



PHYSICS

BOOKS - AIIMS PREVIOUS YEAR PAPERS

AIIMS 2017

Physics

1. The potential difference that must be applied to stop the fastest photoelectrons

emitted by a nickel surface , having work function $5.01eV$, when ultraviolet light of $200nm$ falls on it , must be

A. 2.4 V

B. - 1.2 V

C. - 2.4 V

D. 1.2 V

Answer: D



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2. Hailstorms are observed to strike the surface of a frozen lake at an angle of 30° with the vertical and rebound at an angle of 60° with vertical. Assuming the contact to be smooth, the coefficient of restitution is

A. $e = \frac{1}{\sqrt{3}}$

B. $e = \frac{1}{3}$

C. $e = \sqrt{3}$

D. $e = 3$

Answer: B



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3. In a npn transistor 10^{10} electrons enter the emitter in 10^{-6} s. 4% of the electrons are lost in the base.

The current transfer ratio will be

A. 0.98

B. 0.97

C. 0.96

D. 0.94

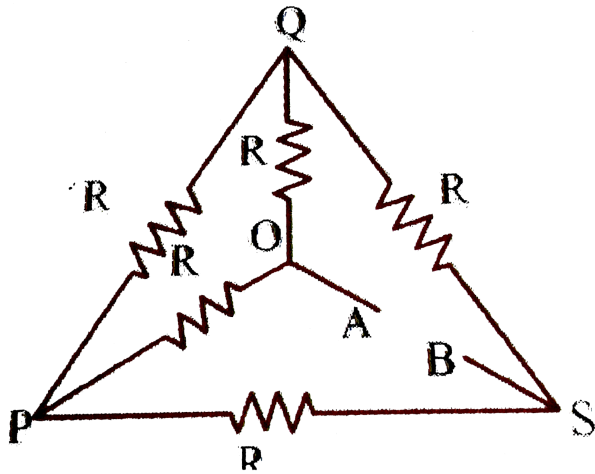
Answer: C



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4. If each of the resistance in the network in figure R ,
the equivalent resistance between terminals A

and B is



A. R

B. $5R$

C. $3R$

D. $6R$

Answer: A



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5. The wheel of a car is rotating at the rate of 1200 revolutions per minute. On pressing the accelerator for 10 seconds, it starts rotating at 4500 revolutions per minute. The angular acceleration of the wheel is

A.

B.

C.

D.

Answer:



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6. An organ pipe open at one end is vibrating in first overtone and is in resonance with another pipe open at both ends and vibrating in third harmonic. The ratio of length of two pipes is–

A. 1 : 2

B. 4: 1

C. 8: 3

D. 3: 8

Answer: A



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7. A material has normal density ρ and bulk modulus K . The increase in the density of the material when it is subjected to an external pressure P from all sides is

A. $K / \rho P$

B. $P / \rho K$

C. ρPK

D. $\rho K / P$

Answer: A



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8. The magnetic flux ϕ (in weber) in a closed circuit of resistance 10Ω varies with time t (in second) according to equation

$\phi = 6t^2 - 5t + 1$. The magnitude of induced current at $t = 0.25$ s is

A. $0.2A$

B. $0.6A$

C. $1.2A$

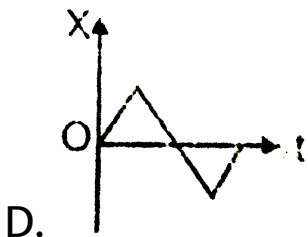
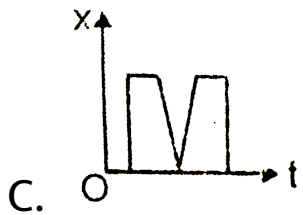
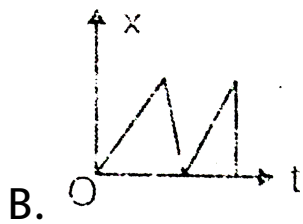
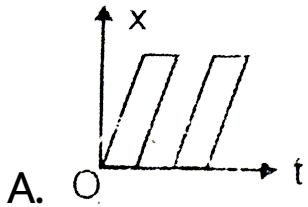
D. $0.8A$

Answer: A



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9. Which of the following displacement (x) time graphs is not possible?



