01 E I

Department of Examinations, Sri Lanka

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கல்விப் பொதுத் தராதரப்பத்திர(உயர் தர)ப் பரீட்சை, 2003 ஏப்பிரல்

General Certificate of Education (Advanced Level) Examination, April 2003

භෞතික විද්‍යාව I

பௌதிகவியல் I

Physics I

පැ දෙකයි

இரண்டு மணித்தியாலம்

Two hours

Important : * *This question paper consists of* **60** *questions in 12 pages.*

* ***Answer all the questions.***
* *Enter your* ***Index Number*** *in the space provided on the answer sheet.*
* *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 unit of intensity level of a sound wave is

   (1) Hz (2) W (3) J m^{-2} (4) W m^{-2} (5) dB

2. Which of the following quantities must be known in order to calculate the energy consumed by an electrical appliance?

   (1) Supply voltage and current
   (2) Current and time of operation
   (3) Current and resistance
   (4) Power consumed and time of operation
   (5) Power consumed and supply voltage

3. Of the elements given below, power (VI) can be amplified only with

   (1) resistors. (2) diodes. (3) capacitors.
   (4) transformers. (5) transistors.

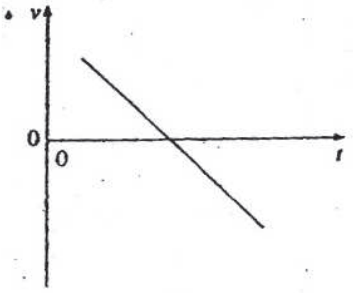
4. A cricket ball is hit for a six. It leaves the bat at an upward angle of 45° to the horizontal with kinetic energy k. Kinetic energy of the ball at the top of its flight is (neglect air resistance)

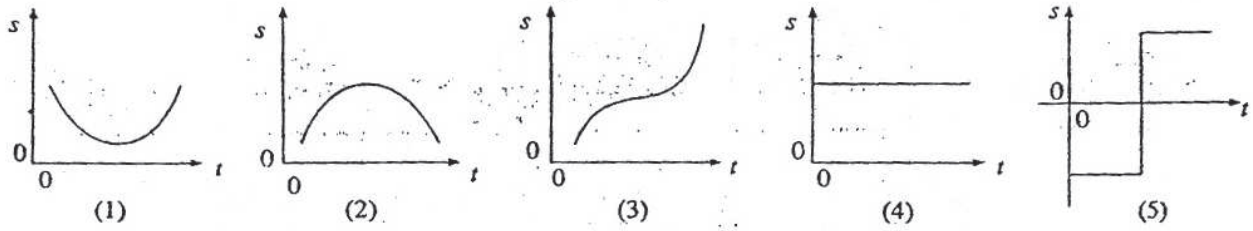
   (1) 0 (2) $\frac{k}{4}$ (3) $\frac{k}{2}$ (4) $\frac{k}{\sqrt{2}}$ (5) k

5. A golf ball of mass 0·05 kg leaves with a velocity of 70 m s^{-1} after being struck by a golf club. If the time of contact of the ball with the golf club is 5 × 10^{-4} s, the mean force applied by the golf club on the ball is

   (1) 5·0 × 10^5 N (2) 2·5 × 10^5 N (3) 7·0 × 10^3 N
   (4) 1·4 × 10^3 N (5) 1·2 × 10^3 N

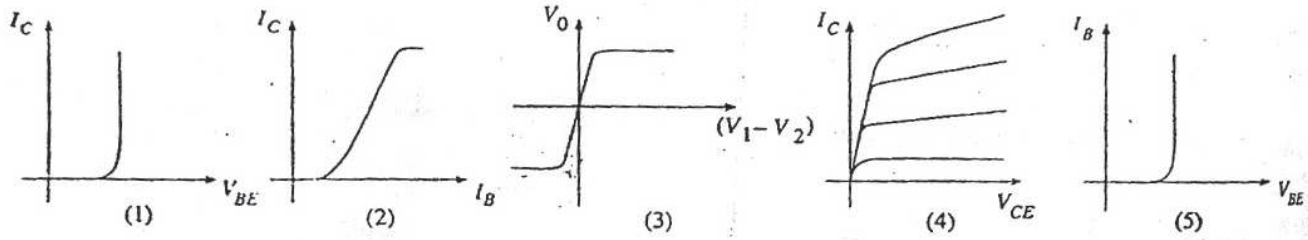
6. The graph shown in the figure represents the velocity (v) - time (t) curve for an object. The corresponding displacement (s) - time (t) curve is best represented by





7. In an adiabatic process always
   (1) no heat enters or leaves the system.
   (2) no work is done on the system or by the system.
   (3) the temperature of the system remains constant.
   (4) the pressure of the system remains constant.
   (5) the volume of the system remains constant.

8. Which of the curves shown in figures represents the output characteristic of an *npn* transistor?



9. If the mass of a radioactive sample is doubled, which of the following is correct, regarding its activity and its half-life.

	Activity	Half-life
(1)	Increases	Increases
(2)	Increases	Decreases
(3)	Increases	Remains the same
(4)	Remains the same	Remains the same
(5)	Remains the same	Decreases

10. A metal plate is illuminated with a beam of light of a certain frequency. Which of the following determines whether the electrons are emitted or not from the metal surface?
   (1) The intensity of the light.
   (2) The length of the time of exposure to the light.
   (3) The surface area of the plate.
   (4) The type of the metal.
   (5) The speed of the incident photons.

11. Consider the following statements made regarding the speed of sound in air.
   (A) Speed increases with the increase of pressure when the temperature is kept constant.
   (B) Speed increases with the increase of temperature and humidity.
   (C) Speed decreases with the increase of density when the temperature is kept constant.

   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 true.

12. Consider the following statements made regarding longitudinal and transverse waves.

(A) Only transverse waves can undergo refraction.
(B) Both types of waves can undergo interference and diffraction.
(C) Both types of waves can produce beats.

