



# PHYSICS

## BOOKS - AIIMS PREVIOUS YEAR PAPERS

### AIIMS 2009

#### Physics

1. A convex lens of refractive index  $\frac{3}{2}$  has a power of  $2.5^\circ$ . If it is placed in a liquid of

refractive index 2, the new power of the lens is

A.  $-1.25D$

B.  $-1.5D$

C.  $1.25D$

D.  $1.5D$

**Answer: A**



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2. What is ratio of Bohr magneton to the nuclear magneton?

A.  $m_1 / m_e$

B.  $m_p^2 / m_e^2$

C. 1

D.  $\frac{m_e}{m_p}$

**Answer: A**



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3. When the inputs of a two input logic gate are 0 and 0, the output is 1. When the inputs are 1 and 0, the output is zero. The type of logic gate is

A. XOR

B. NAND

C. NOR

D. OR

**Answer: C**



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4. De Broglie wavelength  $\lambda$  associated with neutrons is related with absolute temperature  $T$  as

A.  $\lambda \propto T$

B.  $\lambda \propto \frac{1}{T}$

C.  $\lambda \propto \frac{1}{\sqrt{T}}$

D.  $\lambda \propto T^2$

**Answer: C**



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5. The dimensions of specific resistance are

A.  $[ML^2T^{-2}A^{-1}]$

B.  $[ML^3T^{-3}A^{-2}]$

C.  $[ML^3T^{-2}A^{-1}]$

D.  $[ML^2T^{-2}A^{-2}]$

**Answer: B**



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6. The reciprocal of impedance is called

A. susceptance

B. conductance

C. admittance

D. transconductance

**Answer: C**



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7. A nucleus of mass number 220 decays by  $\alpha$  decay. The energy released in the reaction is 5 MeV. The kinetic energy of an  $\alpha$  – particle is

A.  $\frac{1}{54} \text{ MeV}$

B.  $\frac{27}{11} \text{ MeV}$

C.  $\frac{54}{11} \text{ MeV}$

D.  $\frac{55}{54} \text{ MeV}$

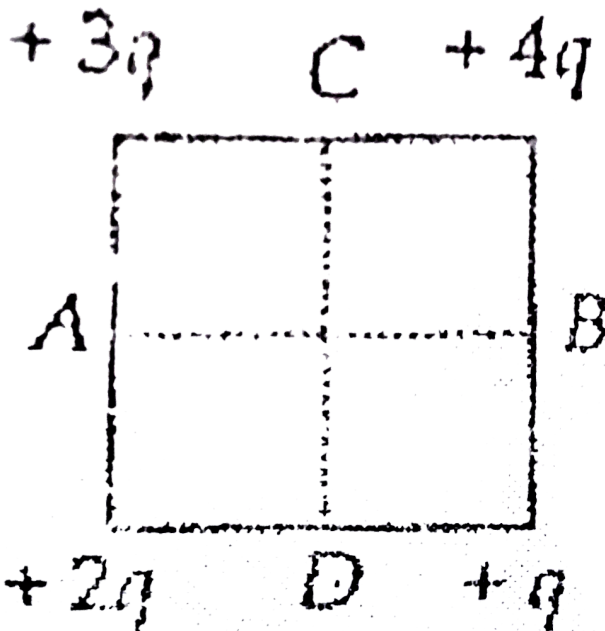
**Answer: C**



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8. Four charges are arranged at the corners of a square as shown in the figure. The direction of electric field at the centre of the square is along



A. DC

B. BC

C. AB

D. AD

**Answer: A**



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9. The wavelength of  $K_a$  , X-rays for lead isotopes

