



PHYSICS

BOOKS - AIIMS PREVIOUS YEAR PAPERS

AIIMS 2004

Physics

1. The waves produced by a motor boat sailing in water are :

A. Transverse

B. Longitudinal

C. Longitudinal and transverse

D. Stationary

Answer: C



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2. In an orbital motion, the angular momentum vector is :

- A. Along the radius vector
- B. Parallel to the linear momentum
- C. In the orbital plane
- D. Perpendicular to the orbital plane.

Answer: D



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3. A radioactive nucleus of mass number A , initially at rest, emits an α – particle with a

speed v . What will be the recoil speed of the daughter nucleus ?

A. $\frac{2v}{A + 4}$

B. $\frac{4v}{A + 4}$

C. $\frac{4v}{A - 4}$

D. $\frac{2v}{A - 4}$

Answer: C



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4. When an electron-positron pair annihilates, the energy released is about.

A. $0.8 \times 10^{-13} J$

B. $1.6 \times 10^{-13} J$

C. $3.2 \times 10^{10-13} J$

D. $4.8 \times 10^{-13} J$

Answer: B



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5. A sphere of mass M and radius R is falling in a viscous fluid. The terminal velocity attained by the falling object will be proportional to :

A. R^2

B. R

C. $(1) / (R)$

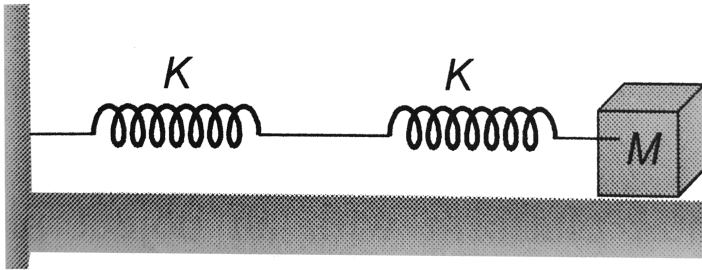
D. $(1) / (R)^2$

Answer: A



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6. Two spring are connected to a block of mass M placed on a frictionless surface as shown if both the spring have a spring constant k the frequency of oscillation block is



- A. $\frac{1}{2\pi} \sqrt{\frac{k}{M}}$
- B. $\frac{1}{2\pi} \sqrt{\frac{k}{2} M}$
- C. $\frac{1}{2\pi} \sqrt{\frac{2k}{M}}$

D. $\frac{1}{2\pi} \sqrt{\frac{M}{K}}$

Answer: B



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7. A photon of energy $4eV$ is incident on a metal surface whose work function is $2eV$. The minimum reverse potential to be applied for stopping the emission of electrons is

A. $2V$

B. 4V

C. 6V

D. 8V

Answer: A



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8. A proton and an α – particle, moving with the same velocity, enter a uniform magnetic field, acting normal to the plane of their motion. The ratio of the radii of the circular

paths described by the proton and α -particle
is

A. 1 : 2

B. 1 : 4

C. 1 : 16

D. 4 : 1

Answer: A



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9. Two parallel beams of positrons moving in the same direction will

A. repel each other

B. Will not interact with each other

C. Attract each other

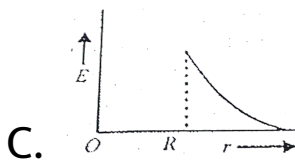
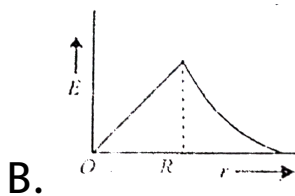
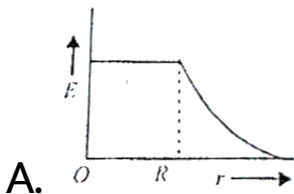
D. Be deflected normal to the plane containing the two beams.

Answer: C

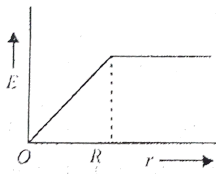


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10. The electric field due to uniformly charged sphere of radius R as a function of the distance from its centre is represented graphically by



D.



