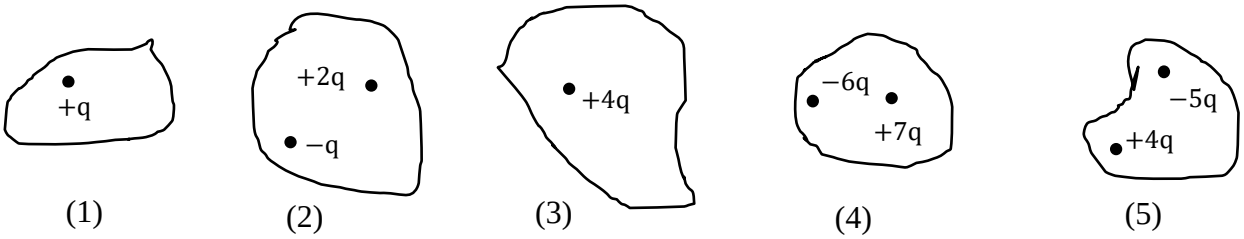
7. The quark composition of a matter is given as $\bar{\mathrm{c}}$, b,s ($\overline{\text{charm}}$, bottom, strange) in standard notation. The effective charge of the matter is,

   (1) $-\frac{5}{3}\mathrm{e}$ (2) $-\frac{4}{3}\mathrm{e}$ (3) 0 (4) $+\frac{2}{3}$ (5) $+\frac{4}{3}$

8. The tension in a guitar string is 5 N and the mass per unit length is 0.05 kg m^{-1}. Velocity of a transverse wave along the string is,

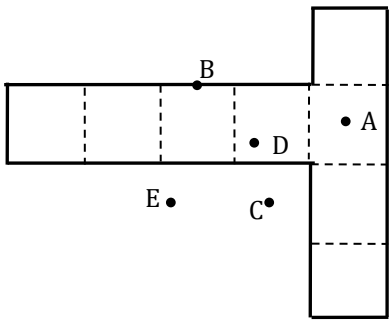
   (1) 1 m s^{-1} (2) 5 m s^{-1} (3) 8 m s^{-1} (4) 10 m s^{-1} (5) 20 m s^{-1}

9. Which of the following closed surfaces has a negative effective electric flux?



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

10. The figure shows an object made from a uniform plate. The center of gravity of the plate could be at,

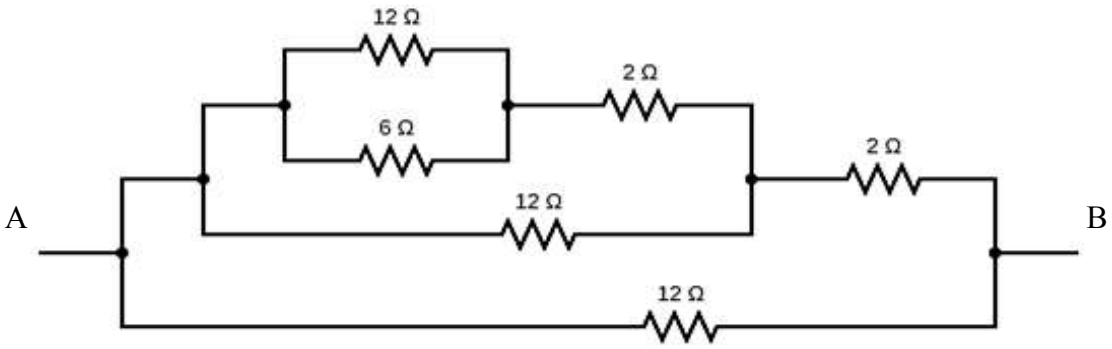


(1) A (2) B (3) C

(4) D (5) E

11. When the fundamental forces in the universe are arranged in ascending order considering their strength, the correct order is,
    (1) Electromagnetic force, weak force, strong force, gravitational force
    (2) Electromagnetic force, gravitational force, weak force, strong force
    (3) Gravitational force, weak force, electromagnetic force, strong force
    (4) Gravitational force, weak force, strong force, electromagnetic force
    (5) Electromagnetic force, weak force, gravitational force, strong force

12.