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.

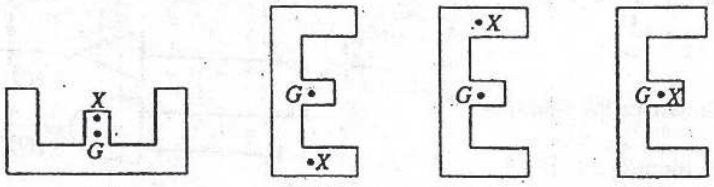
13. A broad beam of parallel light is to be converted to a narrow beam of parallel light. This can be achieved with

(A) two convex lenses.
(B) two concave lenses.
(C) a convex lens and a concave lens.

Of the above statements

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

14. Identical laminae cut into the form of the letter E are pivoted vertically at X. If G is the centre of gravity of the laminae, which of the states shown in the figure are at **stable** equilibrium positions?



(A) (B) (C) (D)

(1) (A) and (C) only.
(2) (A) and (B) only.
(3) (C) and (D) only.
(4) (B), (C) and (D) only.
(5) (A), (C) and (D) only.

15. Which of the following statements is correct with regard to the angle of deviation (d) of a monochromatic ray of light, produced by a glass prism.

(1) d is independent of the angle of incidence.
(2) d always increases with the angle of incidence.
(3) d always decreases with the angle of incidence.
(4) d has a minimum value and it is independent of the angle of prism.
(5) d has a minimum value which is dependent on the angle of prism.

16. Which of the following images **cannot** be formed by a concave mirror of focal length f ?

(1) Real inverted image larger than the object.
(2) Virtual erect image larger than the object.
(3) Inverted image larger than the object, and formed at a distance more than $2f$.
(4) Inverted image having same size as the object.
(5) Inverted image smaller than the object, and formed at a distance more than $2f$.

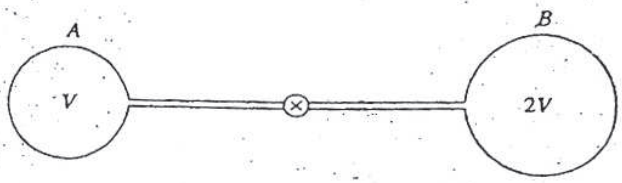
17. A circular hole is made in a steel sheet of linear expansivity $1{\cdot}2 \times 10^{-5}\,^{\circ}C^{-1}$. When the temperature of the sheet is raised by 100 °C the area of the hole

(1) is increased by a fraction of $2{\cdot}4 \times 10^{-3}$
(2) is decreased by a fraction of $2{\cdot}4 \times 10^{-3}$
(3) is increased by a fraction of $1{\cdot}2 \times 10^{-3}$
(4) is decreased by a fraction of $1{\cdot}2 \times 10^{-3}$
(5) remains unchanged.

18. Three identical straight metal wires are subjected to the following changes separately.
(A) the length is increased by stretching.
(B) the temperature is increased.
(C) the wire is coiled into a solenoid.
Which of the above will cause an increase in the resistance of the wire?
(1) (A) only. (2) (B) only. (3) (C) only.
(4) (A) and (B) only. (5) all (A), (B) and (C).

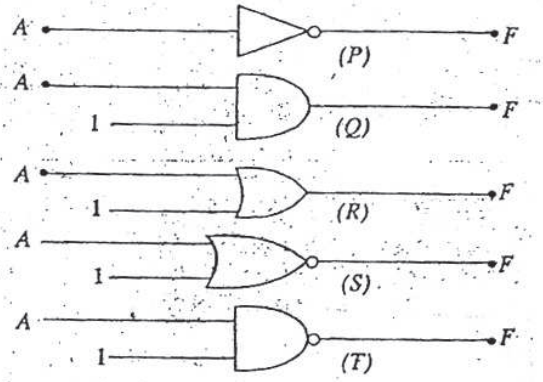
19. An electric water heater has to supply hot water at 40 °C at a constant rate of $1\,kg\,s^{-1}$ from water at 30 °C. If the heat loss to surroundings is neglected, the minimum power of the heating element of the heater should be (specific heat capacity of water is $4200\,J\,kg^{-1}\,°C^{-1}$)
(1) $4{\cdot}2 \times 10^4$ W. (2) $4{\cdot}2 \times 10^3$ W. (3) $1{\cdot}2 \times 10^4$ W. (4) $1{\cdot}8 \times 10^4$ W. (5) $1{\cdot}8 \times 10^3$ W.

20. Two containers A and B of volumes V and $2V$ respectively, are connected by a narrow tube via a tap as shown in the figure. Initially, the tap is closed and A and B, each contains n moles of an ideal gas at same temperature. When the tap is opened and the steady state is reached the number of gas moles remaining in A is

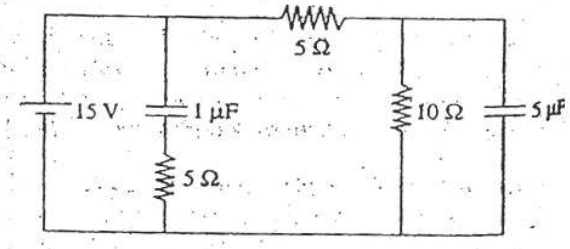


(1) $\frac{n}{3}$. (2) $\frac{n}{2}$. (3) $\frac{2n}{3}$. (4) $\frac{3n}{4}$. (5) n.