Answer: B



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11. Equipotential surfaces associated with an electric field which is increasing in magnitude along the x-direction are

A. Plane parallel to yz-plane

B. planes parallel to xy-plane

C. plane parallel to xz -plane

D. Coaxial cylinders of increasing of increasing radii around the x -axis

Answer: A



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12. Suppose the sun expands so that its radius becomes 100 times its present radius and its surface temperature becomes half of its

present value. The total energy emitted by it then will increase by a factor of :

A. 10^4

B. 625

C. 256

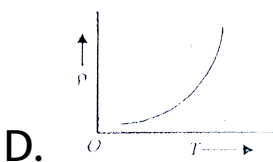
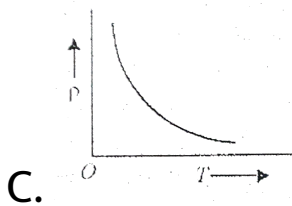
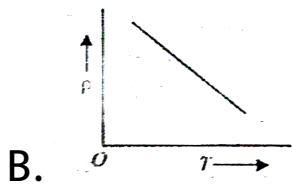
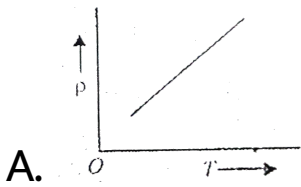
D. 16

Answer: B



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13. The temperature (T) dependence of resistivity (ρ) of a semiconductor is represented by :



Answer: B



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14. In old age arteries carrying blood in the human body become narrow resulting in an increase in the blood pressure, this follows from

A. Pascal's law

B. stoke's law

C. Bernoulli's principle

D. Archimedes principle

Answer: C



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15. The direction of the angular velocity vector is along
is along

A. The tangent to the circular path

B. The inward radius

C. The outward radius

D. The axis of rotation.

Answer: D



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16. A circular coil of radius R carries an electric current. The magnetic field due to the coil at a point on the axis of the coil located at a distance r from the centre of the coil, such that $r \gg R$, varies as

A. $(1) / r$

B. $(1) / (r^{3/2})$

C. $\frac{1}{r^2}$

D. $(1) / (r^3)$

Answer: D



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17. Sodium lamps are used in foggy conditions because

A. Yellow light is scattered more by the fog particles

B. Yellow light is scattered more by the fog particles

C. Yellow light is unaffected during its passage through the fog

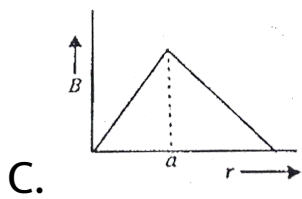
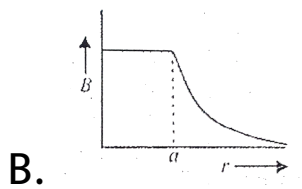
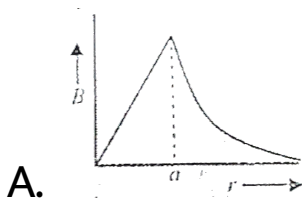
D. Wavelength of yellow light is the mean of the visible part of the spectrum

Answer:

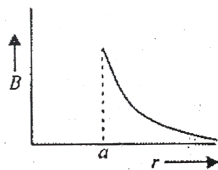


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18. The magnetic field due to a conductor of uniform cross section of radius a and carrying a steady current is represented by



D.



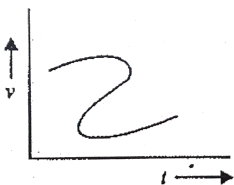
Answer:



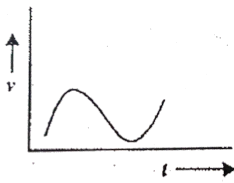
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19. Which of the following velocity-time graphs shows a realistic situation for a body in motion ?

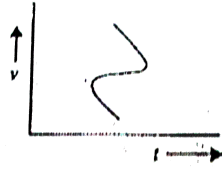
A.



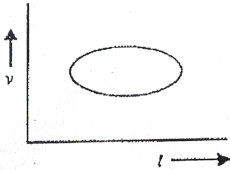
B.



C.



D.



Answer: B



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20. A bomb of mass 3.0kg explodes in air into two pieces of masses 2.0kg and 1.0kg . The smaller mass goes at a speed of 80m/s . The total energy imparted to the two fragments is :

A. 1.07 KJ

B. 2.14 KJ

C. 2.4 KJ

D. 4.KJ

Answer: D



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21. A monochromatic beam of light is used for the formation of fringes on a screen by illuminating the two slits in the Young's double slit interference experiment. When a thin film of mica is interposed in the path of one of the interfering beams

- A. The fringe width increases
- B. The fringe width decreases

C. The fringe width remains the same but the pattern shifts

D. The fringe pattern disappears.

Answer: C



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22. An object is immersed in a fluid. In order that the object becomes invisible, it should

A. Behave as perfect reflector

B. absorb all light falling on it

C. Have refractive index one

D. Have refractive index exactly matching

with that of the surrounding fluid.

