



PHYSICS

BOOKS - AIIMS PREVIOUS YEAR PAPERS

AIIMS 2003

Physics

1. The velocity with which a projectile must be fired so that it escapes earth's gravitation

does not depend on:

- A. Mass of the earth
- B. Mass of the projectile
- C. Radius of the projectile's orbit
- D. Gravitational constant.

Answer: B



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2. Bernoulli's equation is a consequence of conservation of

A. Energy

B. Linear momentum

C. Angular momentum

D. Mass

Answer: A



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3. A laser beam is used for carrying out surgery because it

A. Is highly monochromatic

B. Is highly coherent

C. Is highly directional

D. Can be sharply focussed.

Answer: D



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4. A wire of length L is drawn such that its diameter is reduced to half of its original diameter. If the initial resistance of the wire were 10Ω , its new resistance would be

A. 40Ω

B. 80Ω

C. 120Ω

D. 160Ω

Answer: D



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5. A proton is about 1840 times heavier than an electron. When it is accelerated by a potential difference of $1kV$, its kinetic energy will be

- A. 1840 keV
- B. $1/1840$ keV
- C. 1 keV
- D. 920 keV

Answer: C



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6. An electric dipole is kept in non-uniform electric field. It experiences

- A. Both a torque and net force
- B. Only a force but no torque
- C. Only a torque but no net force
- D. No torque and no net force

Answer: A



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7. An an ideal parallel LC circuit, the capacitor is charged by connecting it to a DC source which is then disconnected. The current in the circuit

- A. Become zero instantaneously
- B. Grows monotonically
- C. Decay monotonically

D. Oscillates instantaneously.

Answer: D



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8. To a germanium sample, traces of gallium are added as an impurity. The resultant sample would behave like

A. A conductor

B. A p-type semiconductor

C. An n- type semiconductor

D. An insulator

Answer: B



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9. A radioactive substance decays to $\left(\frac{1}{16}\right)^{th}$ of its initial activity in 40 days. The half-life of the radioactive substance expressed in days is

A. 2.5

B. 5

C. 10

D. 20

Answer: C



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10. A neutron makes a head-on elastic collision with a stationary deuteron. The fraction energy loss of the neutron in the collision is

A. $16/81$

B. $8/9$

C. $8/27$

D. $2/3$

Answer: B



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11. The motion of planets in the solar system is an example of conservation of

A. Mass

B. Linear momentum

C. Angular momentum

D. Energy

Answer: C



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12. Two small drops of mercury, each of radius R , coalesce to form a single large drop. The

ratio of the total surface energies before and after the change is

A. $1 : 2^{1/3}$

B. $2^{1/3} : 1$

C. $2 : 1$

D. $1 : 2$

Answer: B



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13. A black body, at a temperature of $227^{\circ}C$, radiates heat at a rate of $20 \text{ cal } m^{-2} s^{-1}$.

When its temperature is raised to $727^{\circ}C$, the heat radiated by it in $\text{cal } M^{-2} s^{-1}$ will be closest to

A. 40

B. 160

C. 320

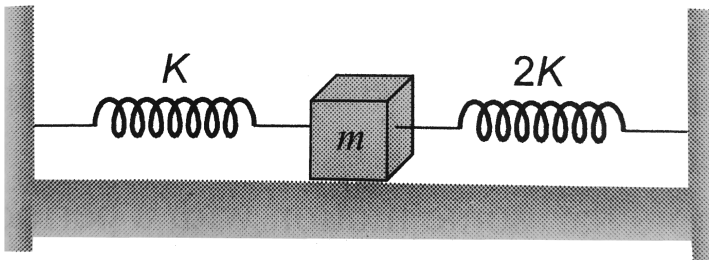
D. 640

Answer: C



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14. Two spring of force constants K and $2K$ are connected a mass m below The frequency of oscillation the mass is



A. $\frac{1}{2\pi} \sqrt{\frac{k}{m}}$

B. $\frac{1}{2\pi} \sqrt{\frac{2k}{m}}$

C. $\frac{1}{2\pi} \sqrt{\frac{3k}{m}}$

D. $\frac{1}{2\pi} \sqrt{\frac{m}{k}}$

Answer: C



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15. When a beam of light is used to determine the position of an object, the maximum accuracy is achieved if the light is

A. Polarised

B. of longer wavelength

C. of shorter wavelength

D. of high intensity

Answer: C



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16. A double slit experiment is performed with light of wavelength 500nm . A thin film of thickness $2\mu\text{m}$ and refractive index 1.5 is introduced in the path of the upper beam. The location of the central maximum will

- A. Remain unshifted
- B. Shift downward by nearly two fringes
- C. Shift upward by nearly two fringes
- D. Shift downward by 10 fringes.