21. The second input of the gates shown in the diagram are connected to binary 1.
Of the gates, performances are identical only in
(1) P and Q
(2) Q and R
(3) R and S
(4) S and T
(5) P and T

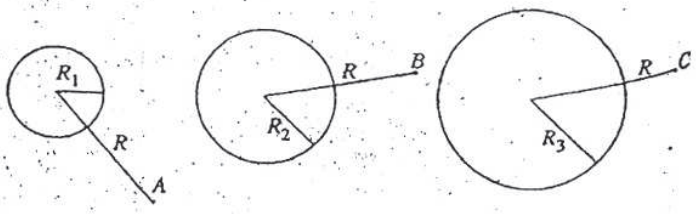


22. In the circuit shown, the charges on the 1 μF and 5 μF capacitors are respectively
(1) 15 μC, 75 μC
(2) 15 μC, 50 μC
(3) 15 μC, 25 μC
(4) 5 μC, 50 μC
(5) 5 μC, 10 μC



23. Figure shows three conducting spheres of radii R_1, R_2 and R_3 ($R_1 < R_2 < R_3$) each carrying a charge Q.

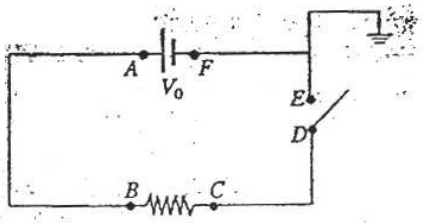
If the electric field intensities at points A, B and C at a distance R from the centre of each sphere are E_A, E_B and E_C respectively, then

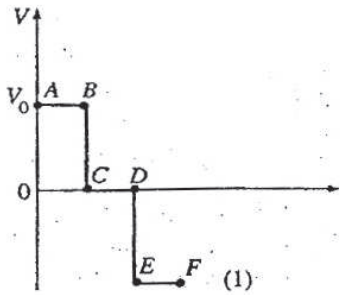


(1) $E_A > E_B > E_C$ (2) $E_A = E_B = E_C$ (3) $E_A < E_B < E_C$

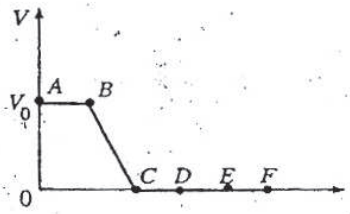
(4) $\frac{E_A}{R_1} = \frac{E_B}{R_2} = \frac{E_C}{R_3}$ (5) $\frac{E_A}{R_1^2} = \frac{E_B}{R_2^2} = \frac{E_C}{R_3^2}$

24. The battery in the given circuit has negligible internal resistance. The potential variation around the circuit when the switch is open, is best represented by

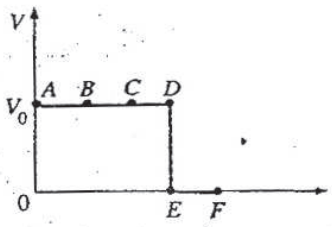




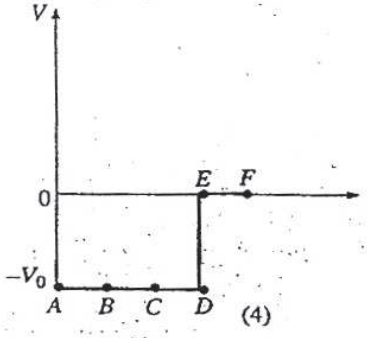
(1)



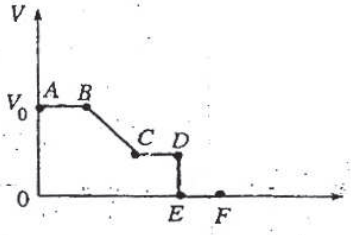
(2)



(3)



(4)



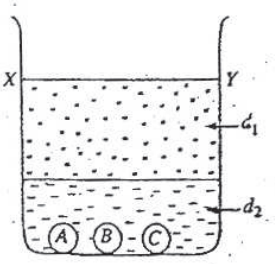
(5)

25. A defective eye of a person has a near point at 0·5 m. The magnitude of the power of the lens that the person has to use in order to bring the near point to 0·25 m is
(1) 2 diopters. (2) 1 diopter. (3) 0·5 diopters. (4) 0·75 diopters. (5) 2·5 diopters.

26. Consider the following statements.
(A) If the kinetic energy of a particle is constant with time, its momentum should also be constant with time.
(B) If the momentum of a particle is constant with time, its kinetic energy should also be constant with time.
(C) If the momentum of a particle varies linearly with time, its kinetic energy should also vary linearly with time.

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) only (A) and (C) are true.

27. A beaker contains two immiscible liquids having densities d_1 and d_2. Three spheres A, B, C made of materials of densities d_A, d_B and d_C respectively, are released from the bottom of the beaker. If $d_1 < d_B < d_A < d_2 < d_C$,



(1) sphere C will reach the surface XY and come to rest.
(2) all spheres will reach the surface XY and come to rest.
(3) none of the spheres will move up.
(4) spheres A and B will reach the surface XY and come to rest.
(5) sphere C will stay at the bottom.

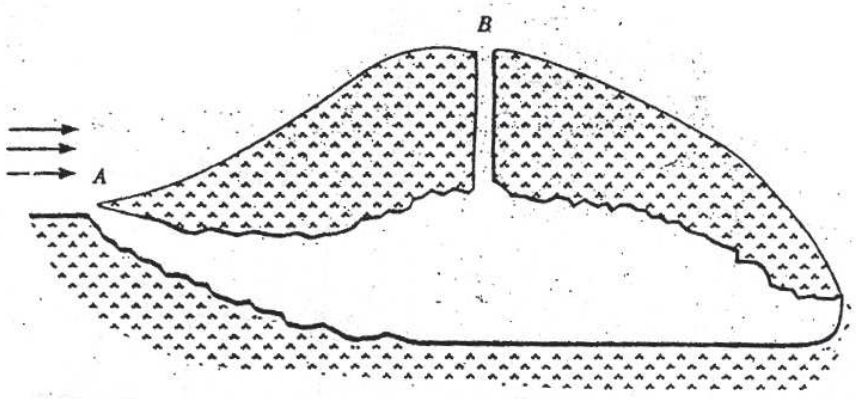
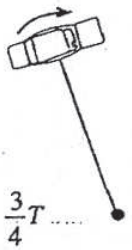
28. 