The equivalent resistance between points A and B of the network above is,

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

13. Consider the following statements about LASER production.

    A. An electron in a lower energy level of an atom can be moved to a higher energy level by a photon of a specific frequency.
    B. When atoms are unstable due to the electron transitions to a higher energy level, the electrons in the atoms become excited.
    C. Spontaneous emission occurs when excited electrons in an excited atom fall down randomly in a very short time ($10^{-8} - 10^{-9}\ s$) .

    Which of the above is/are correct?

(1) Only A . (2) Only B. (3) Only A and B. (4) Only B and C. (5) All A, B and C

14. An object in simple harmonic motion has amplitude A and maximum velocity v. When the amplitude is reduced to $A/8$, its maximum velocity is,

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

15. The sound intensity level at a distance of 50 m from a bell is 60 dB. Consider that $\log 4 \approx 0.6$ .The sound intensity level at a distance of 100 m from the same bell is,

(1) 58 dB (2) 54 dB (3) 50 dB (4) 46 dB (5) 42 dB

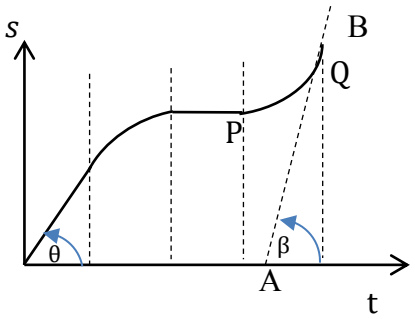
16. The capillary rise of water in a glass capillary tube is h. The contact angle between glass and water is zero. A plastic capillary tube with same dimensions as the glass tube makes a contact angle of 90° with water. The capillary rise of water in the second tube is,

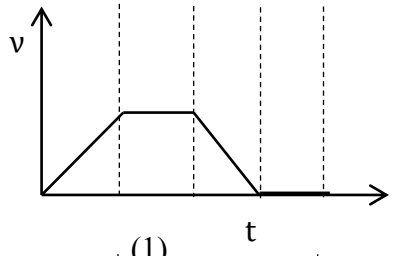
(1) 0 (2) $\frac{h}{2}$ (3) h (4) 2h (5) 10h

17. Under constant environmental conditions the time taken by a liquid to cool from 65 °C to 55 °C in a room at 30 °C is 5 minutes. The time taken by the liquid to cool from 55 °C to 45 °C is,

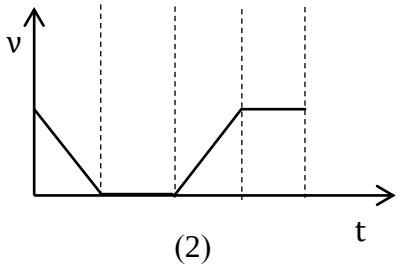
(1) 5.0 min (2) 6.5 min (3) 7.5 min (4) 8.0 min (5) 10.0 min

18. The graph shows how the displacement (s) of an object changes with time (t). AB is the tangent to the curve PQ at Q. $\beta > \theta$. The corresponding velocity (v) - time (t) graph is given by,

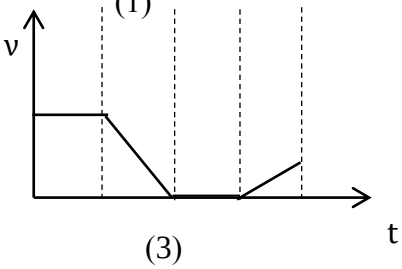




(1)



(2)