$Pb^{208}$  ,  $Pb^{206}$  ,  $Pb^{204}$  are  $\lambda_1$  ,  $\lambda_2$  and  $\lambda_3$ ,

resperctively. Then

A.  $\lambda_2 = \sqrt{\lambda_1 \lambda_3}$

B.  $\lambda_2 = \lambda_1 + \lambda_3$

C.  $\lambda_2 = \lambda_1 \lambda_3$

D.  $\lambda_2 = \frac{\lambda_1}{\lambda_3}$

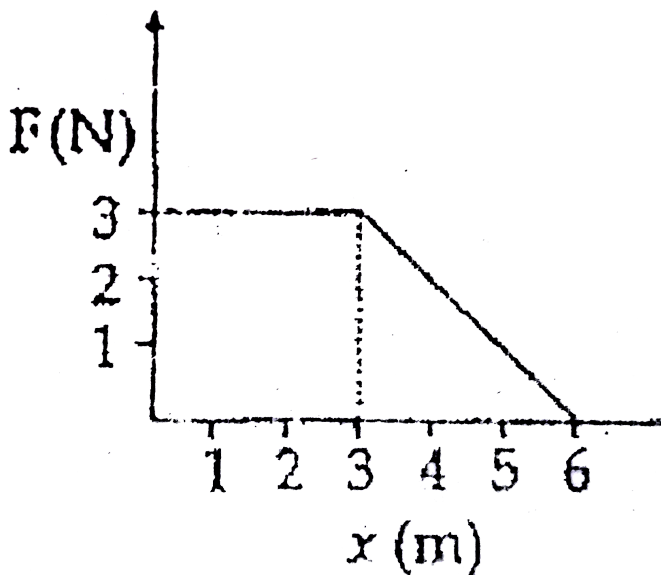
**Answer: A**



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**10.** A force  $F$  acting on an object varies with distance  $x$  as shown in the figure. The force is in N and  $x$  in m. The work done by the force in

moving the object from  $x = 0$  to  $x = 6$  m is



A. 13.5 J

B. 10 J

C. 15 J

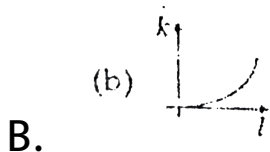
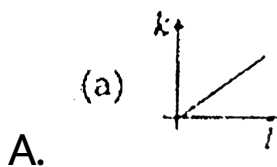
D. 20 J

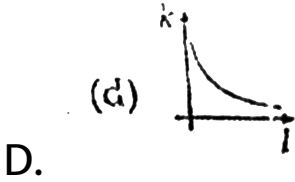
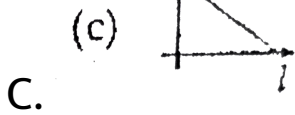
**Answer: A**



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**11.** Which of the following graph depicts spring constant  $k$  versus length  $l$  of the spring correctly





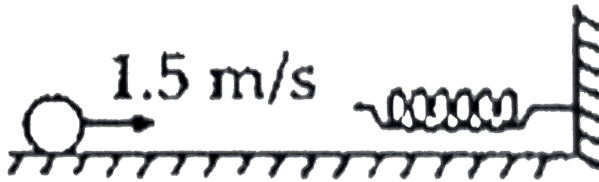
**Answer: D**



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**12.** A body of mass 5 kg moving with a speed of 1.5 m/s on a horizontal smooth surface collides with a nearly weightless spring of

force constant  $k = 5 \text{ N/m}$ . The maximum compression of the spring would be



- A. 0.5 m
- B. 0.15 m
- C. 1.5 m
- D. 0.12 m

**Answer: C**



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13. A body is moved along a straight line by a machine delivering constant power . The distance moved by the body is time  $t$  is proportional to

A.  $t^{1/2}$

B.  $t$

C.  $t^{3/2}$

D.  $t^2$

**Answer: C**





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14. Light with an energy flux of  $18W/cm^2$  falls on a non-reflecting surface at normal incidence. The pressure exerted on the surface is

A.  $2N/m^2$

B.  $2 \times 10^{-4}N/m^2$

C.  $6N/m^2$

D.  $6 \times 10^{-4}N/m^2$

**Answer: D**



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**15.** The dimensional formula for Planck's constant ( $h$ ) is \_\_\_\_\_

A.  $[ML^2T^{-1}]$

B.  $[ML^2T^{-2}]$

C.  $[ML^0T^2]$

D.  $[MLT^2]$

**Answer: A**



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**16.** A body is projected horizontally with a velocity of  $4\sqrt{2}m / \text{sec}$ . The velocity of the body after 0.7 seconds will be bearly (Take  $g = 10\frac{m}{\text{sec}^2}$ )