Answer: C



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17. If an electron and a photon propagate in the form of waves having the same

wavelength , it implies that they have the same

A. Energy

B. Momentum

C. Velocity

D. Angular momentum

Answer: B



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18. Characteristic X-rays are produced due to

A. Transfer to momentum in collision of electrons with target atomss

B. Transition of electron from higher to lower electrons orbits in an atom

C. Heating of the target

D. Transfer of energy in collision of electrons with atoms in the target.

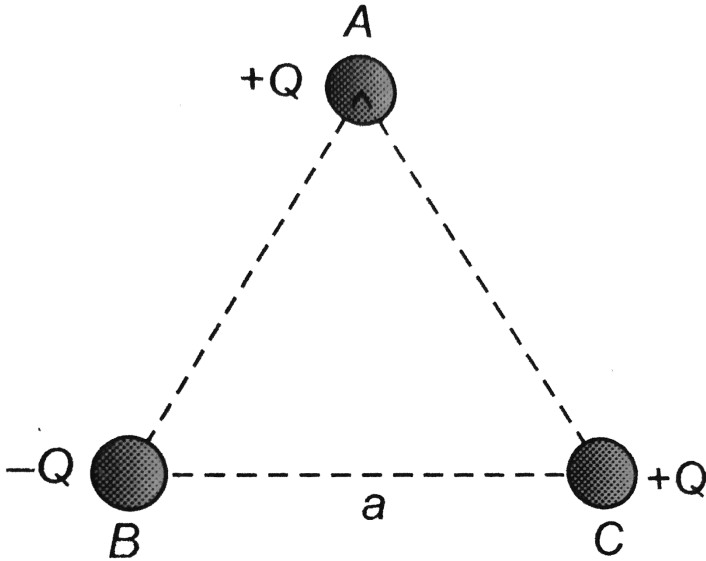
Answer: B



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19. Three charges are placed at the vertices of an equilateral triangle of side a as shown in the following figure. The force experienced by the charge placed at the vertex A in a

direction normal to BC is



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20. A capacitor of capacitance $2\mu F$ is connected in the tank circuit of an oscillator oscillating with a frequency of 1 kHz. If the

current flowing in the circuit is $2mA$, the voltage across the capacitor will be

A. 0.16V

B. 0.32V

C. 79.5V

D. 159V

Answer: C



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21. The earth's magnetic field at a given point is $0.5 \times 10^{-5} \text{Wb} - \text{m}^{-2}$. This field is to be annulled by magnetic induction at the centre of a circular conducting loop of radius 5.0cm . The current required to be flown in the loop is nearly

A. 0.2A

B. 0.4A

C. 4A

D. 40A

Answer: B



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22. A frog can be levitated in a magnetic field produced by a current in a vertical solenoid placed below the frog. This is possible because the body of the frog behaves as

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

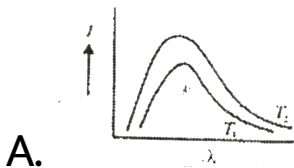
D. Antiferromagnetic

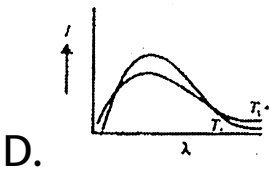
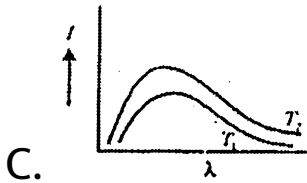
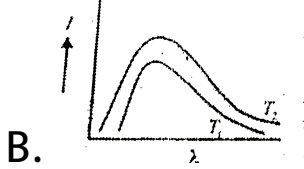
Answer: A

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23. Shown below are the black body radiation curves at temperature T_1 and T_2 ($T_2 > T_1$).

Which of the following plots is correct?



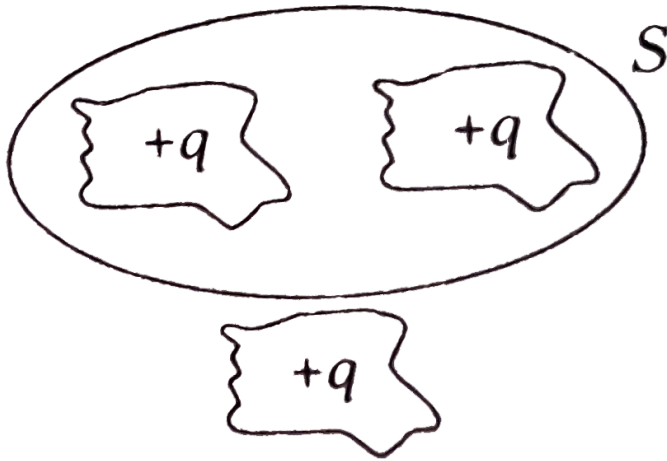


Answer: C

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24. Figure shown below is a distribution of charges. The flux of electric field due to these

