



PHYSICS

BOOKS - AIIMS PREVIOUS YEAR PAPERS

AIIMS 2010

Physics

1. Transmission lines transmit a voltage of volt to our houses from power stations, then the

power P supplied by them is proportional to

A. $\frac{1}{V}$

B. V

C. V^2

D. $\frac{1}{V^2}$

Answer: B



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2. Whenever a stream of electrons collides with a stream of photons, in this collision, which of the following is not conserved?

A. Linear momentum

B. Total energy

C. No. of photons

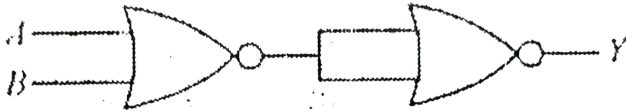
D. No. of electrons

Answer: C



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3. The logic gate represented in following figure is



(a) OR Gate

(b) NOT Gate

(c) NAND Gate

(d) XOR Gate

A. OR Gate

B. NOT Gate

C. NAND Gate

D. XOR Gate

Answer: A



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4. For a person near point of vision is 100cm. Then the power of lens he must wear so as to have normal vision, should be

A. $+1D$

B. $-1D$

C. $+3D$

D. $-3D$

Answer: C



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5. Two projectiles of same mass have their maximum kinetic energies in ratio 4: 1 and ratio of their maximum heights is also 4 : 1 then what is the ratio of their ranges?

A. 2: 1

B. 4: 1

C. 8: 1

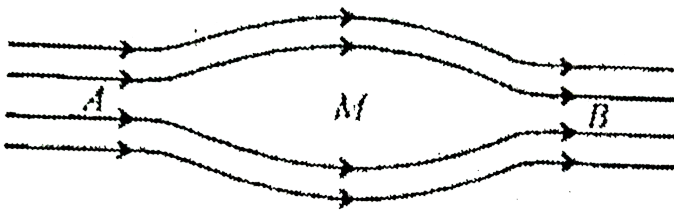
D. 16: 1

Answer: B



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6. An uncharged particle is moving with a velocity of in non-uniform magnetic field as shown.



velocity \vec{v} would be

A. Maximum at A & B

B. Minimum at A & B

C. Maximum at M

D. Same at all points

Answer: D



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7. Which of the following is true regarding diamagnetic substances (symbols have their usual meaning)

A. $\mu > 1, \chi_m > 1$

B. $\mu_r > 1, \chi_m < 1$

C. $\mu_r > 1, \chi_m < 0$

D. $\mu < 1, \chi_m > 0$

Answer: C



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8. What is moment of inertia of a cylinder of radius r , along its height?

A. mr^2

B. $\frac{mr^2}{2}$

C. $\frac{2mr^2}{5}$

D. $\frac{mr^2}{5}$

Answer: B



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9. A uniform string is vibrating with a fundamental frequency 'f'. The new frequency, if radius & length both are doubled would be

A. $2f$

B. $3f$

C. $\frac{f}{4}$

D. $\frac{f}{3}$

Answer: C



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10. Two spherical soap bubbles of radii a and b in vacuum coalesce under isothermal

conditions. The resulting bubble has a radius given by

A. $\frac{(a + b)}{2}$

B. $\frac{ab}{a + b}$

C. $\sqrt{a^2 + b^2}$

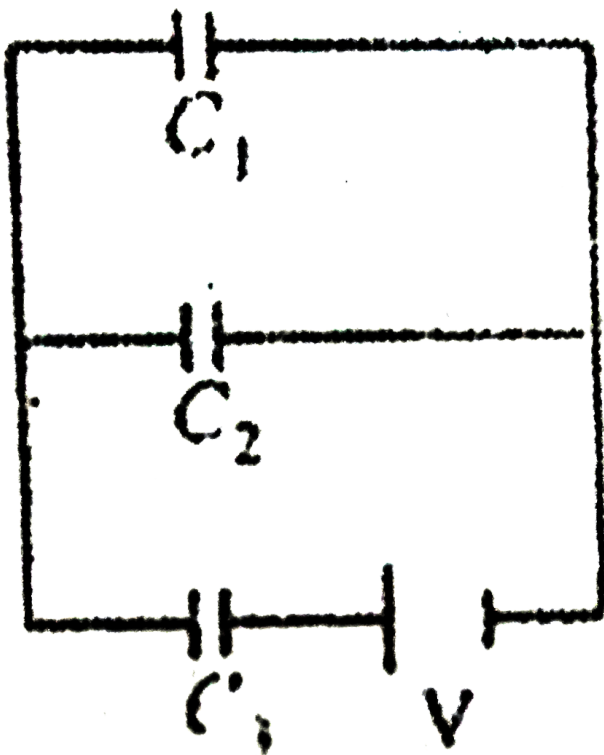
D. $a + b$

Answer: C



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11. What would be the voltage across C_3 ?