Figure shows an underground cave with two small openings at A and B. A wind is blowing over the cave. Pressures and velocities of air at A and B are P_A, V_A and P_B, V_B respectively.

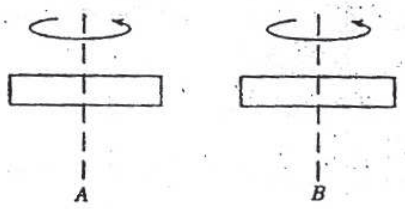
Which of the following statements is true?

(1) $V_A > V_B$, and $P_A > P_B$, therefore air circulates from A to B through the cave.
(2) $V_A < V_B$ and $P_A > P_B$, therefore air circulates from A to B through the cave.
(3) $V_A < V_B$ and $P_A < P_B$, therefore air circulates from B to A through the cave.
(4) $V_A > V_B$ and $P_A < P_B$, therefore air circulates from B to A through the cave.
(5) P_A and P_B are the same and therefore air does not circulate through the cave.

29. A toy car connected to a fixed point by an elastic string as shown in figure, travels in a horizontal circle of radius $2r$. The initial unstretched length of the elastic string is r. The period of rotation of the car is T. The car is then speeded up until it is moving in a circle of radius $3r$. If the string obeys Hooke's law, and resistive forces are negligible, the new period of rotation of the car will be



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

30. 

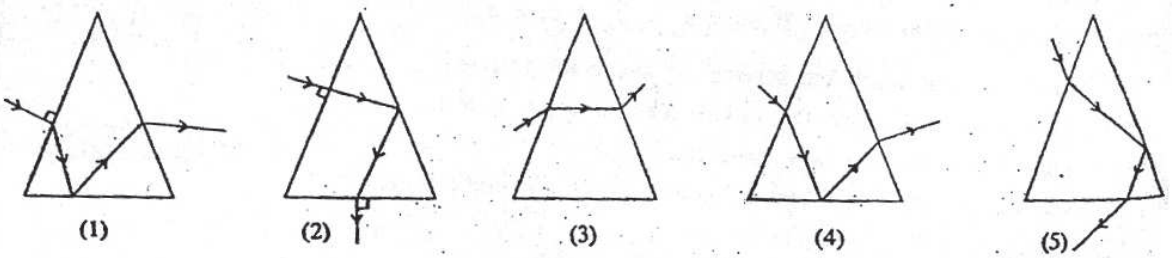
Two uniform rods A and B having same dimensions but made of different materials of densities d_A and d_B rotate as shown in the figure. If the rotational kinetic energies of the rods are same, then the ratio,

$\frac{\text{Angular momentum of } A}{\text{Angular momentum of } B}$ is given by

(1) 1 (2) $\frac{d_A}{d_B}$ (3) $\left(\frac{d_A}{d_B}\right)^2$ (4) $\left(\frac{d_A}{d_B}\right)^{\frac{1}{2}}$ (5) $\left(\frac{d_A}{d_B}\right)^{\frac{3}{2}}$

31. A string is stretched between two fixed supports, It is observed to have two consecutive resonant frequencies at 300 Hz and 400 Hz. The lowest resonant frequency of the string is
(1) 50 Hz. (2) 100 Hz. (3) 150 Hz. (4) 200 Hz. (5) 300 Hz.

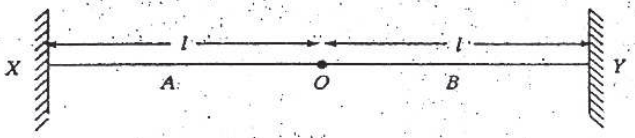
32. Which of the following is a possible path of a ray of light through a glass prism placed in air?



33. An astronomical telescope is in normal adjustment. The diameter of the incident light beam falling on the objective is d. If the angular magnification of the telescope is m the diameter of the emerged beam is —

(1) $\frac{d}{m}$ (2) dm (3) $d(m+1)$ (4) $\frac{2d}{m}$ (5) $\frac{d}{2m}$

34.



Two strings (A and B) having equal lengths (l) and equal cross sectional areas but different densities (d_A and d_B) are connected together, and the composite string is stretched across fixed walls as shown in the figure. Two pulses simultaneously sent along A and B from the two ends X and Y at $t = 0$ are found to pass through the centre O of the string at times t_A and t_B. If $d_A = 4d_B$, then

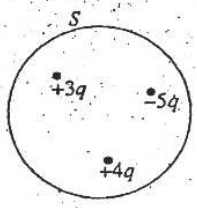
(1) $t_B = \frac{1}{4}t_A$ (2) $t_B = \frac{1}{2}t_A$ (3) $t_B = t_A$ (4) $t_B = 2t_A$ (5) $t_B = 4t_A$

35. A train moving along a straight track at a velocity of $30\,m\,s^{-1}$ emits a sound of frequency 600 Hz. If the speed of sound in air is $330\,m\,s^{-1}$, the wavelength of the sound propagated forward along the track will be

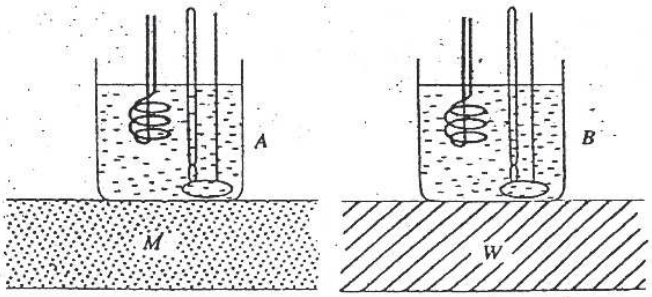
(1) 30 cm. (2) 40 cm. (3) 45 cm. (4) 50 cm. (5) 55 cm.