A. 10 m/sec

B. 9 m/sec

C. 19 m/sec

D. 11 m/sec

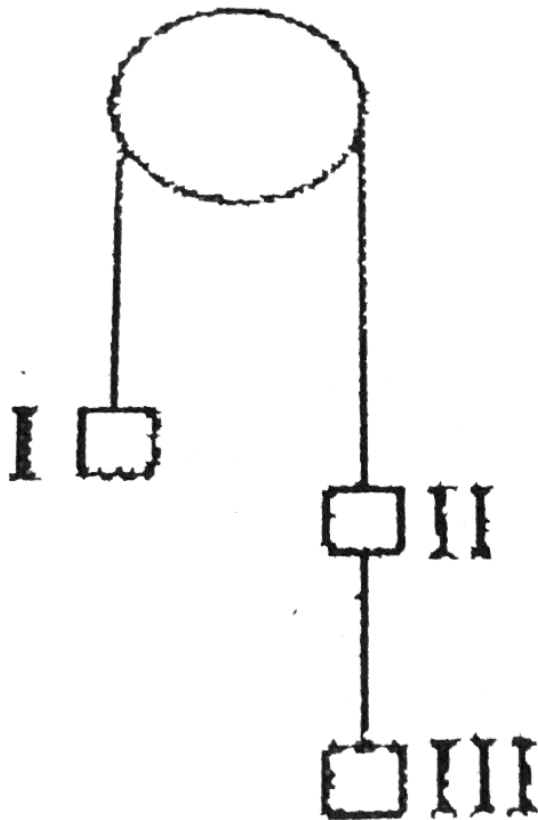
**Answer: B**



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**17.** Three equal weights of 3 kg each are hanging on a string passing over a frictionless pulley as shown in figure. The tension in the string between masses II and III will be (Take =

$10\text{ m/sec}^2$ )



A. 5 N

B. 6 N

C. 10 N

D. 20 N

**Answer: D**



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**18.** A ball is bouncing down a set of stairs. The coefficient of restitution is  $e$ . The height of each step is  $d$  and the ball bounces one step at each bounce. After each bounce the ball rebounds to a height  $h$  above the next lower step. Neglect width of each step in

comparison to  $h$  and assume the impacts to be effectively head on. Which of the following relation is correct ?

A.  $h = \frac{d}{1 - e^2}$

B.  $h = \frac{d}{1 + e^2}$

C.  $h = \frac{d}{1 + e}$

D.  $h = \sqrt{\frac{d}{1 - e^2}}$

**Answer: A**



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19. A conducting sphere of radius  $R$  and carrying a charge  $Q$  is joined to an uncharged conducting sphere of radius  $2R$ . The charge flowing between them will be

A.  $\frac{1}{4\pi\epsilon_0} \cdot \frac{Q^2}{4R}$

B.  $\frac{1}{4\pi\epsilon_0} \cdot \frac{Q^2}{2R}$

C.  $\frac{1}{4\pi\epsilon_0} \cdot \frac{Q^2}{R}$

D.  $\frac{2}{2\pi\epsilon_0} \cdot \frac{Q^2}{3R}$

**Answer: A**



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20. Black holes in orbit around a normal star are detected from the earth due to the frictional heating of infalling gas into the black hole, which can reach temperature greater than  $10^6 K$ . Assuming that the infalling gas can be modelled as a blackbody radiator, then the wavelength of maximum power lies

A. in the visible region

B. in the X-ray region

C. in the microwave region

D. in the gamma-ray region of  
electromagnetic spectrum

**Answer: B**



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21. Neglecting the density of air, the terminal velocity obtained by a raindrop of radius  $0.3\text{mm}$  falling through the air of viscosity  $1.8 \times 10^{-5} \text{N/m}^2$  will be

