



PHYSICS

BOOKS - AIIMS PREVIOUS YEAR PAPERS

AIIMS 2005

Physics

1. For sky wave propagation of a $10MHz$ signal, what should be the minimum electron

density in ionosphere?

A. $\sim 1.2 \times 10^{12} m^{-3}$

B. $\sim 10^6 m^{-1}$

C. $\sim 10^{14} m^{-3}$

D. $\sim 10^{22} m^{-3}$

Answer: A



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2. Which of the following logic gates is an universal gate?

A. OR

B. NOT

C. AND

D. NAND

Answer: D



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3. What should be the maximum acceptance angle at the aircore interface of an optical fibre if n_1 and n_2 are the refractive indices of the core and the cladding, respectively

A. $\sin^{-1}(n_2 / n_1)$

B. $\sin^{-1} \sqrt{n_1^2 - n_2^2}$

C. $\left[\frac{\tan^{-1}(n_2)}{n_1} \right]$

D. $\left[\frac{\tan^{-1}(n_1)}{n_2} \right]$

Answer: B



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4. A Conducting ring of radius 1 meter is placed in an uniform magnetic field B of 0.01 tesla oscillating with frequency 100Hz with its plane at right angles to B . What will be the induced electric field?

A. π volts/m

B. 2 volts/m

C. 10 volts/m

D. 62 volts/m

Answer: B



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5. Consider an $n - p - n$ transistor amplifier in common-emitter configuration. The current gain of the transistor is 100. If the collector current changes by 1mA , what will be the change in emitter current?

A. 1.1 mA

B. 1.01 mA

C. 0.01 mA

D. 10 mA

Answer: B



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6. A telescope has an objective lens of focal length 200cm and an eye piece with focal length 2cm . If this telescope is used to see a 50 meter tall building at a distance of 2km ,

what is the height of the image of the building formed by the objective lens?

A. 5 cm

B. 10 cm

C. 1 cm

D. 2 cm

Answer: A



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7. The ground state energy of hydrogen atom is -13.6eV . What is the potential energy of the electron in this state

A. 0 eV

B. -27.2eV

C. 1 eV

D. 2 eV

Answer: B



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8. Solid targets of different elements are bombarded by highly energetic electron beam. The frequency (f) of the characteristic X -rays emitted from different targets varies with atomic number Z as

A. $f \propto \sqrt{Z}$

B. $f \propto Z^2$

C. $f \propto Z$

D. $f \propto Z^{1/2}$

Answer: B



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9. Two infinitely long parallel conducting plates having surface charge densities $+\sigma$ and $-\sigma$ respectively, are separated by a small distance. The medium between the plates is vacuum. If ϵ_0 is the dielectric permittivity of vacuum, then the electric field in the region between the plates is

A. 0 volt/meter

B. $\sigma / 2\epsilon_0$ volt/meter

C. σ / ϵ_0 volt/meter

D. $2\sigma / \epsilon_0$ volt/meter

Answer: C



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10. In a semiconducting material the mobilities of electrons and holes are μ_e and μ_h respectively. Which of the following is true?

A. $\mu_e > \mu_h$

B. $\mu_e < \mu_n$

C. $\mu_e = \mu_n$

D. $\mu_e < 0, \mu_n > 0$

Answer: A



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11. The magnetic moment (μ) of a revolving electron around the nucleus varies with principle quantum number n as

A. $\mu \propto n$

B. $\mu \propto 1/n$

C. $\mu \propto n^2$

D. $\mu \propto 1/n^2$

Answer: A



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12. A radioactive material has half-life of 10 days. What fraction of the material would remain after 30 days ?

A. 0.5

B. 0.25

C. 0.125

D. 0.33

Answer: C



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13. According to Hubble's law, the redshift (Z) of a receding galaxy and its distance r from earth are related as

A. $Z \propto r$

B. $Z \propto 1/r$

C. $Z \propto 1/r^2$

D. $Z \propto r^{3/2}$

Answer: A



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14. When exposed to sunlight, thin films of oil on water often exhibit brilliant colours due to the phenomenon of