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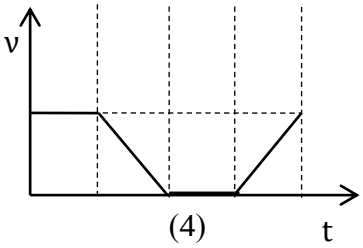
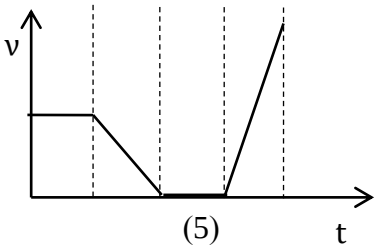


(4)



(5)

19. When white light passes through a glass prism,

A. orange light travels faster than indigo light

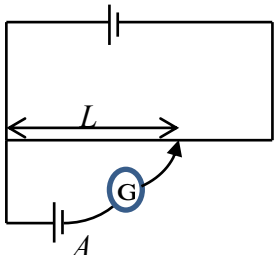
B. blue light is deflected less than red light

C. the refractive indexes of each color passing through the prism are different

Which of the above is/are correct?

(1) Only A . (2) OnlyB. (3) Only A and B. (4) Only A and C. (5) All A, B and C

20. To determine the EMF of cell A of internal resistance r, it is connected in the potentiometer circuit as shown in the figure and obtained the balanced length as L. When a resistor of $5r$ is connected across the terminals of cell A, the new balanced length is,



(1) $\frac{L}{6}$ (2) $\frac{L}{5}$ (3) $\frac{5L}{6}$ (4) 5L (5) 6L

21. Consider the following statements regarding a p-n junction.

A. The current (I) - voltage (V) characteristic of the junction is linear.

B. The currents carried by free electrons and holes are in opposite directions.

C. The direction of the electric field generated is from p to n.

Which of the above statements is/are true?

(1) Only A . (2) Only B. (3) Only C. (4) Only A and B. (5) Only B and C

22. A rectangular coil of length 0.25 m and width 0.20 m has 1000 turns. It is placed in a uniform magnetic field of flux density 0.08 T. If a current of 1 A flows through the coil, the maximum torque on the coil is,

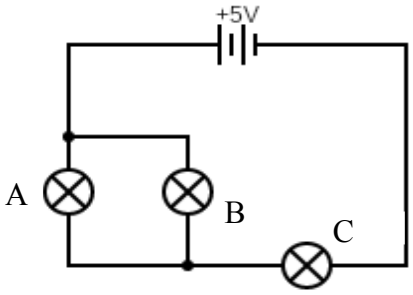
(1) 1 N m (2) 2 N m (3) 3 N m (4) 4 N m (5) 5 N m

23. The electromotive force of a cell connected in a circuit is 1.5 V. The potential difference across the terminals of that cell is,
(1) always less than 1.5 V (2) always equal to 1.5 V (3) always greater than 1.5 V
(4) zero. (5) depends on the rest of the circuit

24. When a straight wire is moving from north to south in a non-uniform magnetic field, an electromotive force (emf) is induced along its length. This emf does not depend on,

(1) the velocity of the wire (2) the length of the wire
(3) the radius of the wire (4) the rate of change of the flux density in the magnetic field
(5) the inclination of the direction of motion of the wire to the magnetic field

25. There are three identical torch bulbs connected in a circuit. Which of the following statements about the brightness of bulbs A, B and C is/are correct?



(1) The brightness of A is maximum.
(2) The brightness of B is maximum.
(3) The brightness of A and B is maximum.
(4) The brightness of C is minimum.
(5) The brightness of A and B is equal.