Answer: D



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10. The binding energy per nucleon number for deuteron H_1^2 and helium He_2^4 are $1.1MeV$ and $7.0MeV$ respectively . The energy released when two deuterons fuse to form a helium nucleus He_2^4 is



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11. A charge q is placed at the centre of the line joining two equal charges Q . The system of the three charges will be in equilibrium if q is equal to:

A. $Q/2$

B. $-Q/2$

C. $Q/4$

D. $-Q/4$

Answer: D



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12. The potential energy of a particle varies with distance x from a fixed origin as

$$V = \frac{A\sqrt{X}}{X + B} \text{ where } A \text{ and } B \text{ are constants .}$$

The dimension of AB are

A. $[M^1 L^{5/2} T^2]$

B. $[M^1 L^2 T^2]$

C. $[M^{3/2} L^{5/2} T^2]$

D. $[M^1 L^{7/2} T^2]$

Answer: D



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13. A light ray falls on a rectangular glass slab as shown. The index of refraction of the glass, if total internal reflection is to occur at the

vertical face, is



A. $\sqrt{3/2}$

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

C. $\frac{(\sqrt{2} + 1)}{2}$

D. $\sqrt{5}/2$

Answer: A



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14. A bucket tied at the end of a $1.6m$ long string is whirled in a vertical circle with constant speed. What should be the minimum

speed so that the water from the bucket does not spill, when the bucket is at the highest position ($Takeg = 10m / s^2$)

A. $4m / sec$

B. $6.25m / sec$

C. $16m / sec$

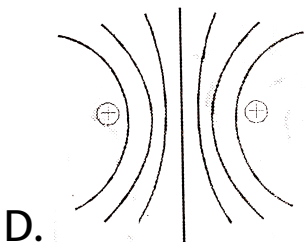
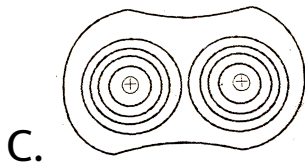
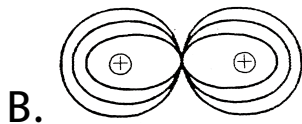
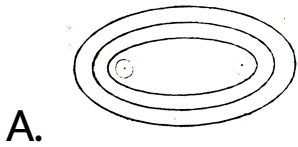
D. None of the above

Answer: A



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15. Which of the following figure shows the correct equipotential surfaces of a system of two positive charges?



Answer: C



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16. A point particle of mass 0.1kg is executing SHM of amplitude 0.1m . When the particle passes through the mean position, its kinetic energy is $8 \times 10^{-3}\text{J}$. Write down the equation of motion of this particle when the initial phase of oscillation is 45° .

$$\text{A. } y = 0.1 \sin\left(\pm 4t + \frac{\pi}{4}\right)$$

B. $y = 0.2 \sin\left(\pm 4t + \frac{\pi}{4}\right)$

C. $y = 0.1 \sin\left(\pm 2t + \frac{\pi}{4}\right)$

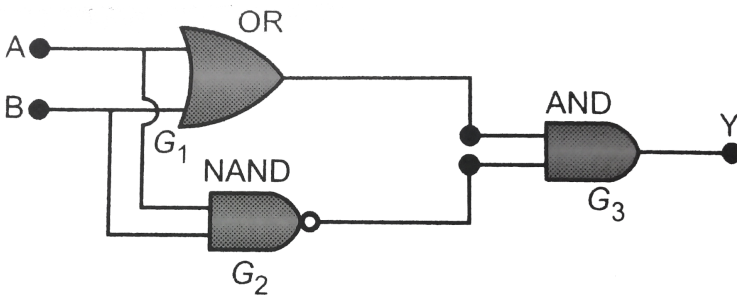
D. $y = 0.2 \sin\left(\pm 2t + \frac{\pi}{4}\right)$

Answer: A



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17. The following configuration of gate is equivalent to



A. NAND gate

B. XOR gate

C. OR gate

D. NOR gate.

Answer: B



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18. Two infinitely long parallel wires carry equal current in same direction. The magnetic field at a mid point in between the two wires is

A. $\mu_0 / 17$

B. $\sqrt{3}\mu_0 / 2\pi$

C. $\mu_0 / 2\pi$

D. $3\mu_0 / 2\pi$

Answer: C



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19. A small block of mass m is kept on a rough inclined surface of inclination θ fixed in an elevator. The elevator goes up with a uniform velocity v and the block does not slide on the wedge. The work done by the force of friction on the block in time t will be

A. zero

B. $mgvt \cos^2 \theta$

C. $mv > \sin^2 \theta$

D. $mgvt \sin 2\theta$

Answer: A



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20. A beam of light of wavelength 600 nm from a distance source falls on a single slit 1 mm wide and resulting diffraction pattern is observed on a screen 2m away. What is the distance between the first bright fringes on either side of the central bright fringe ?