A.
$$\frac{(C_1 + C_2)V}{C_1 + C_2 + C_3}$$

B.
$$\frac{C_1 V}{C_1 + C_2 + C_3}$$

C. $\frac{C_2 V}{C_2 + C_2 + C_3}$

D. $\frac{C_3 V}{C_1 + C_2 + C_3}$

Answer: A



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12. What would be maximum wavelength for Brackett series of hydrogen-spectrum?

A. 74583Å

B. 22790Å

C. 40519\AA

D. 18753\AA

Answer: C



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13. What would be the radius of second orbit of He^+ ion?

A. 1.058\AA

B. 3.023\AA

C. 2.068 Å

D. 4.458 Å

Answer: A



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14. The position of a particle moving in the xy plane at any time t is given by $x = (3t^2 - 6t)$ metres, $y = (t^2 - 2t)$ metres. Select the correct statement about the moving particle from the following

A. acceleration is zero at $t=0$

B. velocity is zero at $t=0$

C. velocity is zero at $t=1s$

D. velocity and acceleration of the particle
are never zero.

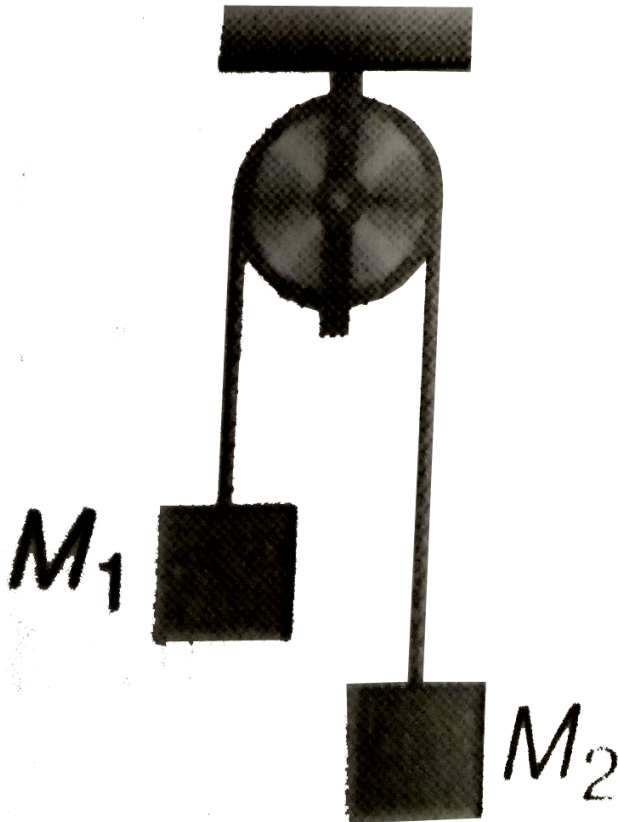
Answer: C



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15. Two masses $M_1 = 5\text{kg}$, $M_2 = 10\text{kg}$ are connected at the ends of an inextensible string passing over a frictionless pulley as shown. When masses are released, then

acceleration of masses will be



A. g

B. $g/2$

C. $g/3$

D. $g/4$

Answer: C



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16. A block of mass M is pulled along a horizontal surface by applying a force at angle θ with the horizontal. The friction coefficient between the block and the surface is μ . If the block travels at a uniform velocity, find the

work done by this applied force during a displacement d of the block.