26. A uniform rod of length L and mass M is rotating in a horizontal plane with a constant angular velocity ω_0, about an axis passing through one end of it. Then the moment of inertia of the rod is $\frac{1}{12}ML^2$. When a pebble of mass m is placed on the rod near the axis of rotation it slides smoothly along the rod. The angular velocity of the system when the pebble reaches the center of the rod is,

(1) $\frac{M\omega_0}{(M+3m)}$ (2) $\frac{M\omega_0}{m}$ (3) $\frac{4M\omega_0}{(4M+3m)}$ (4) ω_0 (5) 0

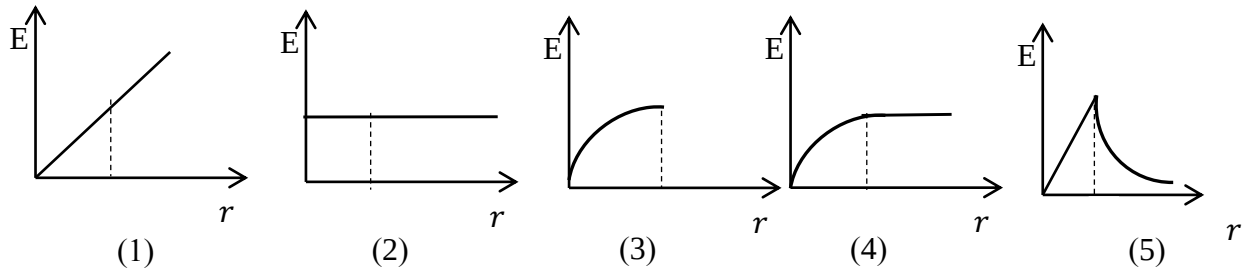
27. A radioactive substance has a half-life of 30 minutes. The fraction of the radioactive substance remaining after two hours, as a percentage is,

(1) 6.25 % (2) 25 % (3)75 % (4)87.5 % (5) 93.75 %

28. A block of mass *5M* falls from rest onto a pillar of mass *20M* from a height *H*. If the collision is fully inelastic, the percentage of energy wasted in one collision is,

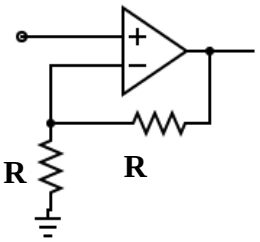
(1) 10 % (2) 20 % (3) 40 % (4) 80 % (5) 100 %

29. A Charge is uniformly distributed within the volume of a non-conducting solid sphere of radius *a*. The change of electric field intensity (*E*), with the distance (*r*) from the center of the sphere is given by,



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

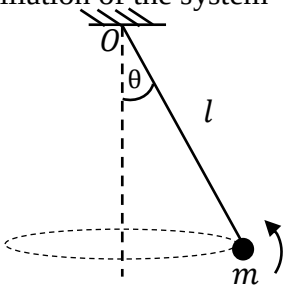
30. The voltage gain of the given operational amplifier circuit is,



(1) $+1$ (2) $+2$ (3) -1

(4) -2 (5) 0

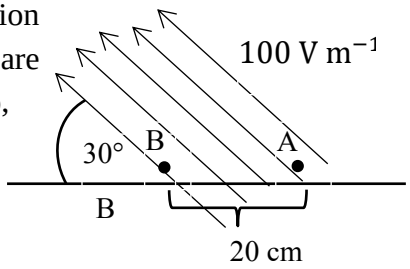
31. An object of mass *m* is suspended by a string of length *l*. The other end of the string is attached to a fixed point *O*. The object is allowed to move in a horizontal circular path about a vertical axis passing through *O* such that the string is inclined an angle θ to the vertical as shown in the figure. If air resistance can be neglected and the angle θ remains constant, the period of oscillation of the system is,



(1) $2\pi\sqrt{\frac{l}{g\cos\theta}}$ (2) $2\pi\sqrt{\frac{l\cos\theta}{g\sin\theta}}$ (3) $\sqrt{\frac{l}{g\sin\theta}}$