Answer: D



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23. An organ pipe closed at one end has fundamental frequency of 1500Hz . The

maximum number of overtones generated by the pipe which is normal person can hear is

A. 14

B. 13

C. 6

D. 9

Answer: C



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24. The Magnetic resonance imaging (MRI) is based on the phenomenon of

- A. Nucleae magnetic resonance
- B. Electron magnetic resonance
- C. Electron Paramagnetic resonance
- D. Diamagnetism of Human tissues

Answer: A



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25. Carbon dating is best suited for determining the age of fossils of their age in years is of the order of

A. 10^3

B. 10^4

C. 10^5

D. 10^6

Answer: B



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26. A $40\mu F$ capacitor in a defibrillator is charged to $3000V$. The energy stored in the capacitor is sent through the patient during a pulse of duration $2ms$. The power delivered to the patient is

A. 45KW

B. 90KW

C. 180KW

D. 360KW

Answer: B

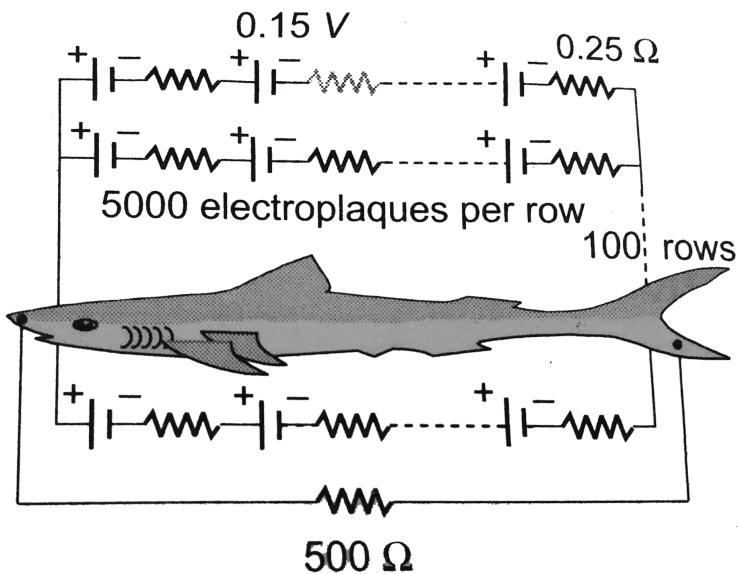


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27. Eels are able to generate current with biological cells called electroplaques. The electroplaques in an eel are arranged in 100 rows, each row stretching horizontally along the body of the fish containing 5000 electroplaques. The arrangement is suggestively shown below. Each electroplaques has an emf of $0.15V$ and internal resistance of 0.25Ω

The water surrounding the eel completes a

circuit be ween the head and its tail. If the water surrounding it has a resistance of 500Ω , the current an eel can produce in water is about



A. 1.5 A

B. 3.0A

C. 15A

D. 30A

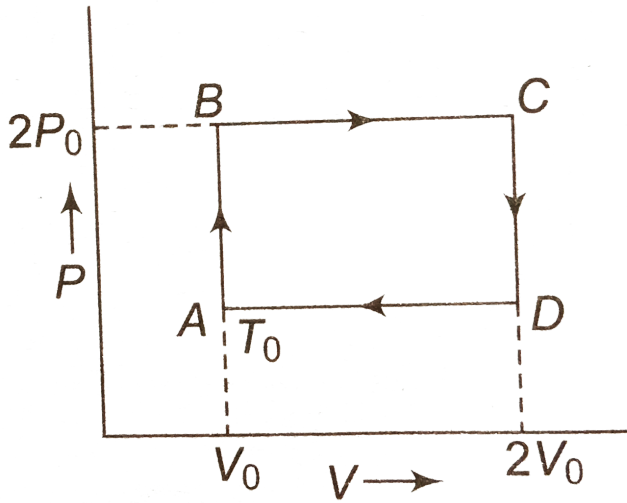
Answer: A



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28. N moles of a monoatomic gas is carried round the reversible rectangular cycle $ABCD$ as shown in the diagram. The temperature at A is T_0

The thermodynamic efficiency of the cycle is :