charges through the surface S is



A. $3q / \epsilon_0$

B. $2q / \epsilon_0$

C. q / ϵ_0

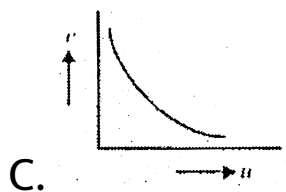
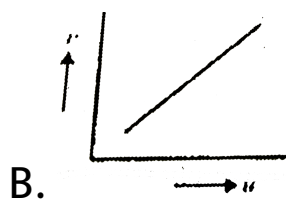
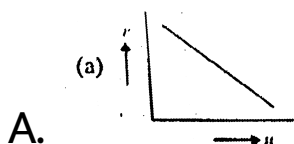
D. zero

Answer: D

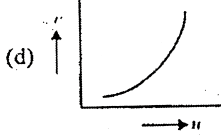


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25. In an experiment to find focal length of a concave mirror, a graph is drawn between the magnitudes of (u) and (v). The graph looks like.



D.



Answer: C



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26. Nuclear fusion is possible

A. Only between light nuclei

B. Only between heavy nuclei

C. Between both light and heavy nuclei

D. Only between nuclei which are stable against β -decay.

Answer: A



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27. An electron is travelling along the x-direction. It encounters magnetic field in the y-direction. Its subsequent motion will be

A. Straight line along the x-direction

B. A circle in the xz plane

C. A circle in the yz plane

D. A circle in the xy plane

Answer: B



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28. The difference in the lengths of a mean solar day and a sidereal day is about

A. 1 min

B. 4 min

C. 15 min

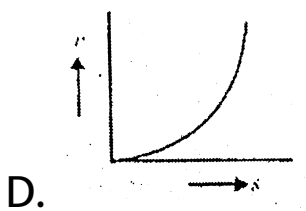
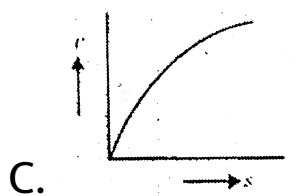
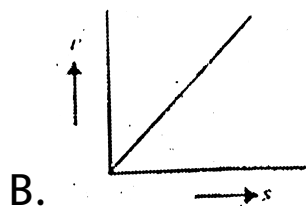
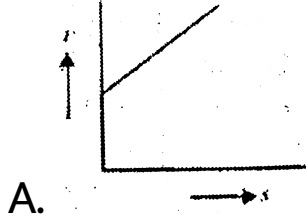
D. 56 min

Answer: B



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29. A body starting from rest moves along a straight line with a constant acceleration. The variation of speed (v) with distance (s) is represented by the graph:

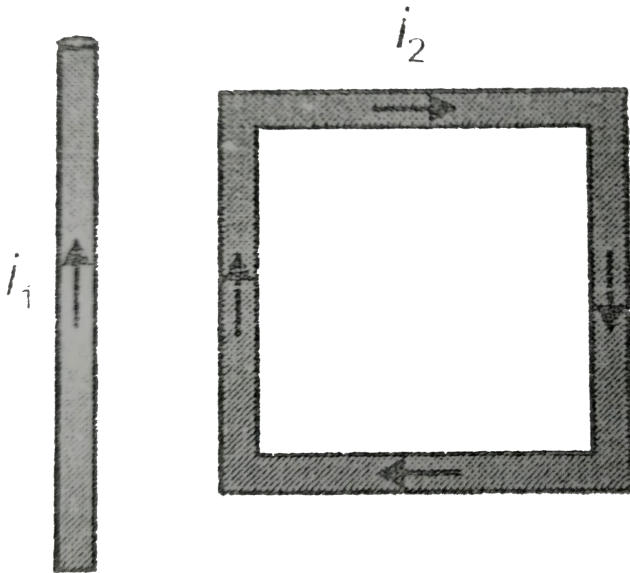


Answer: B



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30. A rectangular loop carrying a current i_2 situated near a long straight wire carrying a steady current i_1 . The wire is parallel to one of the sides of the loop and is in the plane of the loop as shown in the figure. Then the current loop will