A. 1.2 cm

B. 1.2 mm

C. 2.4 cm

D. 2.4 mm

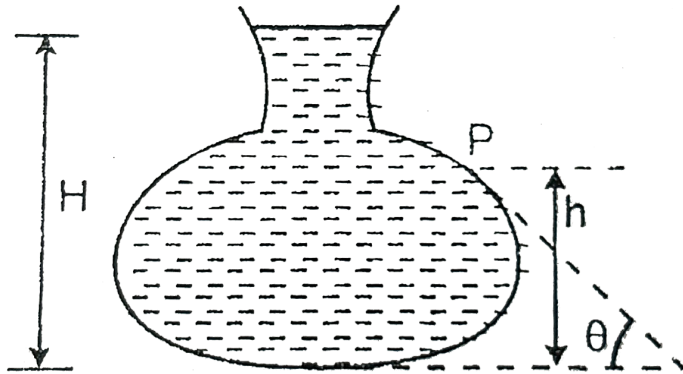
Answer: D



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21. Figure here shows the vertical cross-section of a vessel filled with a liquid of density ρ . The normal thrust per unit area on the walls vessel

at point. P , as shown, will be



A. $h\rho g$

B. $H\rho g$

C. $(H - h)\rho g$

D. $(H - h)\rho g \cos \theta$

Answer: C



22. If in the experiment of Wheatstone's bridge, the positions of cells and galvanometer are interchanged, then balance point will

A. change

B. remain unchanged

C. depend on the internal resistance of cell
and resistance of galvanometer

D. None of these

Answer: B



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23. In the formula $X = 3YZ^2$, X and Z have dimensions of capacitance and magnetic induction respectively. The dimensions of Y in MKSQ system are,

A. $[M^{-3}L^{-2}T^{-2}Q^{-4}]$

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

C. $[M^{-3}L^{-2}Q^4T^8]$

D. $[M^{-3}L^{-2}Q^4T^4]$

Answer: D



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24. Half lives for α and β emission of a radioactive material are 16 years and 48 years respectively. When material decays giving α and β emission simultaneously, time in which $3/4^{th}$ material decays is .

A. 29 years

B. 24 years

C. 64 years

D. 12 years

Answer: B



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25. The real angle of dip, if a magnet is suspended at an angle of 30° to the magnetic meridian and the dip needle makes an angle of 45° with horizontal, is:

A. $\tan^{-1}\left(\sqrt{3/2}\right)$

B. $\tan^{-1}\left(\sqrt{3}\right)$

C. $\tan^{-1}\left(\sqrt{3}/2\right)$

D. $\tan^{-1}\left(2\sqrt{3}\right)$

Answer: D



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26. Gauss's law states that

A. the total electric flux through a closed surface is $\frac{1}{\epsilon_0}$ times total charge placed near the closed surface .

B. the total electric flux thorough a colsed surface is $\frac{1}{\epsilon_0}$ times the total charge enclosed by the closed surface

C. the total electric flux through an open surface is $\frac{1}{\epsilon_0}$ time the total charge placed near the open surface.

D. the line integral of electric field around the boundary of an open surface is $\frac{1}{\epsilon_0}$ times the total charge placed near the open surface.

Answer: B



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27. A current carrying coil is subjected to a uniform magnetic field. The coil will orient so that its plane become



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28. Radio waves and visible light in vacuum have

- A. same velocity but different wavelength
- B. continuous emission spectrum
- C. band absorption spectrum
- D. line emission spectrum