A. interference

B. diffraction

C. dispersion

D. polarisation

Answer: A



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15. 'Parse' is the unit of

A. time

B. distance

C. frequency

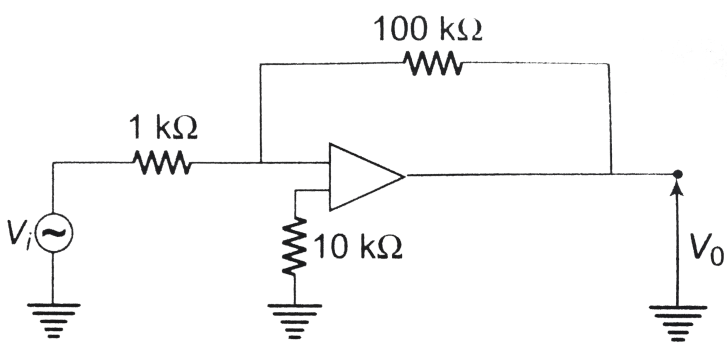
D. angular acceleration

Answer: B



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16. The voltage gain of the following amplifier is



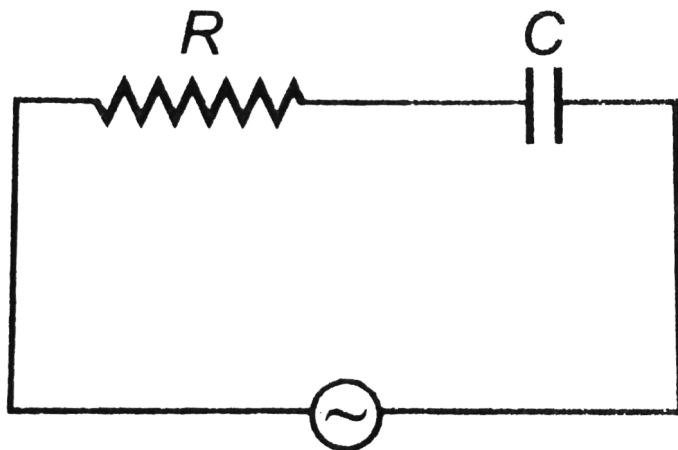
- A. 10
- B. 100
- C. 1000
- D. 9.9

Answer: B



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17. A 50Hz AC source of 20V is connected across R and C as shown in figureure.



The voltage across R is 12V . The voltage across C is

A. 8 V

B. 16 V

C. 10 V

D. not possible to determine unless values
of R and C are given

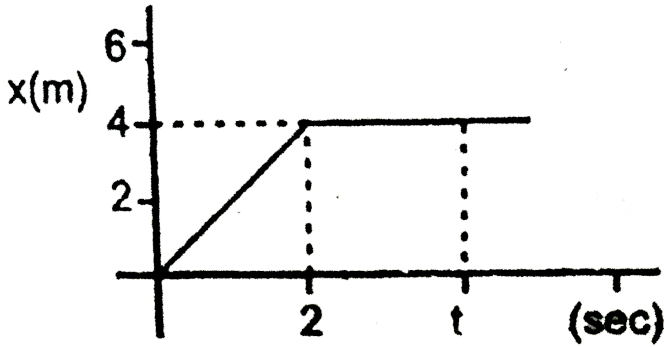
Answer: B



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18. In the figure given below, the position time graph of a particle of mass 0.1kg is shown. The

impulse at $t=2$ sec is



- A. $0.2 \text{ kg m sec}^{-1}$
- B. $-0.2 \text{ kg m sec}^{-1}$
- C. $0.1 \text{ kg m sec}^{-1}$
- D. $-0.4 \text{ kg m sec}^{-1}$

Answer: A



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19. The pressure exerted by an electromagnetic wave of intensity I (watt/m^2) on a nonreflecting surface is [c is the velocity of light]

A. Ic

B. Ic^2

C. I/c

D. I/c^2

Answer: C



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20. A block of mass 20 kg is moving in x -direction with a constant speed of 10 m s^{-1} . It is subjected to a retarding force $F = (-0.1x) \text{ N}$ during its travel from $x=20 \text{ m}$ to $x=30 \text{ m}$. Its final kinetic energy will be

A. 475 joule

B. 450 joule

C. 275 joule

D. 250 joule

Answer: A



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21. Energy required to break one bond in DNA is approximately