(4) $2\pi\sqrt{\frac{l\cos\theta}{g}}$ (5) $\pi\sqrt{\frac{l\cos\theta}{g}}$

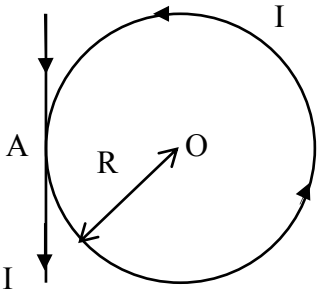
32. A uniform electric field of magnitude $100\ \mathrm{V\,m^{-1}}$ acts in a direction inclined at 30° to the horizontal as shown in the figure. If V_A and V_B are the potentials at points A and B respectively, then $V_A - V_B$ is equal to,



(1) $5\sqrt{2}\ \mathrm{V}$ (2) $-10\sqrt{3}\ \mathrm{V}$ (3) $-10\sqrt{2}\ \mathrm{V}$

(4) $-20\sqrt{3}\ \mathrm{V}$ (5) $10\sqrt{3}\ \mathrm{V}$

33. A long wire of infinite length is bent as shown in the figure such that no conductive parts touching each other at *A*. If the radius of the circular section is *R* and the current flowing through the wire is *I*, then the magnitude and direction of the magnetic flux density at the center *O* are,



(1) $\frac{\mu_0 I}{2R}\left(1-\frac{1}{\pi}\right)$ perpendicular and into the paper

(2) $\frac{\mu_0 I}{2R}\left(1-\frac{1}{\pi}\right)$ perpendicular and out of the paper

(3) $\frac{\mu_0 I}{2R}\left(1+\frac{1}{\pi}\right)$ perpendicular and into the paper

(4) $\frac{\mu_0 I}{2R}\left(1+\frac{1}{\pi}\right)$ perpendicular and out of the paper

(5) Zero

34. From an area where there is no any field, an electron and a proton with equal momentum enter perpendiculer to a uniform magnetic field in a large area. Which of the following statements is true?

(1) The electron moves in a semicircular path with a larger radius.

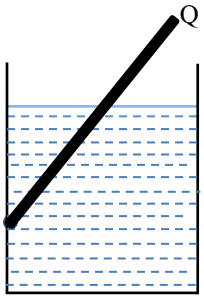
(2) The proton moves in a semicircular path with a larger radius.

(3) Both electron and proton move in semicirculer paths with equal radius in the same direction.

(4) Both electron and proton move in semicirculer paths with equal radius in opposite directions.

(5) Both electron and proton move in fully circular paths with equal radius in opposite directions.

35. A uniform rod PQ is freely attached to the wall of a water container at *P*. At equilibrium, three-sevenths (3/7) of the length of the rod is stay outside the water. The specific gravity of the material of the rod is,



(1) $\frac{16}{49}$ (2) $\frac{8}{49}$ (3) $\frac{16}{25}$ (4) $\frac{49}{16}$ (5) $\frac{16}{7}$

36. A glass vessel of volume $5V$ is completely filled with a liquid of volume expansivity γ. The linear expansivity of glass is α. When the temperature of the glass vessel is increased by an amont θ, the volume of liquid that expels from the vessel is V . The relationship between α and γ is,

(1) $\alpha = \frac{\gamma}{3} - \frac{1}{15\theta}$ (2) $\alpha = \frac{\gamma}{3} + \frac{1}{\theta}$ (3) $\alpha = \frac{\gamma}{15} - \frac{1}{\theta}$ (4) $\alpha = \frac{\gamma}{3} - \frac{1}{\theta}$ (5) $\alpha = \frac{\gamma}{3} + \frac{1}{15\theta}$

37. A siren fixed in a factory emits a sound of 1600 Hz in an alarm due to a sudden fire. A person who hears the sound runs away from the factory horizontally to the right side at a uniform velocity of $2\ \mathrm{m\ s^{-1}}$, while a wind is blowing towards the factory from the right side at a uniform velocity of $20\ \mathrm{m\ s^{-1}}$. The speed of sound in still air is $340\ \mathrm{m\ s^{-1}}$. The frequency of the siren heard by the person is,