A. $\frac{\mu mgd}{\cos \theta + \mu \sin \theta}$

B. $\frac{\mu mgd \cos \theta}{\cos \theta + \mu \sin \theta}$

C. $\frac{\mu mgd \sin \theta}{\cos \theta + \mu \sin \theta}$

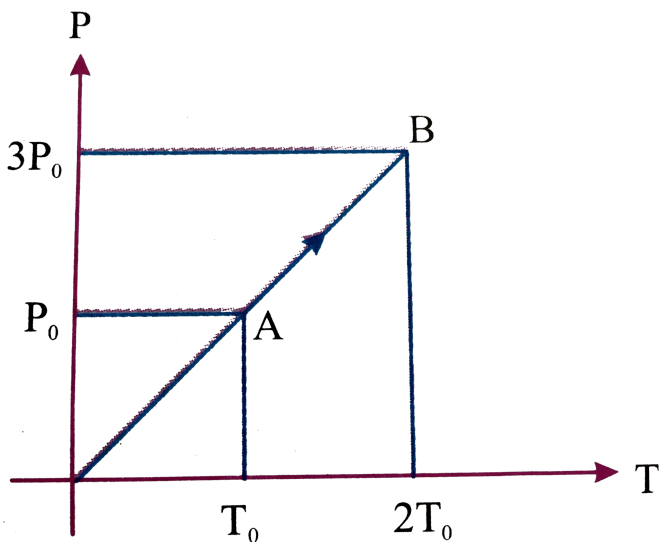
D. $\frac{\mu mgd \cos \theta}{\cos \theta - \mu \sin \theta}$

Answer: B



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17. Pressure versus temperature graph of an ideal gas is shown in figure. Density of the gas at point A is ρ_0 . Density at B will be



A. $\frac{3}{4}\rho_0$

B. $\frac{3}{2}\rho_0$

C. $\frac{4}{3}\rho_0$

D. $2\rho_0$

Answer: B



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18. The latent heat of fusion of a substance is always less than the latent heat vapourization or latent heat of sublimation of the same substance. Explain.

A. greater than its heat of fusion

B. greater than its latent heat of
sublimation

C. equal to its latent heat of sublimation

D. less than its latent heat of fusion

Answer: A



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19. A reversible engine converts one-sixth of the heat input into work. When the temperature of the sink is reduced by $62^{\circ}C$, the efficiency of the engine is doubled. The temperatures of the source and sink are

A. $99^{\circ}C, 37^{\circ}C$

B. $80^{\circ}C, 37^{\circ}C$

C. $95^{\circ}C, 37^{\circ}C$

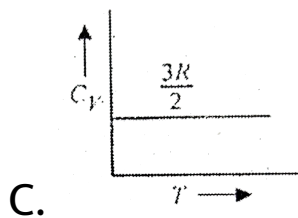
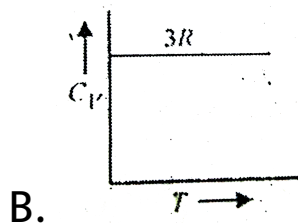
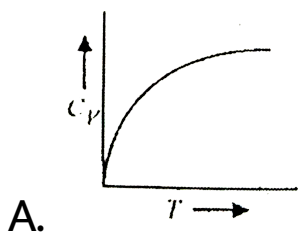
D. $90^{\circ}C, 37^{\circ}C$

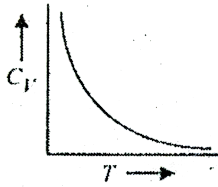
Answer: A



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20. Graph for specific heat at constant volume for a monoatomic gas





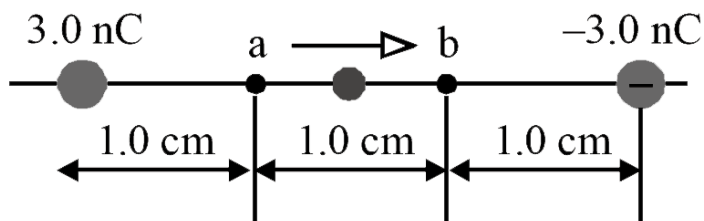
D.

Answer: C

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21. As shown in figure a dust particle with mass $m = 5.0 \times 10^{-9}$ kg and charge $q_0 = 2.0$ nC starts from rest at point a and moves in a straight line to point b . What is its speed v at

point b?



