



PHYSICS

BOOKS - D MUKHERJEE PHYSICS (HINGLISH)

PRACTICE WORKSHEET 2

Straight Objective Type

1. A converging glass lens with a refractive index of 1.5 has a focal length of f in air. When

it is completely immersed in a liquid of refractive index 2, its focal length and nature will be respectively

- A. $2f$ and converging
- B. $3f$ and converging
- C. $2f$ and diverging
- D. $3f$ and diverging

Answer: C



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2. A large hollow metal sphere of radius R has a small opening at the top. Small drops of mercury each of radius r and charged to a potential V fall into the sphere. The potential of the sphere becomes V' after N drops fall into it. Then,

A. $V' < V$ for all N

B. $V'=V$ for $N=1$

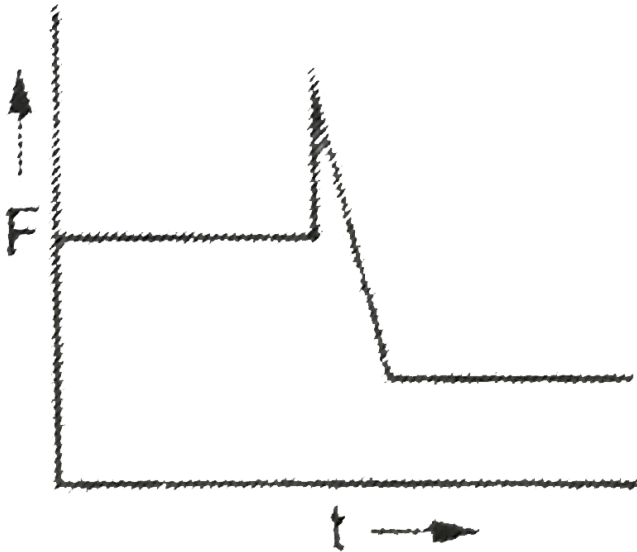
C. $V'=V$ for $N=R/r$

D. $V'=V$ for $N=(R/r)^{1/3}$

Answer: A



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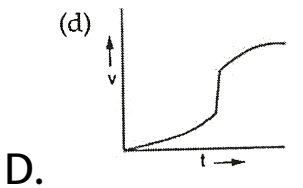
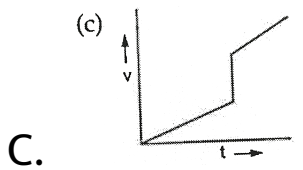
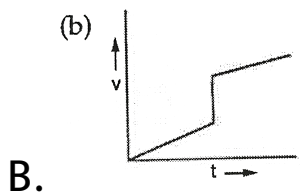
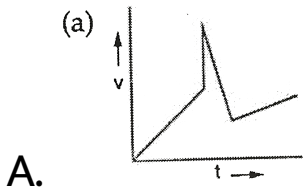


3.

9-19

The force F acting on a particle plotted against

time t is shown in figure given. Its velocity v is plotted against t in the following figure. Which of these represents the resulting curve best ?



Answer: B



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4. A body cools in a surrounding of constant temperature $30^{\circ}C$. Its heat capacity is $2J/^{\circ}C$. Initial temperature is $40^{\circ}C$ and Newton's law of cooling is valid. The body of mass 1kg cools to $38^{\circ}C$ in 10 min.

When the body temperature has reached $38^{\circ}C$, it is heated again so that it reaches $40^{\circ}C$.

in 10 min. The heat required from a heater by the body is

A. 3000J

B. 3600J

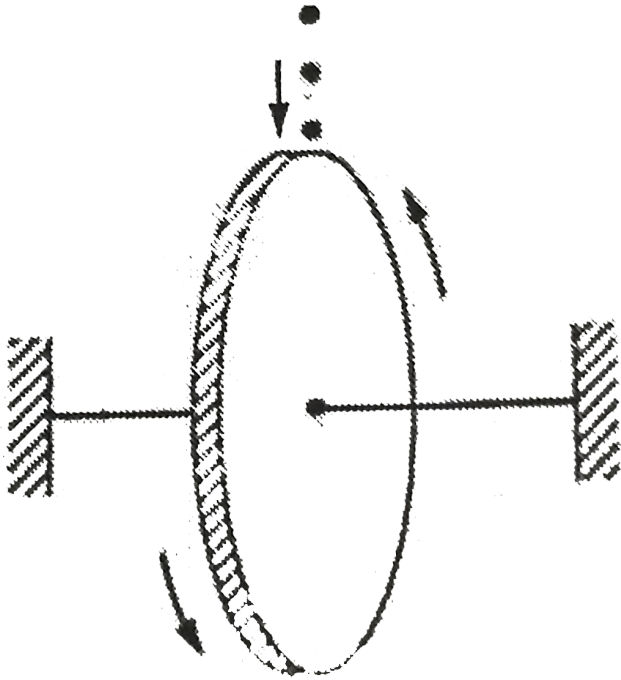
C. 4500J

D. 5400J

Answer: C



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5.