(1) 1590 Hz (2) 1591 Hz (3) 1600 Hz (4) 1610 Hz (5) 1609 Hz

38. Some cookies of mass 125 g were put in a container that has a relative humidity of 60%, and then sealed it. After a few days, it was observed that the new relative humidity of the container had decreased to 40% and the total mass of cookies had increased to 126 g. If the temperature of the container remained constant, the mass of water vapor in the container before the cookies were placed is,

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

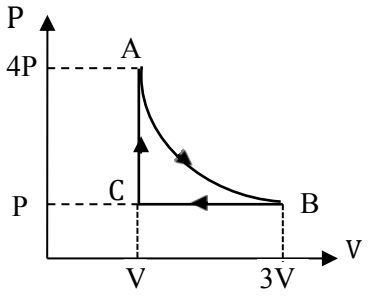
39. A parallel plate capacitor is charged to a potential difference *V*. Then, the capacitor is isolated and the gap between the plates is reduced to $\frac{1}{4}$ of the original value. The new potential difference between the plates is,

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

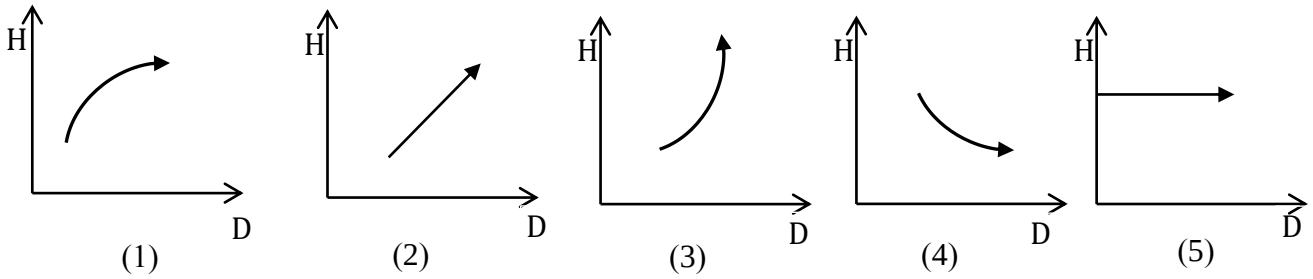
40. The work done in the ABCA cyclic thermodynamic process is approximately given by,

(1) $-3PV$ (2) $-\frac{11}{4}PV$ (3) $+2PV$

(4) $+\frac{11}{4}PV$ (5) $+3PV$



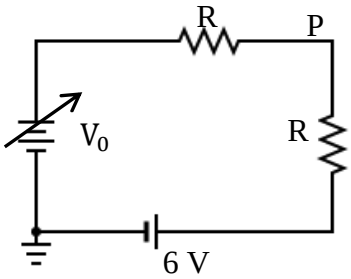
41. From a light source on the ground a light ray travels upward at an angle θ (where $\theta < 90°$) to the horizontal. The refractive index of air decreases with vertical height. The path of the light beam with the vertical height (H) and horizontal distance (D) from the source is best represented by,