A. 2.65 cm s^{-1}

B. 3.65 cm s^{-1}

C. 4.65 cm s^{-1}

D. 5.65 cm s^{-1}

Answer: C



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22. A galvanometer has a current sensitivity of 1 mA per division. A variable shunt is connected across the galvanometer and the combination is put in series with a resistance of 500Ω and cell of internal resistance 1Ω . It gives a deflection of 5 division for shunt of 5 ohm and 20 division for shunt of 25 ohm. The emf of cell is

A. 47.1 V

B. 57.1 V

C. 67.1 V

D. 77.1 V

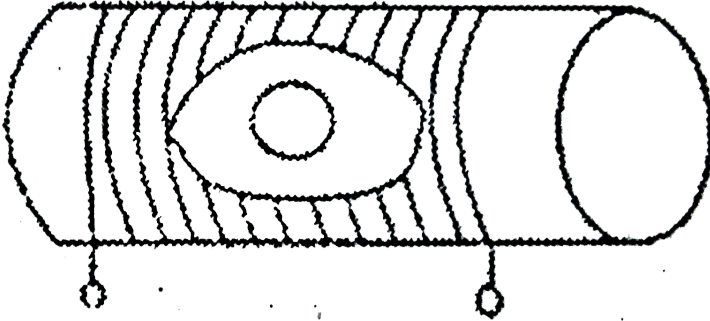
Answer: A



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23. A circular coil with a cross-sectional area of 4cm^2 has 10 turns. It is placed at the center of a long solenoid that has 15 turns/cm and a cross sectional area of 10cm^2 , shown in the figure. The axis of the coil coincides with the axis of the solenoid. What is their mutual

inductance?



A. $7.54\mu H$

B. $8.54\mu H$

C. $9.54\mu H$

D. $10.54\mu H$

Answer: A



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24. If K_1 and K_2 are maximum kinetic energies of photoelectrons emitted when light of wavelength λ_1 and λ_2 respectively are incident on a metallic surface. If $\lambda_1 = 3\lambda_2$ then

A. $K_1 > (K_2/3)$

B. $K_1 < (K_2/3)$

C. $K_1 = 2K_2$

D. $K_2 = 2K_1$

Answer: B



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25. Two radioactive substance A and B have decay constants 5λ and λ respectively. At $t = 0$ they have the same number of nuclei.

The ratio of number of nuclei of nuclei of A to those of B will be $\left(\frac{1}{e}\right)^2$ after a time interval

A. 4λ

B. 2λ

C. $\frac{1}{2\lambda}$

D. $\frac{1}{4\lambda}$

Answer: C



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26. The intensity of gamma radiation from a given source is I

On passing through 36mm of lead , it is reduced to $\frac{1}{8}$. The thickness of lead which will reduce the intensity to $\frac{1}{2}$ will be

A. 18mm

B. 12 mm

C. 6 mm

D. 9 mm

Answer: B



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27. An electric charge $10^{-3}\mu\text{C}$ is placed at the origin $(0, 0)$ of X-Y co-ordinate system. Two points A and B are situated at $(\sqrt{2}, \sqrt{2})$ and

(2, 0) respectively. The potential difference between the points A and B will be

A. 4.5 volt

B. 9 volt

C. zero

D. 2 volt

Answer: C



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28. If the energy, $E = G^p h^q c^r$, where G is the universal gravitational constant, h is the Planck's constant and c is the velocity of light, then the values of p are q and r are, respectively

A. $-1/2, 1/2$ and $5/2$

B. $1/2, -1/2$ and $-5/2$

C. $-1/2, 1/2$ and $3/2$

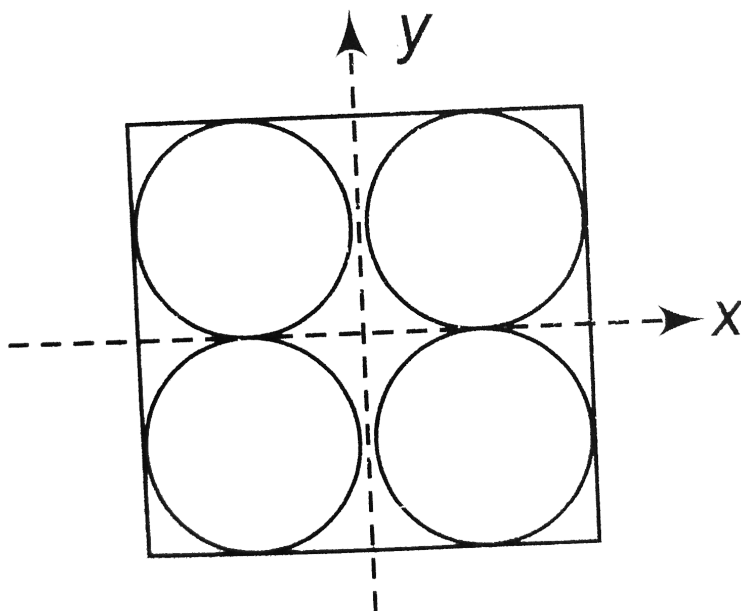
D. $1/2, -1/2$ and $-3/2$

Answer: A



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29. Four holes of radius R are cut from a thin square plate of side $4R$ and mass M . The moment of inertia of the remaining portion about z -axis is :