A disc of mass m_0 rotates freely about a fixed horizontal axis passing through its centre. A thin cotton pad is fixed to its rim, which can absorb water. The mass of water dripping onto the pad per unit time is μ . After what time will

the angular velocity of the disc get reduced to half its initial value?

A. $\frac{2m_0}{\mu}$

B. $\frac{3m_0}{\mu}$

C. $\frac{m_0}{\mu}$

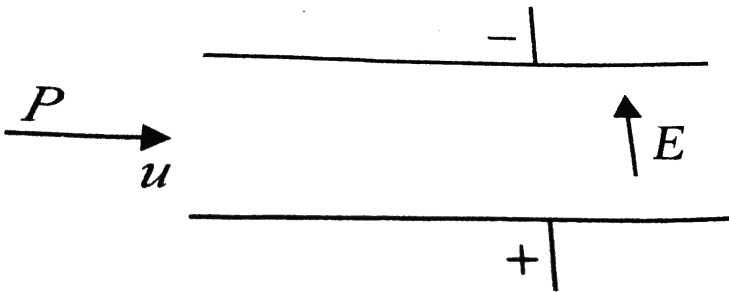
D. $\frac{m_0}{2\mu}$

Answer: D



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6. A positively charged particle P enters the region between two parallel plates with a velocity u , in a direction parallel to the plates. There is a uniform electric field in this region. P emerges from this region with a velocity v . Taking C as a constant, v will depend on u as



A. $v = \alpha u$

B. $v = \sqrt{u^2 + \alpha u}$

$$\text{C. } v = \sqrt{u^2 + \frac{\alpha}{u}}$$

$$\text{D. } v = \sqrt{u^2 + \frac{\alpha}{u^2}}$$

Answer: D



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7. A spaceship orbits the earth at a constant speed along a circular path. When an astronaut inside the spaceship releases an object, it does not move away from him. Which

of the following is the most accurate reason for this?

A. The astronaut and the object move along the same circular path due to the earth's gravitational pull.

B. An object moving in a circular path round the earth experiences no gravitational pull.

C. The gravitational forces on the object due to the spaceship exactly balance the

gravitational pull on it due to the earth.

D. The gravitational pull on the object due to the earth is very weak at a large distance from the earth.

Answer: A



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8. The radius of gyration of a square plate of side length l about a diagonal is

A. $\frac{l}{3}$

B. $\frac{l}{3\sqrt{2}}$

C. $\frac{l}{2\sqrt{3}}$

D. $\frac{l}{6}$

Answer: C



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9. The total energy of a hydrogen atom in its ground state is -13.6 eV. If the potential energy

in the first excited state is taken as zero then the total energy in the ground state will be

A. -3.4eV

B. 3.4eV

C. -6.8eV

D. 6.8 eV

Answer: C



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10. The average number of degree of freedom per molecule for a gas is 7. A sample of the gas perform 30 J of work when it expands at constant pressure. Find the heat absorbed by the gas in the process.

A. 3

B. 4

C. 5

D. 6

Answer: B



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11. A coaxial cable consists of a thin inner conductor fixed along the axis of a hollow outer conductor. The two conductor carry equal currents in opposite directions. Let B_1 and B_2 be the magnetic fields in the region between the conductors and outside the conductor, respectively. Then,

A. Y but not in X

B. X but not in Y

C. both X and Y

D. neither X nor Y

Answer: A



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12. At ordinary temperatures, the molecules of an ideal gas have only translational and rotational kinetic energies. At high temperatures they may also have vibrational

energy.

As a result of this, at higher temperature

A. lower molar heat capacity

B. higher molar heat capacity

C. lower isothermal compressibility

D. higher isothermal compressibility

Answer: B



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13. A parallel - plate capacitor containing a dielectric slab is connected to a cell. The slab is then taken out of the capacitor slowly. Disregard the forces of gravity and friction. For this process, which of the following statements is incorrect?

A. The external agent pulling the slab out will have to perform some work.

B. The potential energy of the capacitor will decrease.

C. The cell will receive some energy

D. The work done on or by the external agent will be equal to the energy supplied or absorbed by the cell.

Answer: D



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14. A car is initially at rest, 330 m away from a stationary observer. It begins to move towards the observer with an acceleration of $1.1ms^{-2}$

sounding its horn continuously. 20 s later, the driver stops sounding the horn. The velocity of sound in air is 330ms^{-1} . The observer will hear the sound of the horn for a duration of

A. 20s

B. 21s

C. $20\frac{2}{3}\text{s}$

D. $19\frac{1}{3}\text{s}$

Answer: A



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15. A point source of light is placed at a distance of $2f$ from a converging lens of focal length f . The intensity on the other side of the lens is maximum at a distance