A.  $10.9ms^{-1}$

B.  $7.48ms^{-1}$

C.  $3.7ms^{-1}$

D.  $12.8ms^{-1}$

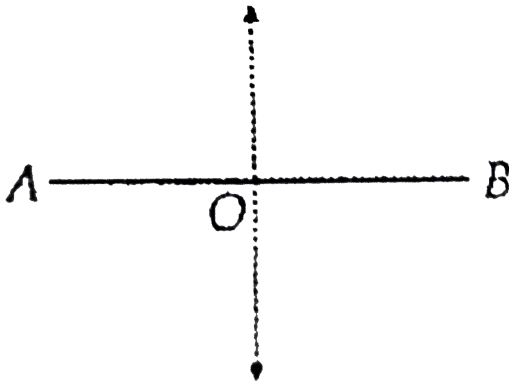
**Answer: A**



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**22.** A particle executes simple harmonic motion of period  $T$  and amplitude  $l$  along a rod  $AB$  of length  $2l$ . The rod  $AB$  itself executes

simple harmonic motion of the same period and amplitude in a direction perpendicular to its length. Initially, both the particle and the rod are in their mean positions. The path traced out the particle will be



- A. a circle of radius  $l$
- B. a straight line inclined at  $\frac{\pi}{4}$  to the rod
- C. an ellipse

D. a figure of eight

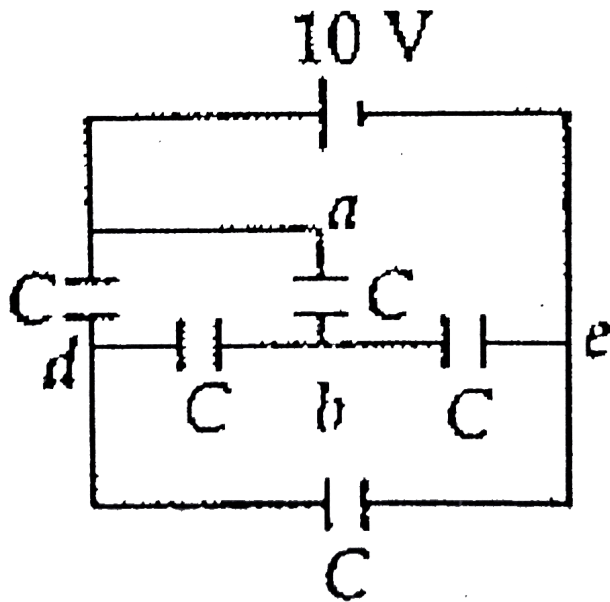
**Answer: B**



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**23.** What is the energy stored in the capacitor between terminals a and b of the network shown in the figure ? (Capacitance of each

capacitance  $C = 1\mu F$ )



A.  $12.5\mu J$

B. Zero

C.  $25\mu J$

D.  $50\mu J$

**Answer: A**



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24. When a current is passed in a conductor,  $3^{\circ}C$  rise in temperature is observed. If the strength of current is made thrice, then rise in temperature will approximately be

A.  $36^{\circ}C$

B.  $27^{\circ}C$

C.  $186^{\circ}C$

D.  $9^{\circ}C$

**Answer: B**



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**25.** In a metal with positive Thomson coefficient, current is passed from the lower temperature to higher temperature side. Then heat will be

A. absorbed



B. constant

C. evolved

D. either 'b' or 'c'

**Answer: A**



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**26.** A moving coil galvanometer has a resistance of  $990\Omega$ . in order to send only 10% of the main current through this