A. $\sim 1eV$

B. $\sim 0.1eV$

C. $\sim 0.01eV$

D. $\sim 2.1eV$

Answer: A



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22. The condition for a uniform spherical mass m of a radius r to be a black hole is [G =gravitational constant and g =acceleration due to gravity]

A. $\left(\frac{2Gm}{r}\right)^{1/2} \leq c$

B. $\left(\frac{2gm}{r}\right)^{1/2} = c$

C. $\left(\frac{2Gm}{r}\right)^{1/2} \geq c$

D. $\left(\frac{gm}{r}\right)^{1/2} \geq c$

Answer: C



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23. Which of the following is an amorphous solid

A. glass

B. diamond

C. salt

D. sugar

Answer: A



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24. For a constant hydraulic stress on an object, the fractional change in the object's

volume $\left(-\frac{\Delta V}{V}\right)$ and its bulk modulus (b) are related as

A. $\frac{\Delta V}{V} \propto B$

B. $\frac{\Delta V}{V} \propto \frac{1}{B}$

C. $\frac{\Delta V}{V} \propto B^2$

D. $\frac{\Delta V}{V} \propto B^{-2}$

Answer: B



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25. Which of the following functions represents a simple harmonic oscillation ?

A. $\sin \omega t - \cos \omega t$

B. $\sin^2 \omega t$

C. $\sin \omega t + \sin 2\omega t$

D. $\sin \omega t - \sin 2\omega t$

Answer: A



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26. In case of linearly polarised light, the magnitude of the electric field vector

A. does not change with time

B. varies periodically with time

C. increases and decreases linearly with time

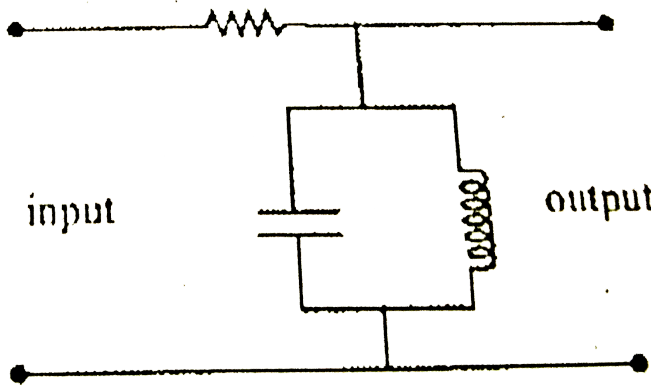
D. is parallel to the direction of propagation

Answer: B



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27. The circuit shown below acts as



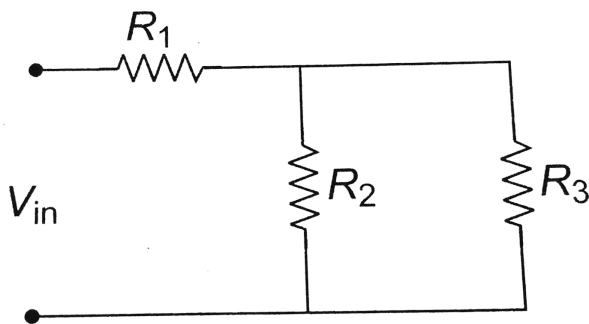
- A. tuned filter
- B. low pass filter
- C. high pass filter
- D. rectifier

Answer: A



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28. For ensuring dissipation of same energy in all three resistors (R_1, R_2, R_3) connected as shown in figure, their values must be related s



A. $R_1 = R_2 = R_3$

B. $R_2 = R_3$ and $R_1 = 4R_2$

C. $R_2 = R_3$ and $R_1 = 1/4R_2$

D. $R_1 = R_2 + R_3$

Answer: C



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29. The apparent depth of water in cylindrical water tank of diameter $2R\text{cm}$ is reducing at the rate of $x\text{cm}/\text{min}$ when water is being drained out at a constant rate. The amount of water drained in $c. c.$ per minute is ($n_1 =$

refractive index of air, $n_2 =$ refractive index of water)