A. $\frac{\pi}{12}MR^2$

B. $\left(\frac{4}{3} - \frac{\pi}{4}\right)MR^2$

C. $\left(\frac{4}{3} - \frac{\pi}{6}\right)MR^2$

D. $\left(\frac{8}{3} - \frac{10\pi}{16}\right)MR^2$

Answer: D



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30. A liquid is kept in a cylindrical vessel which is being rotated about a vertical axis through the centre of the circular base. If the radius of

the vessel is r and angular velocity of rotation is ω , then the difference in the heights of the liquid at the centre of the vessel and the edge is.

A. $\frac{r\omega}{2g}$

B. $\frac{r^2\omega^2}{2g}$

C. $\sqrt{2gr\omega}$

D. $\frac{\omega^2}{2gr^2}$

Answer: B



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31. A block of mass 10 kg, moving in x-direction with a constant speed of 10ms^{-1} , is subjected to a retarding force $F = 0.1 \times J/m$ during its travel from $x=20$ m to 30 m. Its final KE will be

A. 475 J

B. 450 J

C. 275 J

D. 250 J

Answer: A



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32. A capillary tube of radius r is immersed in water and water rises in to a height h . The mass of water in the capillary tube is 5g. Another capillary tube of radius $2r$ is immersed in water. The mass of water that will rise in this tube is

A. 2.5 g

B. 5.0 g

C. 10 g

D. 20 g

Answer: C



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33. Out of the following pairs, which one does not have identical dimensions?

A. impulse and momentum

B. moment of inertia and moment of force

C. angular momentum and Planck's
constant

D. work and torque.

Answer: B



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34. The wavelength of Lyman series for first
number is

A. $\frac{4 \times 1.097 \times 10^7}{3} \text{ m}$

B. $\frac{3}{4 \times 1.097 \times 10^7} \text{ m}$

C. $\frac{4}{3 \times 1.097 \times 10^7} \text{ m}$

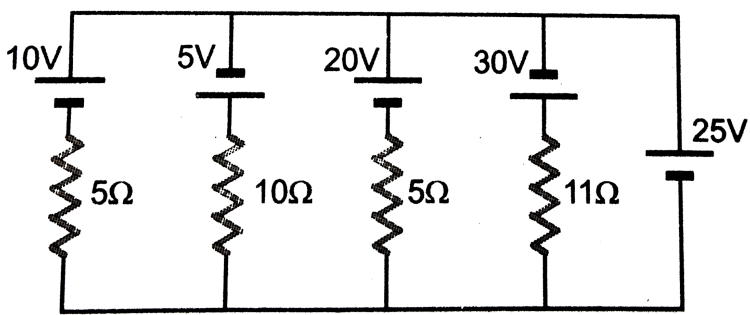
D. $\frac{3}{4} \times 1.097 \times 10^7 \text{ m}$

Answer: A



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35. In the circuit shown in figure the current flowing through 25 V cell is



A. $7.2A$

B. $10A$

C. $12A$

D. $14.2A$

Answer: C



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36. Five sinusoidal waves have the same frequency 500Hz but their amplitudes are in the ratio $2:1/2:1/2:1:1$ and their phase angles $0, \pi/6, \pi/3, \pi/2$ and π , respectively. The phase angle of resultant wave obtained by the superposition of these five waves is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B



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37. The second overtone of an open pipe has the same frequency as the first overtone of a closed pipe 2 m long. The length of the open pipe is

A. $8m$

B. $4m$

C. $2m$

D. $1m$

Answer: B



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38. Let T_1 and T_2 be the periods of springs A and B when mass M is suspended from one end of each spring. If both springs are taken in series and the same mass A is, suspended from the séries combination, the time period is T, then