Answer: A



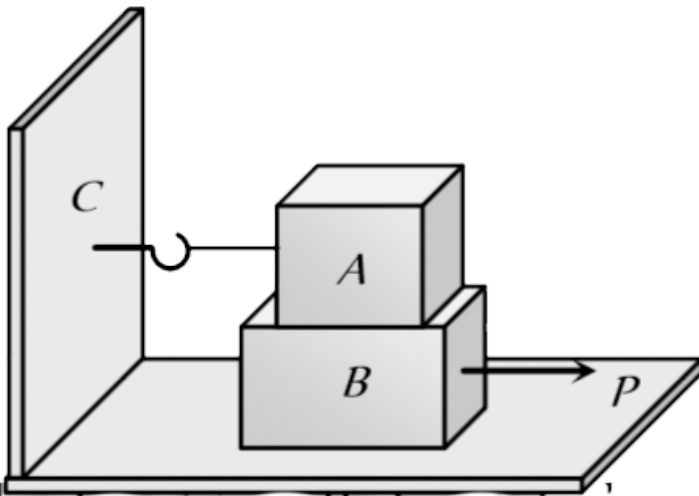
29. A given system undergoes a change in which the work done by the system equals to the decrease in its internal energy. The system must have undergone an

- A. Adiabatic process
- B. Adiabatic process
- C. Isochoric process
- D. None of these

Answer: A



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30.

Block A weighing 100 kg rests on a block B and is tied with a horizontal string to the wall at C. Block B weighs 200 kg. The coefficient of

friction between A and B is 0.25 and between B and the surface is $\frac{1}{3}$. The horizontal force P necessary to move the block B should be $(g = 10m / s^2)$

A. 1050 N

B. 1450 N

C. 1050 N

D. 1250 N

Answer: D



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31. In an A.C. circuit, the current flowing in inductance is $I = 5 \sin(100t - \pi/2)$ amperes and the potential difference is $V = 200 \sin(100t)$ volts. The power consumption is equal to

- A. 1000 watt
- B. 40 watt
- C. 20 watt
- D. Zero

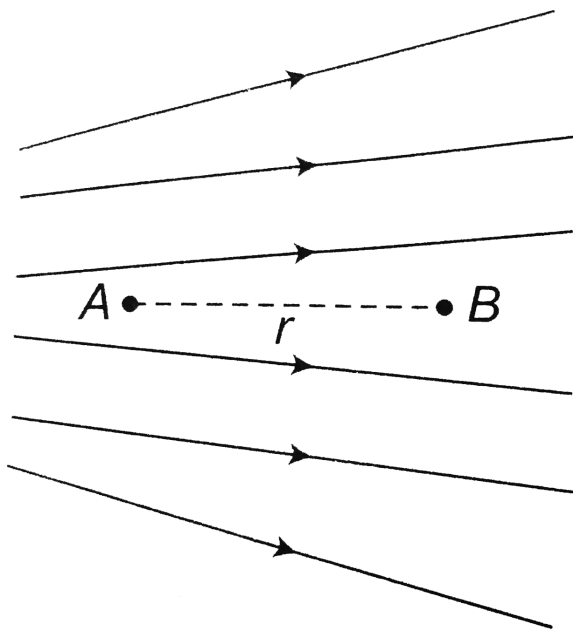
Answer: D



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32. Figure shows the electric lines of force emerging from a charged body. If the electric field at A and B are E_A and E_B respectively and if the displacement between A and B is r

then



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33. The temperature of the two outer surfaces of a composite slab, consisting of two

materials having coefficients of thermal conductivity K and $2K$ and thicknesses x and $4x$, respectively are T_2 and T_1 ($T_2 > T_1$). The rate of heat of heat transfer through the slab, in ? steady state is $\left[\left(A \frac{T_2 - T_1}{x} \right) f \right]$, with f equal to :-



- A. 1
- B. $1/2$
- C. $2/3$
- D. $1/3$

Answer: D



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34. The ratio of the longest to shortest wavelength in Brackett series of hydrogen spectra is

A. $\frac{25}{9}$

B. $\frac{17}{6}$

C. $\frac{9}{5}$

D. $\frac{4}{3}$

Answer: A



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35. Curie temperature is the temperature above which