A. 0.15

B. 0.5

C. 0.2

D. 0.25

Answer: B



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29. Liquid oxygen remains suspended between two pole faces of a magnet because it is

- A. Diamagnetic
- B. Paramagnetic
- C. Ferromagnetic
- D. Antiferromagnetic

Answer: B



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30. An endoscope is employed by a physician to view the internal parts of body organ. It is based on the principle of

- A. Refraction
- B. Reflection
- C. Total internal reflection
- D. Dispersion

Answer: C



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31. We wish to see inside an atom. Assuming the atom to have a diameter of 100 pm, this means that one must be able to resolve a width of say 10 pm. If an electron microscope is used, the minimum electron energy required is about

A. 1.5 keV

B. 15 KeV

C. 150 keV

D. 1.5 MeV.

Answer: B



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32. When a compact disc is illuminated by a source of white light, coloured lines are observed. This is due to

A. Dispersion

B. Diffraction

C. Interference

D. Refraction

Answer: B

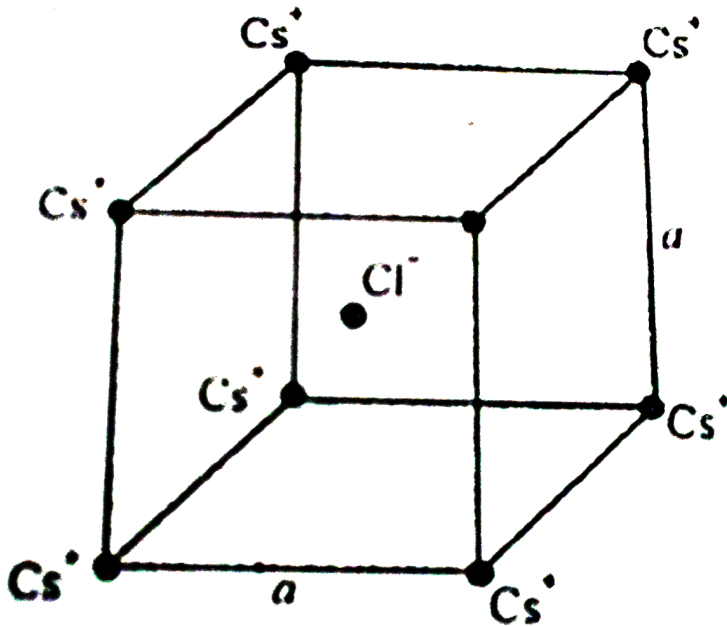


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33. In the basic CsCl crystal structure, Cs^+ and Cl^- ions are arranged in a bcc configuration as shown in the figure. The net electrostatic

force exerted by the eight Cs^+ ions on the

Cl^- ion is



A. $-\frac{1}{4\pi\epsilon_0} - \frac{4e^2}{3a^2}$

B. $-\frac{1}{4\pi\epsilon_0} - \frac{16e^2}{3a^2}$

C. $-\frac{1}{4\pi\epsilon_0} - \frac{32e^2}{3a^2}$

D. Zero

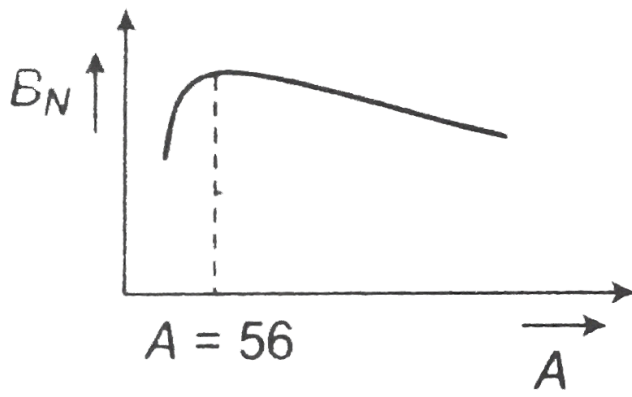
Answer: D



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34. The dependence of binding energy per nucleon, B_N on the mass number, A is represented by.