galvanometer, the resistance of the required shunt is

A.  $0.9\Omega$

B.  $100\Omega$

C.  $405\Omega$

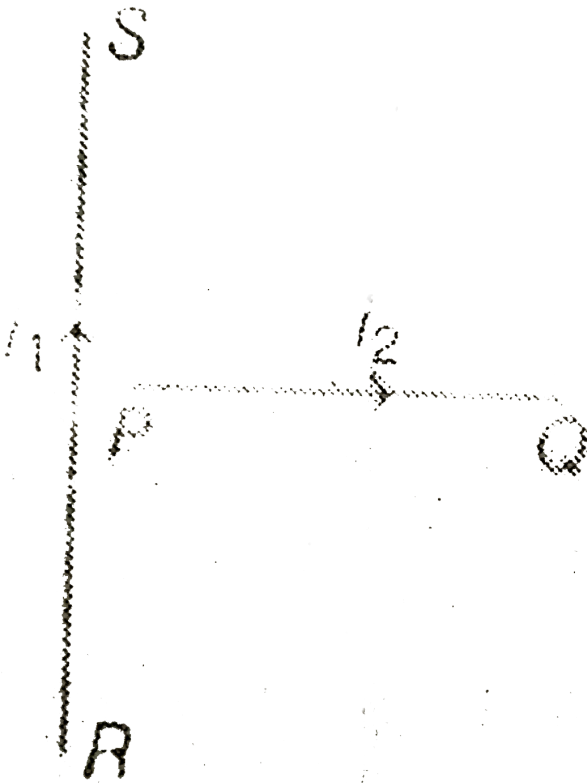
D.  $90\Omega$

**Answer: B**



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27. A current carrying wire PQ is placed near an another long current carrying wire RS . If free to moves , wire will be have



A. rotational motion only

B. translational motion only

C. rotational as well as translational motion

D. neither rotational nor translational motion.

**Answer: C**



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28. A coil of wire of a certain radius has 100 turns and a self inductance of 15 mH. The self inductance of a second similar coil of 500 turns will be

A. 75 mH

B. 375 mH

C. 15 mH

D. none of these

**Answer: B**



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29. In a series LCR circuit, the voltage across the resistance, capacitance and inductance is 10 V each. If the capacitance is short circuited the voltage across the inductance will be

A. 10 V

B.  $10\sqrt{2}V$

C.  $10 / \sqrt{2}V$

D. 20 V

**Answer: C**



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**30.** choose the correct option. If speed of gamma rays, X-rays and microwaves are  $V_g$ ,  $V_x$  and  $V_m$ .

A.  $v_s > v_x > v_m$

B.  $v_s < v_x < v_m$

C.  $v_s > v_x > v_m$

D.  $v_s = v_x = v_m$

**Answer: D**



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**31.** Which out of the following cannot produce two coherent sources?

- A. Lloyd's mirror
- B. Fresnel biprism
- C. Young's double salt
- D. Prism



**Answer: D**



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**32.** In Young's double slit experiment, the two slits act as coherent sources of equal amplitude  $A$  and wavelength  $\lambda$ . In another experiment with the same set up the two slits are of equal amplitude  $A$  and wavelength  $\lambda$  but are incoherent. The ratio of the intensity of light at the mid-point of the screen in the first case to that in the second case is

A. 2:1

B. 1:2

C. 3:4

D. 4:3

**Answer: A**



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**33.** If the kinetic energy of a particle is increased by 10 times, the percentage change in the de Broglie wavelength of the particle is

A. 25 %

B. 75 %

C. 60 %

D. 50 %

**Answer: B**



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**34.** If the half lives of a radioactive element for  $\alpha$  and  $\beta$  decay are 4 year and 12 years

respectively, then the percentage of the element that remains after 12 year will be

A. 6.25 %

B. 12.5 %

C. 25 %

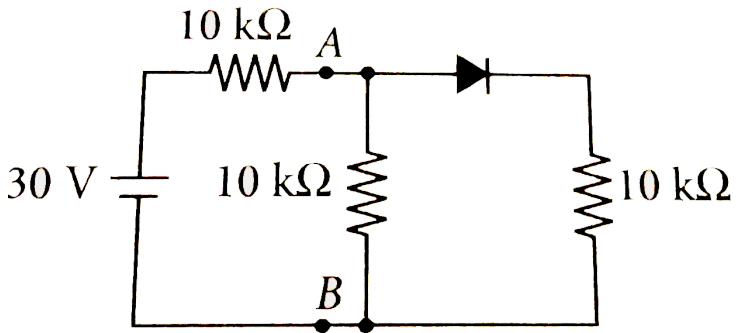
D. 50 %

**Answer: A**



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35. In the given circuit, the potential difference between A and B is