A. $\frac{x\pi R^2 n_1}{n_2}$

B. $\frac{x\pi R^2 n_2}{n_1}$

C. $\frac{2\pi R n_1}{n_2}$

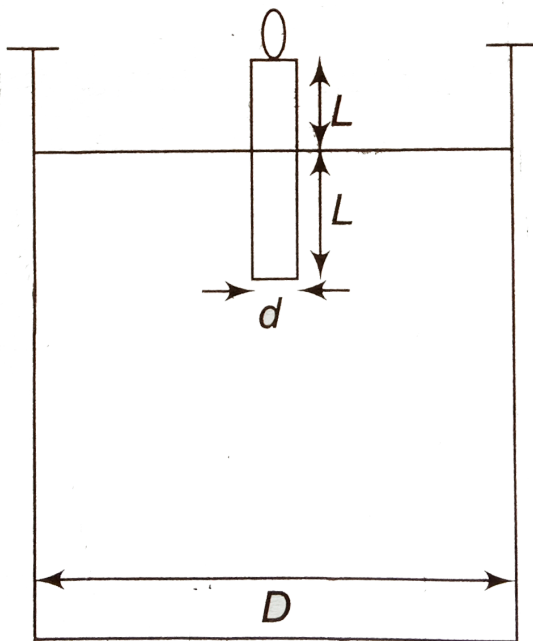
D. $\pi R^2 x$.

Answer: B



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30. A candle of diameter d is floating on a liquid in a cylindrical container of diameter D ($D \ll d$) as shown in figure. If it is burning at the rate of $2\text{cm}/h$ then the top of the candle will :



A. remain at the same height

B. fall at the rate of 1 cm/hour

C. fall at the rate of 2 cm/hour

D. go up at the rate of 1 cm/hour

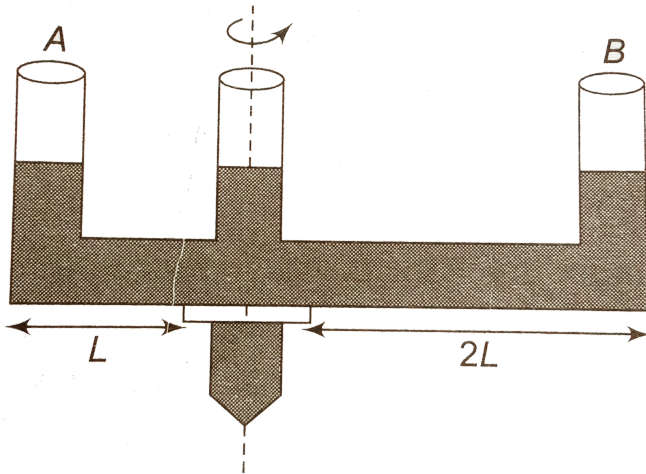
Answer: B



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31. A given shaped glass tube having uniform cross-section is filled with water and is mounted on a rotatable shaft as shown in

figure. If the tube is rotated with a constant angular velocity ω then :



A. water levels in both sections A and B go up

B. water level in section A goes up and that in B comes down

C. water level in section A comes down and
that in B it goes up

D. water levels remain same in both
sections

Answer: A



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32. When a ball is thrown up vertically with velocity v_0 , it reaches a maximum height of h .

If one wishes to triple the maximum height then the ball should be thrown with velocity

A. $\sqrt{3}v_0$

B. $3v_0$

C. $9v_0$

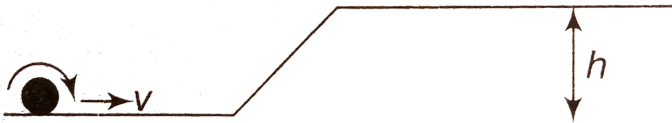
D. $3/2v_0$

Answer: A



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33. A solid sphere is rolling on a frictionless surface, shown in figure with a translational velocity vm/s . If it is to climb the inclined surface then v should be :



A. $\geq \sqrt{10/7gh}$

B. $\geq \sqrt{2gh}$

C. $2gh$

D. $10/7gh$

Answer: A



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34. A horizontal platform is rotating with uniform angular velocity around the vertical axis passing through its centre. At some instant of time a viscous fluid of mass m is dropped at the centre and is allowed to spread out and finally fall. The angular velocity during this period :