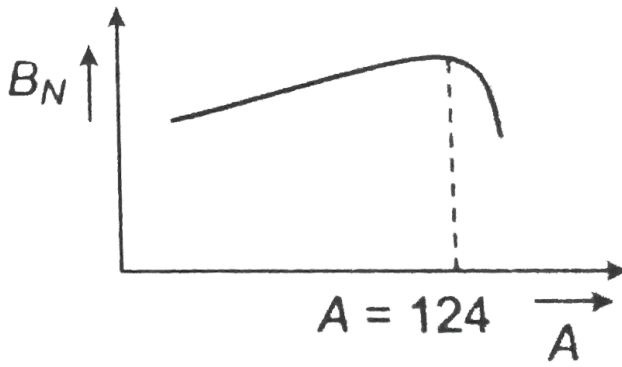
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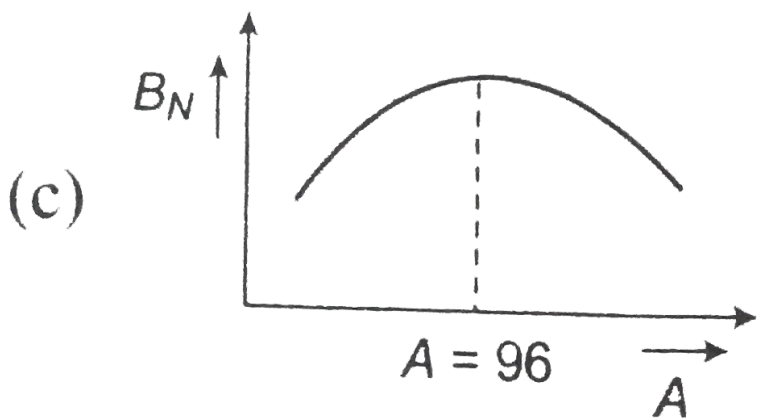
(a)

, (b)

(b)

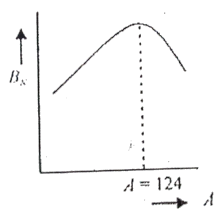
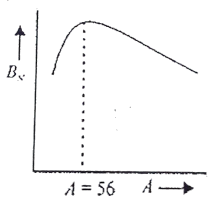
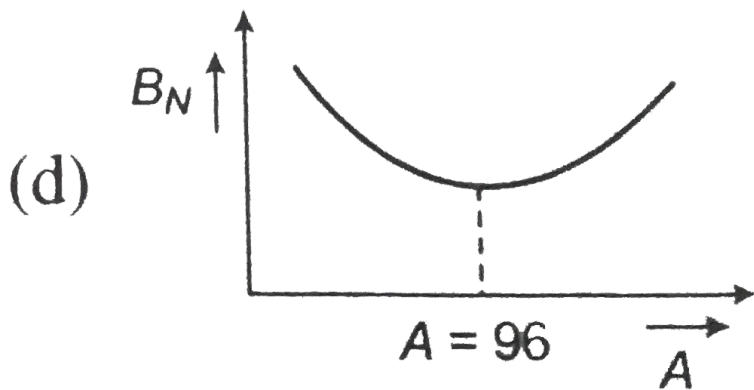


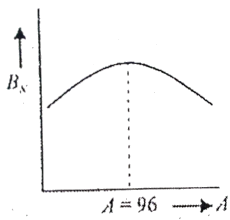
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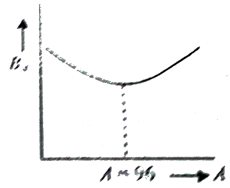
(c)

, (d)





C.



D.

Answer: A



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35. The magnetic moment of a current (i) carrying circular coil of radius (r) and number of turns (n) varies as

A. $1/r^2$

B. $1/r$

C. r

D. r^2

Answer: D



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36. The cyclotron frequency of an electron gyrating in a magnetic field of $1T$ is approximately:

A. 28 MHz

B. 280 MHz

C. 2.8GHz

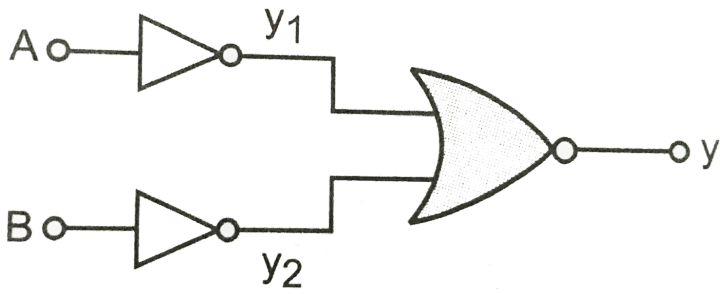
D. 28 GHz

Answer: D



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37. Which logic gate is represented by the following combination of logic gates