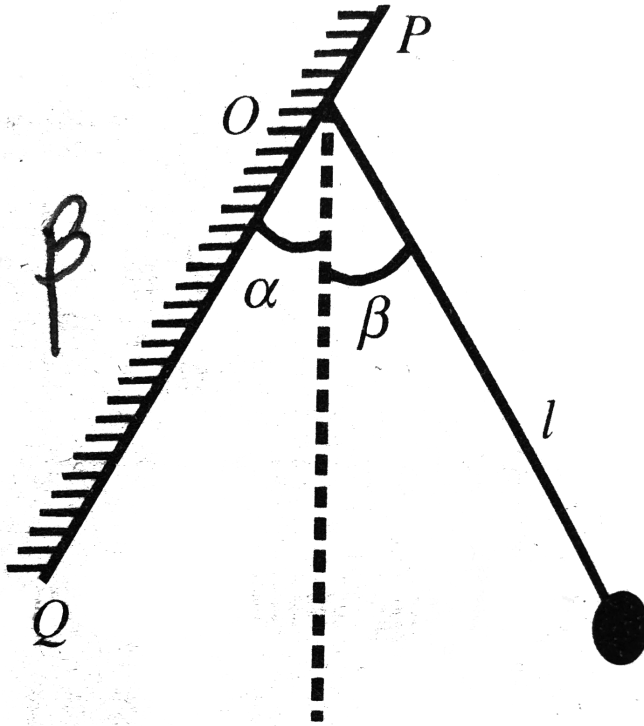
- A. 0
- B. 5 volt
- C. 10 volt.
- D. 15 volt.

**Answer: C**



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**36.** A ball is suspended by a thread of length  $l$  at the point  $O$  on an incline wall as shown. The inclination of the wall with the vertical is  $\alpha$ . The thread is displaced through a small angle  $\beta$  away from the vertical and the ball is released. Find the period of oscillation of pendulum.



Consider both cases

a.  $\alpha > \beta$

b.  $\alpha < \beta$

Assuming that any impact between the wall and the ball is elastic.

$$\text{A. } \sqrt{\frac{L}{g}} \left[ \pi + 2 \sin^{-1} \frac{\alpha}{\beta} \right]$$

$$\text{B. } \sqrt{\frac{L}{g}} \left[ \pi - 2 \sin^{-1} \frac{\beta}{\alpha} \right]$$

$$\text{C. } \sqrt{\frac{L}{g}} \left[ 2 \sin^{-1} \frac{\beta}{\alpha} - \pi \right]$$

$$\text{D. } \sqrt{\frac{L}{g}} \left[ 2 \sin^{-1} \frac{\alpha}{\beta} + \pi \right]$$

**Answer: A**



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**37.** A radioactive nucleus is being produced at a constant rate  $\alpha$  per second. Its decay



constant is  $\lambda$ . If  $N_0$  are the number of nuclei at time  $t = 0$ , then maximum number of nuclei possible are .

A.  $N_0 + \frac{\alpha}{\lambda}$

B.  $N_0$

C.  $\frac{\lambda}{\alpha} + N_0$

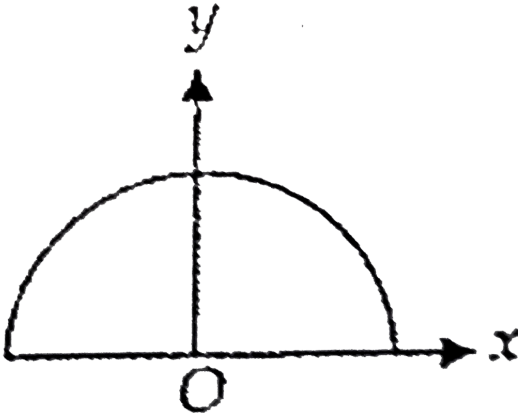
D.  $\frac{\alpha}{\lambda}$

**Answer: D**



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38. A wire of length  $l$  and mass  $m$  is bent in the form of a semicircle. The gravitational field intensity at the centre of semicircle is



- A.  $\frac{Gm}{\pi l}$  along x-axis
- B.  $\frac{Gm}{\pi l}$  along y-axis
- C.  $\frac{2pGm}{l^2}$  along y-axis

D.  $\frac{2\pi Gm}{l^2}$  along x-axis

**Answer: C**



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**39.** In a concave mirror, an object is placed at a distance  $d_1$  from the focus and the real image is formed at a distance  $d_2$  from the focus.