A. a parallel beam of light emerging from the lens

B. a real image of S in air

C. a virtual image of S in Water

D. a virtual image of S in air

Answer: C



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16. A vertical tank, open at the top, is filled with a liquid and rests on a smooth horizontal surface. A small hole is opened at the centre of one side of the tank. The area of cross-section of the tank is N times the area of the hole, where N is a large number. Neglect mass of the tank itself. The initial acceleration of the tank is

A. $\frac{g}{2N}$

B. $\frac{g}{\sqrt{2N}}$

C. $\frac{g}{N}$

D. $\frac{g}{2\sqrt{N}}$

Answer: C



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17. A string of length 2 m is fixed at both ends. If this string vibrates in its fourth normal mode with a frequency of 500 Hz then the waves would travel on it with a velocity of

A. $\frac{2lv}{V}$

B. $\frac{2lV}{v}$

C. $\frac{lV}{v}$

D. $2l$

Answer: A



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Assertion Reason Type

1. STATEMENT-1: In a gas , any rapid change must be adiabatic, whereas a slow change may

be adiabatic.

STATEMENT-2: In a p-V diagram, the magnitude of the slope is greater for an adiabatic process than for an isothermal process.

A. Statement-1 is True , Statement-2 is True,
Statement-2 is a correct explanation for
Statement-1.

B. Statement-1 is True , Statement-2 is True,
Statement-2 is not a correct explanation
for Statement-1.

C. Statement-1 is True , Statement-2 is False.

D. Statement-1 is False , Statement-2 is True.

Answer: A



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2. STATEMENT-1: An open organ pipe can be used as a musical instrument but not a closed organ pipe.

STATEMENT-2: The fundamental frequency of an open organ pipe is twice the fundamental

frequency of a closed organ pipe of the same length.

A. Statement-1 is True , Statement-2 is True,
Statement-2 is a correct explanation for
Statement-1.

B. Statement-1 is True , Statement-2 is True,
Statement-2 is not a correct explanation
for Statement-1.

C. Statement-1 is True , Statement-2 is False.

D. Statement-1 is False , Statement-2 is True.

Answer: B



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3. STATEMENT-1: Electric or magnetic lines of force do not intersect.

STATEMENT-2: The tangent drawn to a line of force gives the direction of the intensity at that point.

A. Statement-1 is True , Statement-2 is True,
Statement-2 is a correct explanation for

Statement-1.

B. Statement-1 is True , Statement-2 is True,

Statement-2 is not a correct explanation

for Statement-1.

C. Statement-1 is True , Statement-2 is False.

D. Statement-1 is False , Statement-2 is True.

Answer: A



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1. A parallel-plate capacitor is clamped to a stand such that its plates are vertical. It remains connected to a cell through a centre-zero galvanometer. A metal sheet which is parallel to the plate of the capacitor and whose thickness is slightly less than the separation between these plates is now allowed to fall under gravity through the plates, without touching them.

Which of the following correctly describes the deflection(s) of the galvanometer?

A. It will show a constant deflection to one side only, as long as the sheet is passing through the plates.

B. It will show a variable deflection to one side only, as long as the sheet is passing through the plates.

C. It will show deflection first to one side and then to the other.

D. It will not show any deflection first to one side and then to the other.

Answer: C



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2. A parallel-plate capacitor is clamped to a stand such that its plates are vertical. It remains connected to a cell through a centre-zero galvanometer. A metal sheet which is parallel to the plate of the capacitor and whose thickness is slightly less than the separation between these plates is now allowed to fall under gravity though the plates,

without touching them.

Which of the following correctly described the motion of the metal plate as it passes through the plates of the capacitors ?

A. It will move with a constant acceleration equal to g the acceleration due to gravity.

B. It will move with a constant acceleration less than g .

C. It will move with a constant acceleration greater than g .

D. It will move with variable acceleration less than the acceleration due to gravity.

Answer: D



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3. A parallel-plate capacitor is clamped to a stand such that its plates are vertical. It remains connected to a cell through a centre-zero galvanometer. A metal sheet which is parallel to the plate of the capacitor and

whose thickness is slightly less than the separation between these plates is now allowed to fall under gravity through the plates, without touching them.

In the entire process of the metal sheet passing through the plates, which of the following statements will not be correct ?

A. Its gain in kinetic energy will be less than its loss in gravitational potential energy.

B. some heat will be produced in the electrical circuit

C. The cell will lose some electrical energy

but never gain any energy

D. The current through the cell will reverse

in direction at some point.

Answer: C



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4. Certain radioactive processes are listed in column A, and some properties and processes

related to them are listed in column B.

column A

column B

(i) α decay

(a) Increase in atomic number

(ii) β decay

(b) Decrease in atomic number

(iii) γ emission

(c) No change in atomic number

(iv) K capture

(d) Emission of energy



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