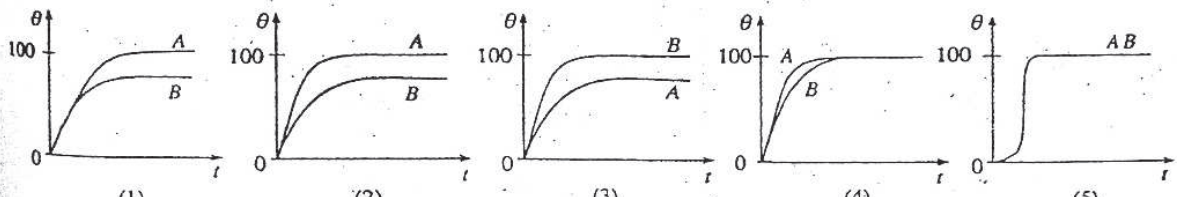
36. Net flux through the closed surface S in the diagram can be reversed by

(1) changing the $+3q$ to $+4q$.
(2) changing the $+4q$ to $+3q$
(3) changing the $-5q$ to $-7q$
(4) changing the $+3q$ to $+1q$
(5) changing the $+4q$ to $+1q$



37. Two identical thin metal cans A and B containing equal amounts of water are heated using two identical domestic electrical heaters. As shown in the figure, the cans A and B are kept on a large metal block (M) and a large wooden block (W) respectively. Which of the following curves best represents the variation of temperature (θ) of water in A and B with time (t) ?





38. Consider the following statements carefully.

(A) Constant volume gas thermometer is not suitable for measuring rapidly changing temperatures because it is not an accurate thermometer.
(B) Thermocouple is suitable for measuring rapidly changing temperatures because its heat capacity is large.
(C) Mercury-in-glass thermometer is not suitable for measuring rapidly changing temperatures because its heat capacity is very small.

Of the above statements

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

39. Consider the following statements made about the space just above a small block of ice placed in still air at a school laboratory, where room temperature and the relative humidity are 30 °C and 80% respectively.

(A) Absolute humidity of air in the space just above the ice block is higher than the absolute humidity of air away from the block.

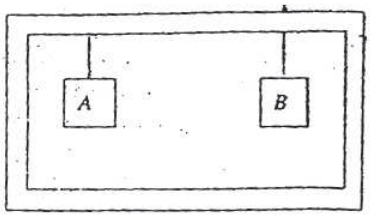
(B) Relative humidity of air in the space just above the ice block is higher than the relative humidity of air away from the block.

(C) Air in the space just above the ice block is drier than the air away from the block.

Of the above statements

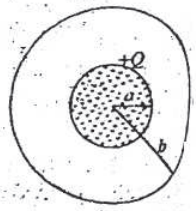
(1) only (A) is true.
(2) only (A) and (B) are true.
(3) only (B) and (C) are true.
(4) only (A) and (C) are true.
(5) all (A), (B) and (C) are true.

40. Two blocks A and B initially at 80 °C and room temperature (30 °C) respectively are hung from insulated strings in an evacuated and conducting enclosure which is at room temperature. The enclosure is insulated from outside. Which of the following statements is correct prior to the system being reached equilibrium?



(1) Temperatures of A, B and the enclosure remain unchanged.
(2) Enclosure remains at room temperature but the temperatures of A and B change.
(3) Temperatures of the enclosure and the block B increase, but that of block A decreases.
(4) Temperature of the enclosure increases but that of A and B remain unchanged.
(5) Temperatures of A and B decrease but that of enclosure increases.

41. A solid metal sphere of radius a carrying a charge $+Q$, is placed concentrically inside an isolated spherical metal shell of radius b as shown in the figure. The electric potential of the solid sphere is



(1) $\frac{1}{4\pi\epsilon_0}\frac{Q}{a}$.
(2) $\frac{1}{4\pi\epsilon_0}Q\left(\frac{1}{a}-\frac{1}{b}\right)$.
(3) 0.
(4) $\frac{1}{4\pi\epsilon_0}\frac{Q}{b}$.
(5) $-\frac{1}{4\pi\epsilon_0}\frac{Q}{a}$.

42. The mass of Mars is 0·1 times that of Earth. The distance between the Sun and Mars is 1·5 times the distance between Sun and Earth. The ratio

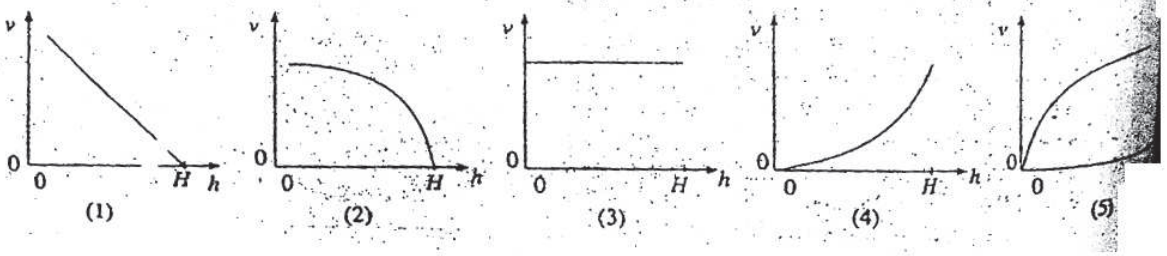
$$\frac{\text{Gravitational force of attraction between the Sun and Mars}}{\text{Gravitational force of attraction between the Sun and Earth}}$$ is

(1) 1
(2) $\frac{0\cdot1}{(1\cdot5)^2}$
(3) $\frac{1}{(1\cdot5)^2}$
(4) $\frac{(1\cdot5)^2}{1}$
(5) $\frac{(1\cdot5)^2}{0\cdot1}$

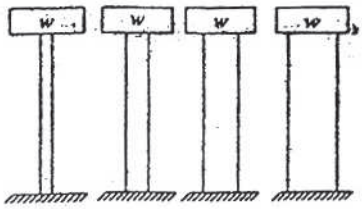
43. A six-legged insect stands on the surface of water. The radius of each circular flat foot is 2×10^{-4} m. The maximum weight of the insect that can be supported by the water surface is (surface tension of water 7×10^{-2} N m^{-1})