A. decreases continuously

B. decreases initially and increases again

C. remains unaltered

D. increases continuously

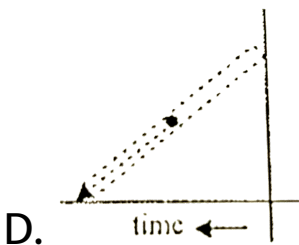
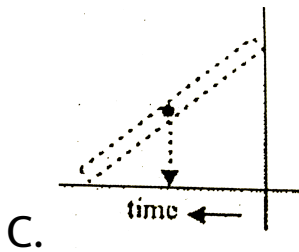
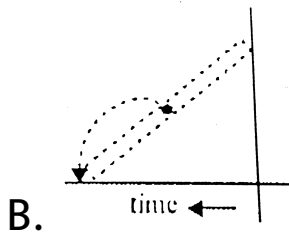
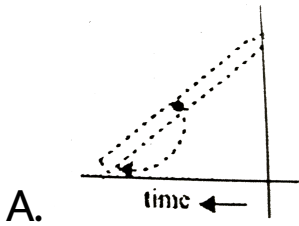
Answer: B



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35. A ladder is leaned against a smooth wall and it is allowed to slip on a frictionless floor.

Which figure represents the track of its centre of mass ?



Answer: C



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36. A person is standing in an elevator. In which situation he finds his weight less ?

A. when the elevator moves upward with constant acceleration

B. when the elevator moves downward with constant acceleration

C. when the elevator moves upward with uniform velocity

D. when the elevator moves downward with uniform velocity

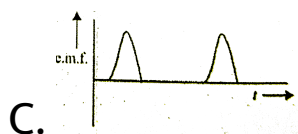
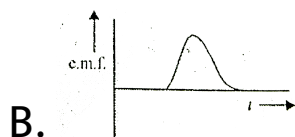
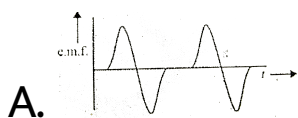
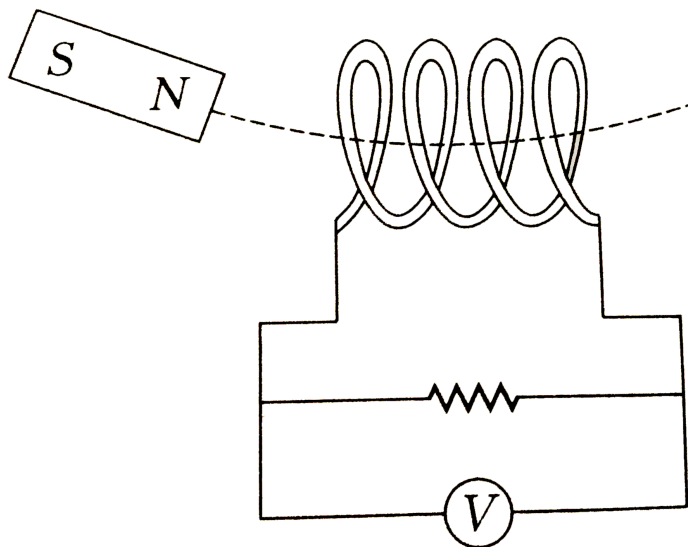
Answer: B



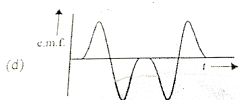
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37. A magnet is made to oscillate with a particular frequency, passing through a coil as shown in figure. The time variation of the

magnitude of emf generated across the coil
during one cycle



D.



Answer: A



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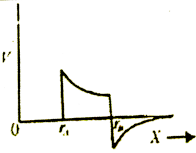
38. Two concentric conducting thin spherical shells A and B having radii r_A and r_B ($r_B > r_A$)

are charged to Q_A and $-Q_B$ ($|Q_B| > |Q_A|$).

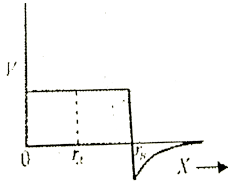
The electric field strength along a line passing through the centre varies with the distance x

as :

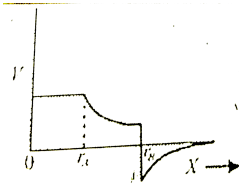
A.



B.



C.



D.