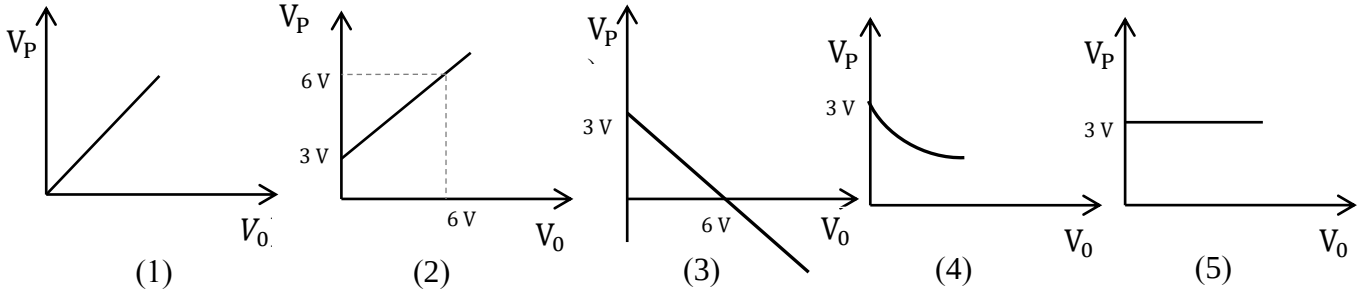


42. The far point of a long-sighted person is at infinity. He uses a hand lens (magnifying glass) to read books. He can see a clear magnified image of the letters only if the book is placed between 10 cm and 15 cm from the lens. The near point of his defected eye is,

(1) 26 cm (2) 27 cm (3) 28 cm (4) 29 cm (5) 30 cm

43. The circuit shows two batteries of negligible internal resistance. One of them provides a variable voltage (V_0) and the other one is a fixed 6 V supply. The graph that correctly shows how the potential (V_P) at point P changes, when the value of V_0 is changed is,





44. When a mercury thermometer is calibrated the values 0 °C and 100 °C has been marked at temperatures that are actually (-1) °C and 101 °C, respectively. When the thermometer reads 50 °C, the actual temperature is,

(1) 48 $°C$ (2) 49$°C$ (3) 50$°C$ (4) 51$°C$ (5) 52$°C$

45. Three point charges of +5 C are placed at distances of 1 cm, 3 cm and 5 cm from a point *O* in a isolated charge distribution. When a charge of -5 C is placed at a distance *d* from point *O*, another charge can be brought from infinity to point *O* without doing any work. The value of *d* is,

(1) $\frac{3}{4}$ cm (2) $\frac{5}{6}$ cm (3) $\frac{7}{8}$ cm (4) $\frac{15}{23}$ cm (5) $\frac{23}{15}$ cm

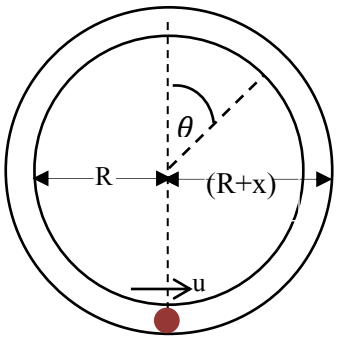
46. Two rods of equal cross-sectional areas and initial lengths but made of different materials with Young's modulus Y_1 and Y_2 are connected in series to form a straight composite rod. The equivalent Young's modulus of this composite rod is,

(1) $Y_1 + Y_2$ (2) $2(Y_1 + Y_2)$ (3) $\frac{2Y_1Y_2}{(Y_1+Y_2)}$ (4) $\frac{Y_1Y_2}{(Y_1+Y_2)}$ (5) $\sqrt{Y_1Y_2}$

47. Two identical horizontal plates of surface area 100 cm^2 are placed 4 cm apart. The space between the plates is filled with an oil of viscosity 0.3 kg m^{-1} s^{-1}. The upper plate is pulled by a horizontal force while the lower plate is held stationary. If the velocities of the oil layers vary linearly with the distance between the plates, then the constant horizontal force that must be applied to the upper plate to maintain the velocity of the middle layer of oil at 6 m s^{-1} is,

(1) 0.1 N (2) 0.2 N (3) 0.7 N (4) 0.9 N (5) 1.0 N

48. Two smooth-walled, coaxial, hollow cylinders of radius R and radius $R + x$ are fixed horizontally. A smooth sphere of diameter d ($d < x$) is at rest, at the bottom in the space between the two cylinders. Now, the sphere is given a horizontal velocity u and then it moves in the space between two cylinders. At the instant it makes an angle θ with the upper vertical radius, the normal reaction on it is reversed. The initial velocity u given to the sphere is,



(1) $\sqrt{gR(2 + 3\cos\theta)}$ (2) $\sqrt{gR(2 + \cos\theta)}$ (3) $\sqrt{3gR(2 + \cos\theta)}$