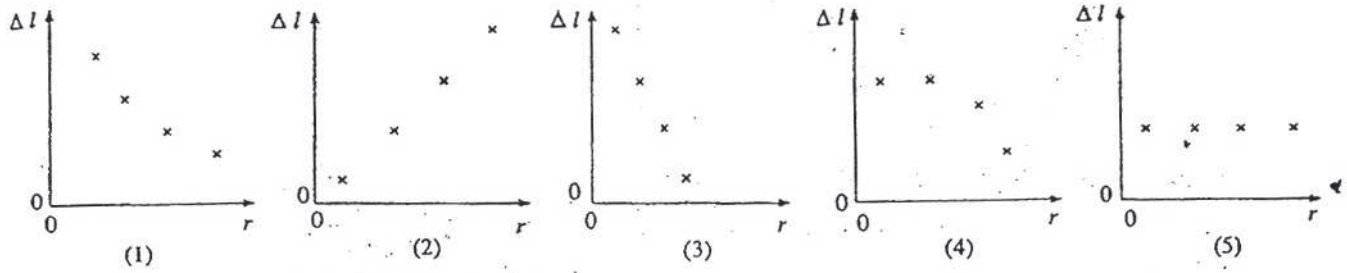
(1) $8\cdot80 \times 10^{-5}$ N
(2) $5\cdot28 \times 10^{-4}$ N
(3) $5\cdot28 \times 10^{-8}$ N
(4) $8\cdot80 \times 10^{-9}$ N
(5) $2\cdot00 \times 10^{-4}$ N

44. A small rain drop releases from a cloud at a height H above the earth surface. The variation of the speed (v) of rain drop with height h from the earth surface is best represented by

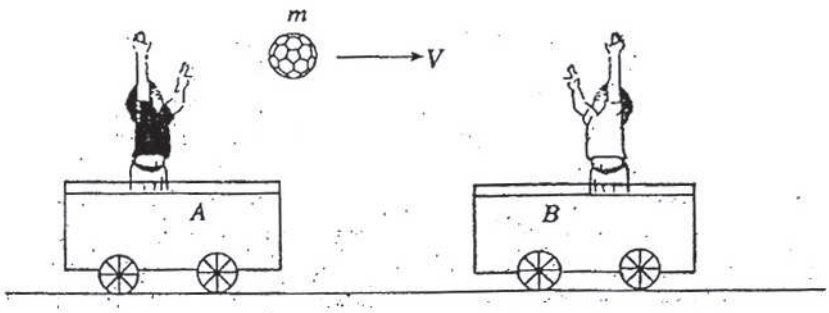


45. Consider a situation where weights w are placed on vertical rods of radii r, $2r$, $3r$ and $4r$ respectively and made of same material as shown in the figure. If the rods have the same length, and not attained the proportional limit, variation of the compression (Δl) with radius (r) is best represented by





46. Two boys of identical masses are standing on two identical trolleys A and B which are at rest on a frictionless horizontal surface. The boy on trolley A then throws a ball of mass m horizontally with velocity V with respect to the earth and the boy on trolley B catches it. If the mass of a trolley with a boy is M, the respective final velocities of trolleys A and B are



(1) $\frac{-mV}{M}$ and $\frac{-mV}{M+m}$.

(2) $\frac{-mV}{M+m}$ and $\frac{mV}{M+m}$.

(3) $\frac{-mV}{M}$ and $\frac{mV}{M+m}$.

(4) $\frac{-mV}{M-m}$ and $\frac{mV}{M+m}$

(5) $-V$ and V.

47.

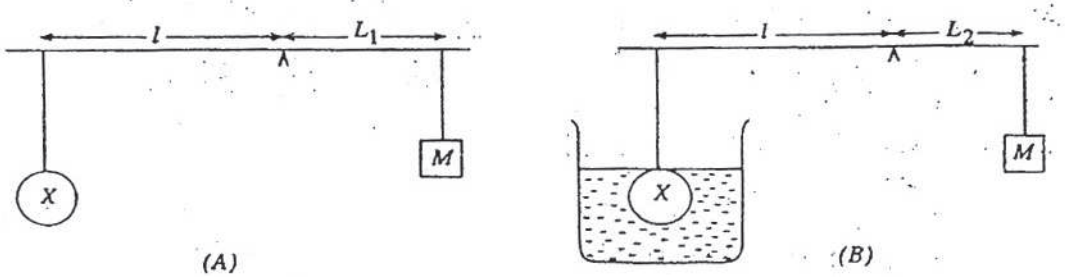
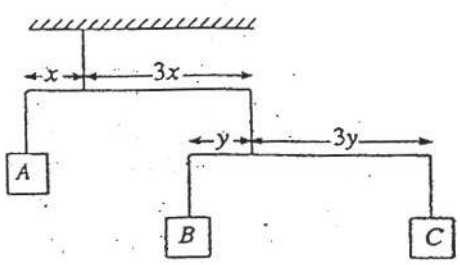


Fig. A shows the balanced position of a light rod carrying an object X and a mass M. Fig. B shows the balanced position of the same system when X is immersed in water. If the density of water is d, the density of the material made of X is given by