A. a ferromagnetic material becomes paramagnetic

B. a paramagnetic material becomes diamagnetic

C. a ferromagnetic material becomes diamagnetic

D. a paramagnetic material becomes ferromagnetic

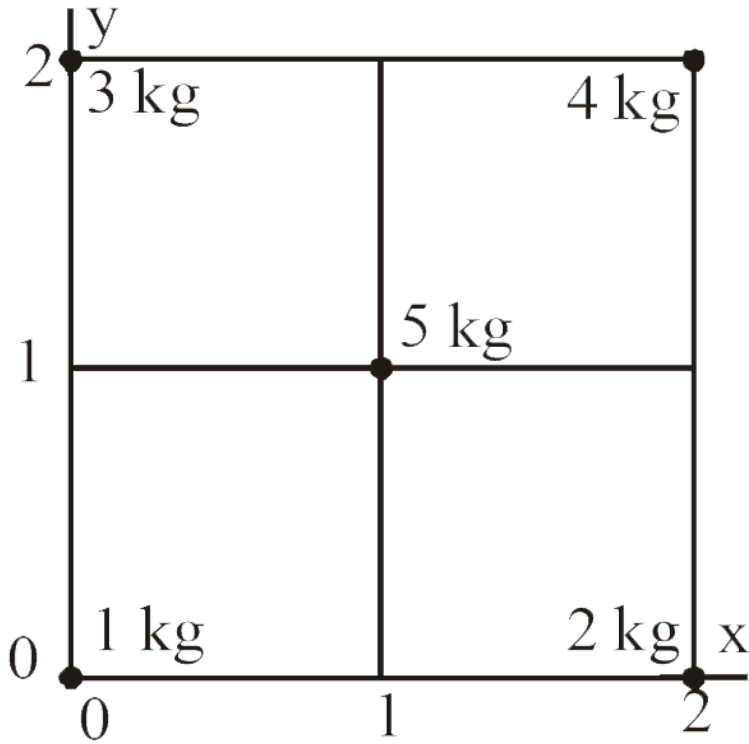
Answer: A



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36. Five masses are placed in a plane as shown in figure. The coordinates of the centre of

mass are nearest to



A. 1.2, 1.4

B. 1.3, 1.1

C. 1.1, 1.3

D. 1.0, 1.0

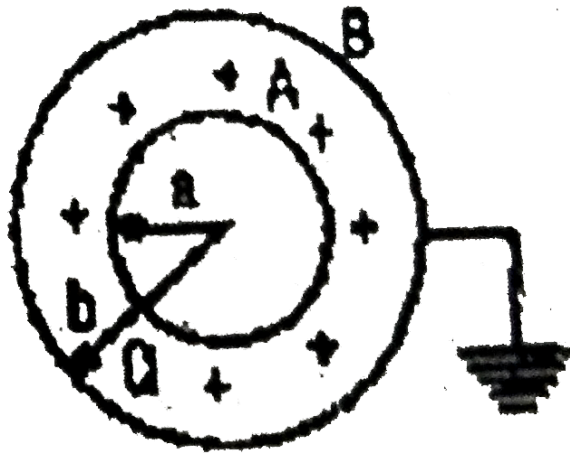
Answer: C



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37. Two spherical conductors A and B of radii a and b ($b > a$) are placed concentrically in air. A is given charged $+Q$ while B is earthed. Then

the equivalent capacitance of the system is



A. $4\pi\epsilon_0 \frac{ab}{b-a}$

B. $4\pi\epsilon_0(a+b)$

C. $4\pi\epsilon_0 b$

D. $4\pi\epsilon_0 a$

Answer: C



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38. The magnitude of the de-Broglie wavelength (λ) of an electron (e), proton (p), neutron (n) and α particle (a) all having the same energy of MeV , in the increasing order will follow the sequence:

A. $\lambda_e, \lambda_p, \lambda_n, \lambda_\alpha$

B. $\lambda_e, \lambda_n, \lambda_p, \lambda_\alpha$

C. $\lambda_\alpha, \lambda_n, \lambda_p, \lambda_e$

D. $\lambda_p, \lambda_e, \lambda_\alpha, \lambda_n$

Answer: C



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39. The specific heat of the mixture of two gases at constant volume is $\frac{13}{6}R$. The ratio of the number of moles of the first gas to the second gas is 1:2.

The respective gases may be

A. O_2 and N_2

B. He and Ne

C. He and N_2

D. N_2 and He

Answer: C



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40. By properly combining two prisms made of different materials, it is possible to (choose the incorrect option)

A. dispersion without average deviation

B. deviation without dispersion

C. both dispersion and average deviation

D. neither dispersion nor average deviation

Answer: D



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41. Assertion : When a convex lens ($\mu_g = 3/2$) of focal length f is dipped in water, its focal length become $\frac{4}{3}f$

Reason : The focal length of convex lens in water becomes $4f$.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: D



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42. Assertion : Resonance is special case of force vibration in which the nature frequency of vebration of the body is the same as the impressed frequency of external periodic force and the amplitude of force vibration is maximum

Reason: The amplitude of forced vibrations of a body increase with an increase in the

frequency of the externally impressed periodic force

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: C



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43. Assertion: Kirchhoff's junction rule can be applied to a junction of several lines or a point in a line.