Answer: C



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39. Dimension of electrical resistance is :-

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

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

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

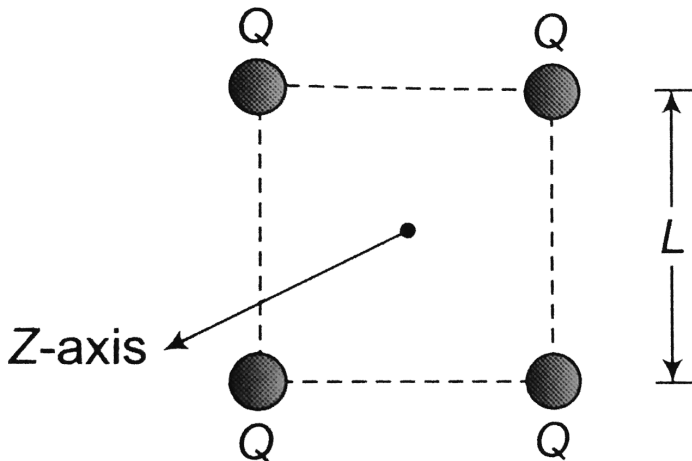
D. $ML^{-1}L^3T^3A^2$

Answer: B



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40. Four point $+ve$ charges of same magnitude (Q) are placed at four corners of a rigid square frame as shown in figure. The plane of the frame is perpendicular to z -axis. If a $-ve$ point charge is placed at a distance z away from the above frame ($z \ll L$) then



A. $-ve$ charge oscillates along the Z -axis

B. it moves away from the frame

C. it moves slowly towards the frame and
stays in the plane of the frame

D. it passes through the frame only once.

Answer: A



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41. Assertion : Specific gravity of a fluid is a dimensionless quantity.

Reason : It is the ratio of ratio of fluid to the density of water

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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42. Assertion: Frictional forces are conservative forces.

Reason: Potential energy can be associated with frictional forces.

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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43. Assertion: By roughening the surface of a glass sheet its transparency can be reduced.

Reason: Glass sheet with rough surface absorbs more 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: C



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44. Statement-I : Diode lasers are used as optical sources in optical communication.

Statement-II : Diode lasers consume less energy.

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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45. Assertion : Diamond glitters brilliantly.

Reason : Diamond does not absorb sunlight.

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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46. Assertion : The energy (E) and momentum (p) of a photon are related by $p = E/c$.

Reason : The photon behaves like a particle.

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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47. Assertion : The clouds in the sky generally appear to be whitish.

Reason : Diffraction due to clouds is efficient in equal measures its all wavelengths.

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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48. Statement-I : Television signals are received through sky-wave propagation

Statement-II : The ionosphere reflects electromagnetic waves of frequencies greater than a certain critical frequency.

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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49. Assertion: The logic gate *NOT* can be built using diode.

Reason: The output voltage and the input voltage of the diode have 180° phase difference.

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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50. Assertion : The resolving power of a telescope is more if the diameter of the objective lens is more.

Reason : Objective lens of large diameter collectd more 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: A



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51. Assertion: Reversible systems are difficult to find in real world.

Reason: Most processes are dissipative in nature.

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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52. For a system of particles under a central force field, the total angular momentum is conserved.

The torque acting on such a system is zero.

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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53. Assertion: Air quickly leaking out of a balloon becomes cooler.

Reason: The leaking air undergoes adiabatic expansion.

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. It is not possible to use ${}^{35}\text{C}1$ as the fuel for fusion energy.

The binding energy of ${}^{35}\text{C}1$ is too small.

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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55. Assertion: The number of electrons in a p -type silicon semiconductor is less than the number of electrons in a pure silicon semiconductor at room temperature.

Reason: It is due to law of mass action.

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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56. Assertion : In a common emitter transistor amplifier, the input current is much less than output current.

Reason : The common-emitter transistor amplifier has a very high input impedance.

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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57. Assertion : A body that is a good radiator is also a good absorber of radiation at a given wavelength.

Reason : According to Kirchhoff's law the absorptivity of a body is equal to its emissivity at a given wavelength

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 : In pressure-temperature (P-T) phase diagram of water, the slope of the melting curve is found to be negative.

Reason : Ice contracts on melting to water.

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 : For higher temperature, the peak emission wavelength of a black body shifts to lower wavelengths.

Reason : Peak emission wavelength of a black

body is proportional to the fourth power of temperature.

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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60. Statement-1: For reynold number

$R_e > 2000$ the flow of fluid is turbulent.

Statement-2: Inertial forces are dominant compared to the viscous forces at such high reynold numbers.

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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