A. $T = T_1 + T_2$

B. $\frac{1}{T} = \frac{1}{T_1} + \frac{1}{T_2}$

C. $T^2 = T_1^2 + T_2^2$

D. $\frac{1}{T^2} = \frac{1}{T_1^2} + \frac{1}{T_2^2}$

Answer: C



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39. Alternating current can not be measured by D.C. Ammeter because

A. A.C. cannot pass through D.C. ammeter

B. A.C. changes direction

C. average value of current for complete cycle is zero

D. D.C. ammeter will get damaged

Answer: C



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40. The core of any transformer is laminated

so as to

A. reduce the energy loss due to eddy

currents

B. make it light weight

C. make it robust & strong

D. increase the secondary voltage

Answer: A



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41. Assertion : Two balls of different masses are thrown vertically upward with same speed. They will pass through their point of projection in the downward direction with the same speed.

Reason: The maximum height and downward velocity attained at the point of projection are independent of the mass, of the ball.

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

assertion. If both assertion and reason are true but reason (q) is not the correct explanation of assertion If assertion is true but reason is false (d) If both assertion and reason are false.

B.

C.

D.

Answer: A



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42. Assertion : In javelin throw, the athlete throws the projectile at an angle slightly more than 45° .

Reason : The maximum range does not depend upon angle of projection.



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43. Assertion : The apparent weight of a body in an elevator moving with some downward

acceleration is less than the actual weight of body.

Reason : The part of the weight is spent in producing downward acceleration, when body is in elevator.



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44. Assertion : An electric field is preferred in comparison to magnetic field for detecting the electron beam in a television picture tube.

Reason : Electric field require low voltage.



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45. Assertion : A horse has to pull a cart harder during the first few steps of his motion.

Reason: The first few steps are always difficult.



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46. Assertion : The magnetic poles of earth do not coincide with the geographic poles.

Reason: The discrepancy between the

orientation of a compass and true north-south direction is known as magnetic declination.



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47. Assertion : Electromagnetic waves are transverse in nature

Reason : The electric and magnetic fields in electromagnetic waves are perpendicular to each other and to the direction of propagation.



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48. Assertion : A wheel moving down a perfectly frictionless inclined plane will undergo slipping (not rolling motion)

Reason : For perfect rolling motion, work done

Reason against friction is zero.



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49. Assertion : A hollow shaft is found to be stronger than a solid shaft made of same material.

Reason : The torque required to produce a given twist in hollow cylinder is greater than that required to twist a solid cylinder of same size and material.



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50. Assertion : Water kept in an open vessel will quickly evaporate on the surface of the moon.

Reason : The temperature at the surface of the

moon is much higher than boiling point of the water.



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51. Assertion : A pure semiconductor has negative temperature coefficient of resistance.

Reason: On raising the temperature, more charge carriers are released, conductance increases and resistance decreases.



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52. Statement-1 : At a fixed temperature, silicon will have a minimum conductivity when it has a smaller acceptor doping.

Statement-2 : The conductivity of an intrinsic semiconductor is slightly higher than that of a lightly doped p-type semiconductor.



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53. Assertion : Communication in UHF/VHF regions can be established by space wave or tropospheric wave.

Reason: Communication in UHF/VHF regions
is limited to line of sight distance



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54. Assertion : If objective and eye lenses of a microscope are interchanged then it can work as telescope.

Reason : The objective of telescope has small focal length.



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55. Statement 1: If a proton and an α -particle enter a uniform magnetic field perpendicularly with the same speed, the time period of revolution of α -particle is double than that of proton.

Statement 2: In a magnetic field, the period of revolution of a charged particle is directly proportional to the mass of the particle and inversely proportional to the charge of particle.



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56. Assertion : If momentum of a body increases by 50%, its kinetic energy will increase by 125%.

Reason: Kinetic energy is proportional to square of velocity.



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57. Assertion : The difference in the value of acceleration due to gravity at pole and equator is proportional to square of angular velocity of earth.

Reason : the value of acceleration due to gravity is minimum at the equator and maximum at the pole.



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58. Assertion : It is advantageous to transmit electric power at high voltage.

Reason: High voltage implies high current.



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59. Assertion: X-ray astronomy is possible only from satellites orbiting the earth.

Reason: Efficiency of X-rays telescope is large as compared to any other telescope.



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60. Assertion: The de-broglie wavelength equation has significance for any microscopic or submicroscopic particles.

Reason : The de-broglie wavelength is

inversely proportional to the mass of the object if velocity is constant.



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