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

49. A ring of radius R and mass M is shown in Figure A. The same ring that two particles, each of mass m_0, were removed at X and Y positions where OX and OY are perpendicular to each other is shown in Figure B. The gravitational field intensities caused by the ring at its center (O) in two A and B cases are,

Figure A

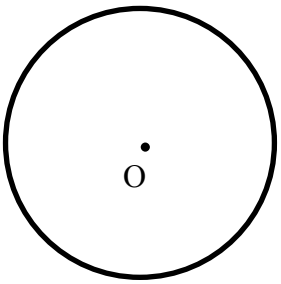
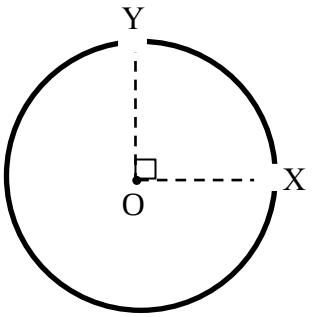
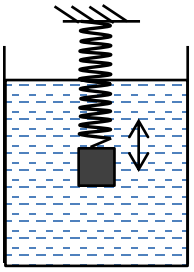


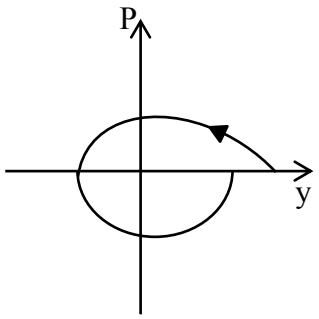
Figure B



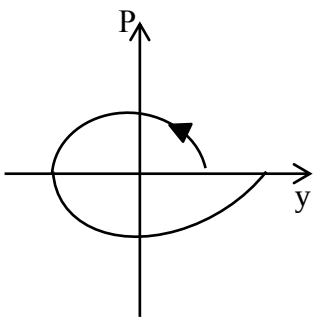
	(1)	(2)	(3)	(4)	(5)
Case A	Zero	Zero	Zero	Infinite	Infinite
Case B	$\frac{Gm_0}{R^2}$ ↙	$\sqrt{2}\frac{Gm_0}{R^2}$ ↙	$\sqrt{2}\frac{Gm_0}{R^2}$ ↗	$\sqrt{2}\frac{Gm_0}{R^2}$ ↙	$\sqrt{2}\frac{Gm_0}{R^2}$ ↗

50. An object is attached to a spring and immersed in water as shown in the figure. The object is given an upward push such that the spring is initially at its maximum compression and then released it. Assume that the object does not rise above the water level during the motion. Note that the displacement and momentum are positive in vertically upward direction. The momentum (P) of the object that varies with the displacement (y) measured from the equilibrium position in one oscillation is,

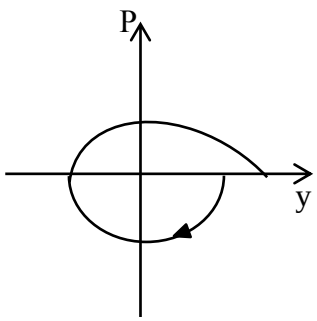




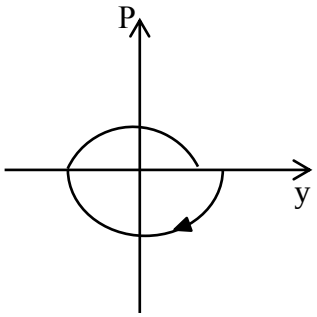
(1)



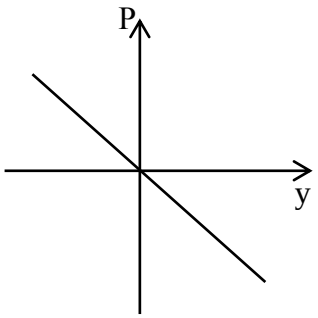
(2)



(3)



(4)



(5)

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