A. OR

B. NAND

C. AND

D. NOR

Answer: C



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38. A *Ge* specimen is dopped with *Al*. The concentration of acceptor atoms is $\sim 10^{21} \text{ atoms}/m^3$. Given that the intrinsic concentration of electron hole pairs is $\sim 10^{19}/m^3$, the concentration of electron in the specimen is

A. $\frac{(10)^{17}}{M^3}$

B. $\frac{(10)^{15}}{M^3}$

C. $\frac{(10)^4}{M^3}$

D. $\frac{(10)^2}{M^3}$

Answer: A



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39. v_{rms} , v_{av} and v_{mp} are root mean square average and most probable speeds of molecules of a gas obeying Maxwellian velocity distribution. Which of the following statements is correct ?

A. $V_{rms} < V_{av} < V_{mp}$

B. $V_{rms} > V_{av} > V_{mp}$

C. $V_{mp} < V_{rms} < V_{av}$

D. $V_{mp} > V_{rms} > V_{av}$

Answer: B



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40. Using mass (M), length (L), time (T) and current (A) as fundamental quantities, the dimension of permittivity is:

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

B. $M^{-1}L^{-3}T^4A^2$

C. $MLT^{-2}A$

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

Answer: B



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41. Assertion : A larger dry cell has higher emf.

Reason : The emf of a dry cell is proportional to its size.

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 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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42. Assertion: A red object appears dark in the yellow light .

Reason: The red colour is scattered less.

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 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: In a pressure cooker the water is brought to boil. The cooker is then removed from the stove. Now on removing the lid the pressure cooker, the water starts boiling again.

Reason: The impurities in water bring down its boiling 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 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: The true geographic north direction is found by using a compass needle.

Reason: The magnetic meridian of the earth is along the axis of rotation of the earth.

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 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. There are very small sporadic changes in the speed of rotation of the earth.

Shifting of large air masses in the earth's atmosphere produce a change in the moment of inertia of the earth causing its speed of rotation to change.

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 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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46. Assertion : In a transistor the base is made thin.

Reason: A thin base makes the transistor stable.

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 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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47. ^{90}Sr from the radioactive fall out from nuclear bomb ends up in the bones of human being through the milk consumed by them. It causes impairment of the production of red blood cells.

The energetics β – particles emitted in the decay of ^{90}Sr damage the bone marrow.

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 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: At the first glance, the top surface of the Morpho butterfly's wing appears a beautiful blue-green. If the wind moves the colour changes.

Reason: Different pigments in the wing reflect light at different angles.

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 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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49. Assertion: A famous painting was painted by not using brush strokes in the usual manner, but rather a myriad of small colour dots. In this painting the colour you see at any given place on the painting changes as you move away.

Reason: The angular separation of adjacent dots changes with the distance from the painting.

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 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 disc-shaped magnet is levitated above a superconducting material that has been cooled by liquid nitrogen.

Reason: Superconductors repel a magnet.

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 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. Energy is released in nuclear fission.

Total binding energy of the fission fragments is large than the total binding energy of the parent nucleus.

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 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. Statement I: Smaller drops of liquid resist deforming forces better than the larger drops.

Statement II: Excess pressure inside a drop is directly proportional to its surface area.

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 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 : The melting point of ice decreases with increase of pressure

Reason : Ice contract on melting.

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 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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54. Assertion: Heavy water preferred over ordinary water as a moderator in reactors.

Reason: Heavy water, used for slowing down the neutrons, has lesser absorption probability of neutrons than ordinary 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 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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55. Assertion: The driver in a vehicle moving with a constant speed on a straight road is in a non-inertial frame of reference.

Reason: A reference frame in which Newton's law of motion are applicable is non-inertial.

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 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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56. Assertion: In He-Ne laser, Population inversion takes place between energy levels of neon atoms.

Reason: Helium atoms have a meta-stable energy level.

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 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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57. Assertion : A transistor amplifier in common emitter configuration has a low input impedance.

Reason : The base to emitter region is forward biased.

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 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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58. Assertion: Thermodynamics process in nature are irreversible.

Reason: Dissipative effects cannot be eliminated.

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 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: Crystalline solids can cause X-rays to diffract.

Reason: Interatomic distance in crystalline solids is of the order of 0.1nm .

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 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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60. Assertion : Photoelectric effect demonstrates the wave nature of light.

Reason: The number of photoelectrons is proportional to the frequency of 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 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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