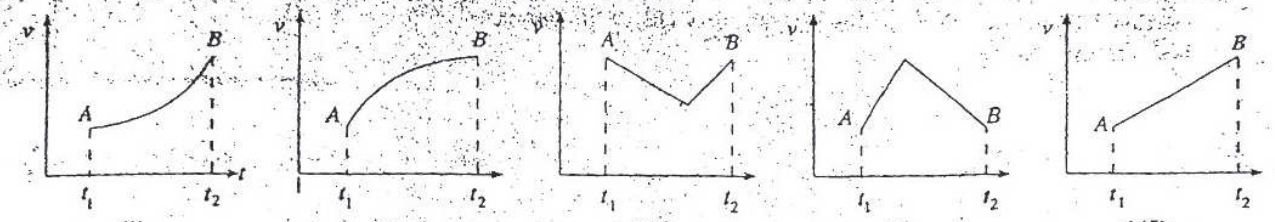
(1) $\frac{L_1}{(L_1-L_2)}d$ (2) $\frac{L_1}{L_2}d$ (3) $\frac{L_1}{(L_1+L_2)}d$ (4) $\frac{(L_1-L_2)}{L_1}d$ (5) $\frac{L_2}{L_1}d$

48. Three masses A, B, and C are hanging from horizontal crossbars as shown in the figure. Each crossbar has negligible mass. If A has mass 6 kg, the masses of B and C respectively are



(1) 1·0 kg ; 1·0 kg
(2) 1·5 kg ; 0·5 kg
(3) 3·0 kg ; 1·0 kg
(4) 0·5 kg ; 1·5 kg
(5) 1·5 kg ; 1·0 kg

49. In which of velocity (v) - time (t) graphs shown below would the average velocity over the entire period between t_1 and t_2 be equal to the average of the two velocities at the ends A and B of the interval?



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

50. Motion of a simple pendulum of length L and period T is interrupted by an object placed at X, where $AX = \frac{1}{2}L$ as shown in the figure. When the pendulum is at rest the object at X just touches the string. The period of the resultant pendulum is given by



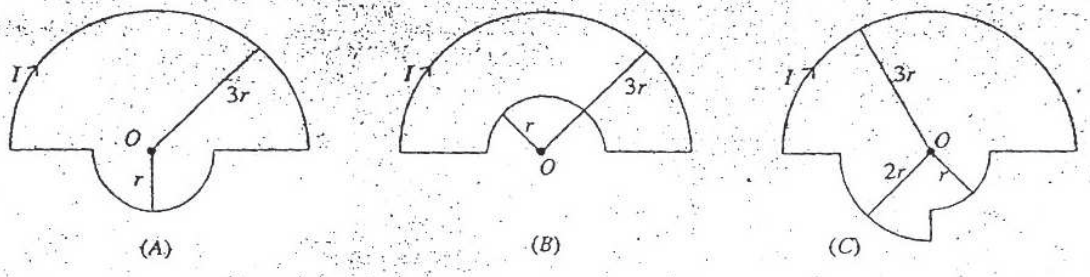
(1) T (2) $\frac{T}{\sqrt{2}}$ (3) $\frac{(1+\sqrt{2})}{2\sqrt{2}}T$

(4) $T + \frac{T}{\sqrt{2}}$ (5) $\frac{T}{2}$

51. When an object is placed 10 cm from a lens its image is formed 10 cm behind the object. The focal length and the type of the lens respectively are

(1) 6·7 cm, concave. (2) 6·7 cm, convex. (3) 10·0 cm, concave.
(4) 10·0 cm, convex. (5) 20·0 cm, convex.

52.

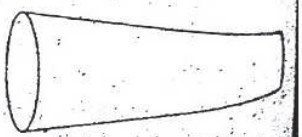


(A) (B) (C)

The figure shows three loops A, B and C consisting of concentric circular arcs (either half or quarter-circles of radii r, $2r$ and $3r$). The loops carry the same current I. If the magnetic flux densities produced at O by each loop is B_A, B_B and B_C respectively, then

(1) $B_A > B_C > B_B$ (2) $B_A = B_B = B_C$ (3) $B_A > B_B > B_C$
(4) $B_A < B_C < B_B$ (5) $B_A = B_B > B_C$

53. The diameter of a current carrying wire decreases as shown in figure, and the current flows through the wire from left to right. Consider the following statements.

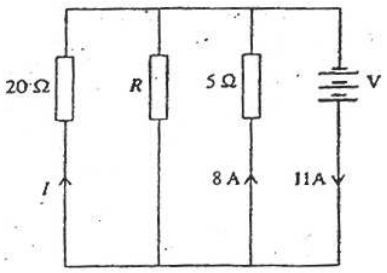


(A) Current decreases along the wire.
(B) Potential drop per unit length increases along the wire.
(C) Magnetic flux density on the surface of the wire due to the current decreases along the wire.

Of the above statements

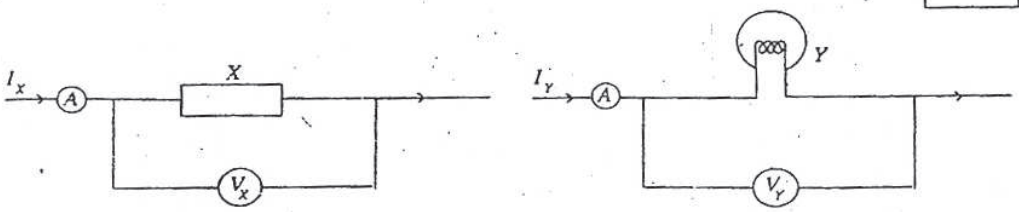
(1) only (A) is true. (2) only (B) is true. (3) only (C) is
(4) only (B) and (C) are true. (5) all (A), (B) and (C) are false.

54. The battery in the circuit has no internal resistance. The values of V, I and R respectively, are



(1) 20 V, 1 A and 10 Ω
(2) 20 V, 1 A and 20 Ω
(3) 40 V, 1 A and 20 Ω
(4) 40 V, 2 A and 20 Ω
(5) 40 V, 2 A and 40 Ω

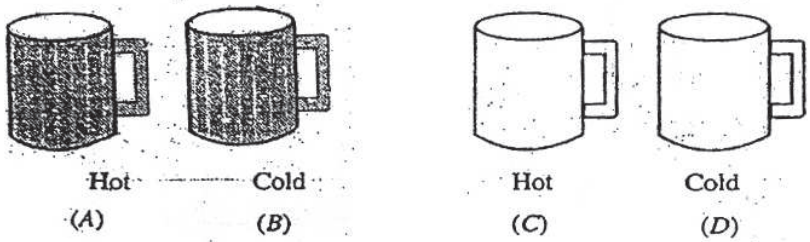
55.