Reason : When steady current is flowing, there is no accumulation of charges at any junction in series with a galvanometer.

A. Assertion is correct, reason is correct,
reason is a correct explanation for
assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: A



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44. Assertion : When a sphere is rolls on a horizontal table it slows down and eventually stops.

Reason : When the sphere rolls on the table, both the sphere and the surface deform near the contact. As a result, the normal force does not pass through the centre and provide an angular declaration.

A. Assertion is correct, reason is correct,
reason is a correct explanation for

assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: B



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45. Assertion : When two semi conductor of p and n type are brought in contact, they form p-n junction which act like a rectifier.

Reason : A rectifier is used to convent alternating current into direct current.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for

assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: B



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46. Assertion: Ampere's circuital law is independent of Biot-Savart's law.

Reason: Ampere's circuital law can be derived from the Biot-savart's law.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: D



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47. STATEMENT-1 : Mechanical energy is the sum of macroscopic kinetic & potential energies.

STATEMENT-2 : Mechanical energy is that part of total energy which always remain conserved.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: D



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48. Assertion : A laminated core is used in transformers to increase eddy currents.

Reason : The efficiency of a transformer increases with increase in eddy currents.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: D



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49. Assertion: In the measurement of physical quantities direct and indirect methods are used.

Reason : The accuracy and precision of measuring instruments along with errors in

measurements should be taken into account, while expressing the result.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: A



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50. Assertion : The Carnot cycle is useful in understanding the performance of heat engines.

Reason : The Carnot cycle provides a way of determining the maximum possible efficiency achievable with reservoirs of given temperatures.

A. Assertion is correct, reason is correct,
reason is a correct explanation for
assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: A



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51. Assertion: Lenz's law violates the principle of conservation of energy.

Reason: Induced e.m.f. opposes always the change in magnetic flux responsible for its production.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: A



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52. Assertion : A bullet is fired from a rifle. If the rifle recoils freely, the kinetic energy of rifle is more than that of the bullet.

Reason : In the case of rifle bullet system the law of conservation of momentum violates.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for

assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: D



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53. Assertion : Orbital velocity of a satellite is greater than its escape velocity.

Reason : Orbit of a satellite is within the

gravitational field of earth whereas escaping is beyond the gravitational field of earth.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: D



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54. Assertion: In the absence of an external electric field, the dipole moment per unit volume of a polar dielectric is zero.

Reason : The dipoles of a polar dielectric are randomly oriented.

A. Assertion is correct, reason is correct,
reason is a correct explanation for

assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: A



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55. Assertion : identical springs of steel and copper are equally stretched. More work will be done on the steel spring.

Reason : Steel is more elastic than copper.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct, reason is not a correct explanation for assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: A



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56. Assertion: Electromagnets are made of soft iron.

Reason: Coercivity of soft iron is small.

A. Assertion is correct, reason is correct,
reason is a correct explanation for
assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: B



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57. Assertion : The internal energy of a real gas is function of both, temperature and volume.

Reason : Internal kinetic energy depends on temperature and internal potential energy depends on volume

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: A



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58. Statement-1: The de-Broglie wavelength of a molecules (in a sample of ideal gas) varies inversely as the square root of absolute temperature

Statement 2:The rms velocity of a molecules (in a sample of ideal gas) depend in temperature.

A. Assertion is correct, reason is correct, reason is a correct explanation for assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: A



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59. Statement-1: Two longitudinal waves given

by equation $y_1(x, t) = 2a \sin(\omega t - kx)$

and $y_2(x, t) = a \sin(2\omega t - 2kx)$

will have equal intensity.

Statement-2 : Intensity of waves of given

frequency in same medium is proportional to

square of amplitude only.

A. Assertion is correct, reason is correct,

reason is a correct explanation for

assertion.

B. Assertion is correct, reason is correct,
reason is not a correct explanation for
assertion

C. Assertion is correct, reason is incorrect

D. Assertion is incorrect, reason is correct

Answer: B



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