Then the focal length of the mirror is :

A.  $\sqrt{d_1 d_2}$

B.  $d_1 d_2$

C.  $(d_1 + d_2) / 2$

D.  $\sqrt{(d_1 / d_2)}$

**Answer: A**



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**40.** A short linear object of length  $b$  lies along the axis of a concave mirror of focal length  $f$  at a distance  $u$  from the pole of the mirror. The size of the image is approximately equal to

A.  $\frac{lf}{d - f}$

B.  $\frac{d - f}{lf}$

C.  $l \frac{f^2}{(d - f)^2}$

D.  $\frac{(d - f)^2}{f^2} l$

**Answer: C**



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**41.** Assertion : Liquid molecules have greater potential energy at the melting point.

Reason : Intermolecular spacing between molecules increases at melting point.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: C**



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**42.** Assertion : The bob of a simple pendulum is a ball full of water, if a fine hole is made in the bottom of the ball, the time period first increases and then decreases.

Reason : As water flows out of the bob the weight of bob decreases.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: B**



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**43.** Assertion : Electric potential of earth is taken zero.

Reason : No electric field exists on earth surface.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of

assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: C**



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**44.** Assertion : A charge, whether stationary or in motion produces a magnetic field around it.

Reason : Moving charge produce only electric field in the surrounding space.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: D**



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**45.** Assertion : Magnetic susceptibillity is a pure number.

Reason : The value of magnetic susceptibility for vacuum is one.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of

assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: C**



**View Text Solution**

**46.** Assertion : Transformers are used only in alternating current source not in direct current.

Reason : Only a.c. can be stepped up or down  
by means of transformers.

A. If both assertion and reason are true  
and reason is the correct explanation of  
assertion

B. If both assertion and reason are true but  
reason is not the correct explanation of  
assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



**View Text Solution**

**47.** Assertion : A total reflecting prism is used to erect the inverted image without deviation.

Reason : Rays of light incident parallel to base of prism emerge out as parallel rays.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



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**48.** Assertion : The edges of the images of white object formed by a concave mirror on the screen appear white.

Reason : Concave mirror does not suffer chromatic aberration.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of

assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



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**49.** Statement-1: Photon has definite momentum though it has no rest mass.

Statement-2: Momentum of photon is due to

its energy and therefore it has equivalent mass.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



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**50. Assertion:-** A photocell is called an electric eye.

**Reason:-** The electric current in a photocell depends upon the incident light.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: B**



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**51. Assertion :** Nuclei having number about 60 are most stable.

**Reason :** When two or more light nuclei are combined into a heavier nucleus, then the binding energy per nucleon will increase.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of

assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: B**



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**52.** Assertion : In a common-emitter amplifier, the load resistance of the output circuit is 1000 times the load resistance of the input circuit. If  $\alpha = 0.98$ , then voltage gain is

$$49 \times 10^3.$$

Reason :  $\alpha = \frac{\beta}{1 - \beta}$  (symbols have their usual meaning).

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false



D. If both assertion and reason are false.

**Answer: C**



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**53.** Assertion : Most amplifiers use common emitter circuit configuration.

Reason : Its input resistance is comparatively higher.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



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**54.** Assertion : For an isothermal process in an ideal gas, the heat absorbed by the gas is entirely used in the work done by the gas.

Reason : During a process taking place in a system, the temperature remains constant then the process is isothermal.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: B**



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**55.** Assertion : When hot water is poured in a beaker of thick glass, the beaker cracks.

Reason : Outer surface of the beaker expands suddenly.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: C**



**View Text Solution**

**56.** Assertion : Generally the path of a projectile from the earth is parabolic but it is elliptical for projectiles going to very great height.

Reason : Up to ordinary height the projectile

moves under a uniform gravitational force, but for great heights, projectile moves under a variable force.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



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**57.** Assertion : Angular speed of a planet around the sun increases, when it is closer to the sun.

Reason : Total angular momentum of the system remains constant.



A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



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**58.** Assertion : The size and shape of the rigid body remains unaffected under the effect of external force.

Reason : The distance between two particles remains constant in a rigid body.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



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**59.** Assertion : Impulsive force is large and acts for a short time.

Reason : Finite change in momentum should be produced by the force.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: A**



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**60.** Assertion : The dimensional formula for product of resistance and conductance is same as for dielectric constant.

Reason : both have dimensions of time constant.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false.

**Answer: C**



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