In figure shown, X is a resistor and Y is a torch bulb. When $I_X = I_Y = 2$ mA, $V_X = V_Y = 0{\cdot}3$ V. When $I_X = I_Y = 40$ mA the filament of the bulb glows. Then the possible voltmeter readings are

(1) $V_X = 6{\cdot}0$ V and $V_Y = 3{\cdot}0$ V
(2) $V_X = 6{\cdot}0$ V and $V_Y = 6{\cdot}0$ V
(3) $V_X = 6{\cdot}0$ V and $V_Y = 9{\cdot}0$ V
(4) $V_X = 3{\cdot}0$ V and $V_Y = 9{\cdot}0$ V
(5) $V_X = 3{\cdot}0$ V and $V_Y = 6{\cdot}0$ V

56.

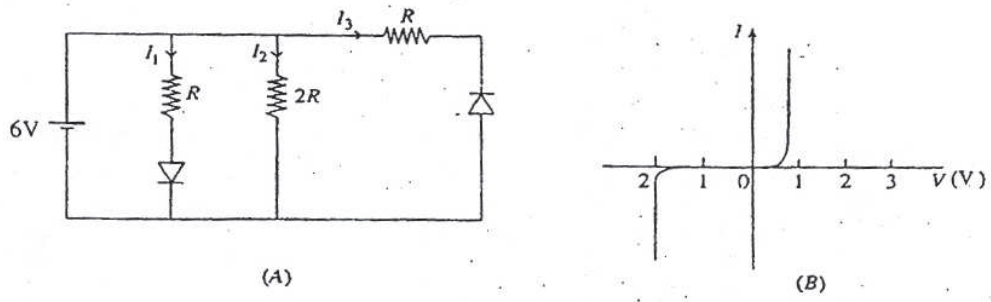


A, B, C and D are four cups of same size. A and B have rough black surfaces and C and D have smooth shining surfaces.

A and C are filled with hot tea at 50°C and B and D are filled with cold tea at 10°C. If the room temperature is 30 °C which of the following is true?

(1) A cools faster than C, and B warms faster than D
(2) A cools slower than C, and B warms faster than D
(3) A and C cool at the same rate, and B warms faster than D
(4) A cools slower than C, and B warms slower than D
(5) A cools faster than C and B warms slower than D

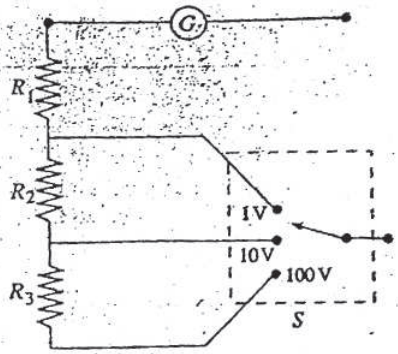
57.



I - V characteristic of the silicon diodes shown in circuit (A) is given in figure (B). 6 V cell has negligible internal resistance. Of I_1, I_2 and I_3, the maximum and the minimum currents respectively, are

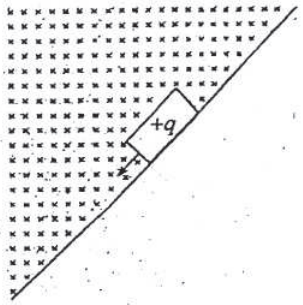
(1) I_2 and I_1 (2) I_3 and I_2 (3) I_1 and I_2 (4) I_3 and I_1 (5) I_1 and I_3

58. A multi-scale voltmeter arrangement giving full-scale readings of 1 V, 10 V and 100 V for the three settings of the switch S is shown in the figure. The galvanometer G gives a full-scale deflection for a current of 1 mA and has a negligible resistance. The values of R_1, R_2 and R_3 respectively are

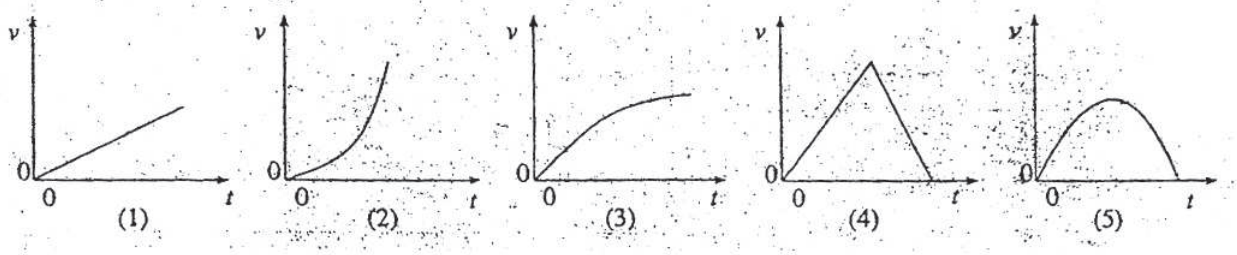


(1) 1 kΩ, 1 kΩ, 1 kΩ
(2) 1 kΩ, 10 kΩ, 100 kΩ
(3) 1 kΩ, 9 kΩ, 99 kΩ
(4) 1 kΩ, 9 kΩ, 90 kΩ
(5) 1 kΩ, 100 kΩ, 1000 kΩ

59. An object carrying a positive charge slides down a long inclined rough plane from rest. A uniform magnetic field is acting as shown in the figure.



The variation of the velocity v of the object with time t is best represented by



60. A circular conducting loop moves at a constant velocity through two regions consisting of magnetic fields. The magnetic fields in the two regions are uniform and have the same magnitude but acting in opposite directions as shown in the figure. The induced e.m.f. (E) in the loop varies with time (t) as