A. Move away from the wire

B. Move towards the wire

C. Remain stationary

D. Rotate about an axis parallel to the wire.

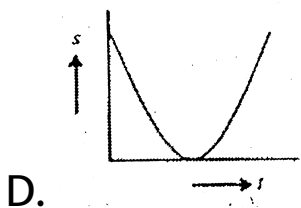
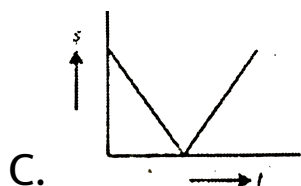
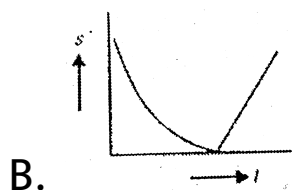
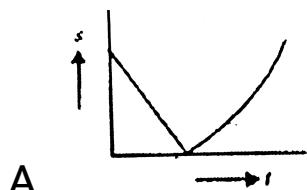
Answer: B



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31. A ball is thrown vertically upwards. Which of the following plots represent the speed

graph of the ball during its flight if the air resistance is not ignored?



Answer: D



32. Radioactive nuclei that are injected into a patient collect at certain sites within its body, undergoing radioactive decay and emitting electromagnetic radiation can then be recorded by a detector. This procedure provides an important diagnostic tool called

A. Gamma camera

B. CAT scan

C. Radiotracer technique

D. Gamma ray spectroscopy

Answer: C



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33. In a material medium, when a positron meets an electron both the particles annihilate leading to the emission of two gamma ray photons. This process forms the basis of an important diagnostic procedure called

A. MRI

B. PET

C. CAT

D. SPECT

Answer: D



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34. An astronaut is looking down on earth's surface from a space shuttle at an altitude of 400km . Assuming that the astronaut's pupil

diameter is 5mm and the wavelength of visible light is 500nm . The astronaut will be able to resolve linear object of the size of about .

A. 0.5m

B. 5m

C. 50m

D. 500m

Answer: C



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35. An earthquake generates both transverse (S) and longitudinal (P) sound waves in the earth. The speed of S waves is about 4.5 km /s and that of P waves is about 8.0 km/s . A seismograph records P and S waves from an earthquake. The first P wave arrives 4.0 min before the first S wave. The epicenter of the earthquake is located at a distance about

A. 25km

B. 250km

C. 2500km

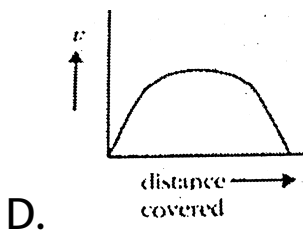
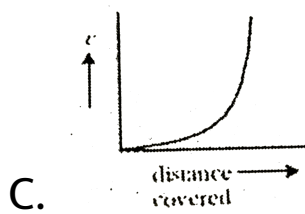
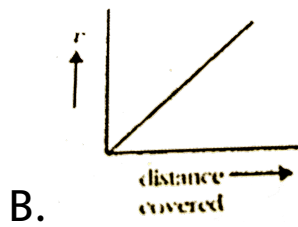
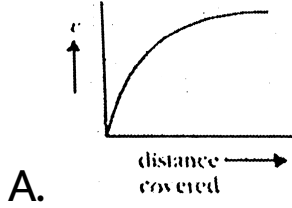
D. 5000km

Answer: C



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36. A lead shot of 1 mm diameter falls through a long column of glycerine. The variation of the velocity v with distance covered (s) is represented by



Answer: A



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37. The maximum distance upto which TV transmission from a TV tower of height h can be received is proportional to

A. $h^{t/2}$

B. h

C. h

D. h^2

Answer: A



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38. In short wave communication, waves of which of the following frequencies will be reflected back by the ionospheric layer having electron density 10^{11} per m^3

A. 2 MHz

B. 10 MHz

C. 12 MHz

D. 18 MHz

Answer: A



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

A. $M^{-1}LT^{-2}A$

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

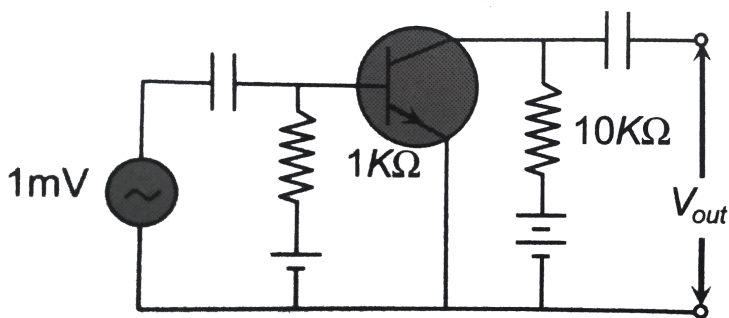
C. $MLT^{-2}A^{-2}$

D. $MLT^{-1}A^{-1}$

Answer: C



40. In the following common emitter configuration an *NPN* transistor with current gain $\beta = 100$ is used. The output voltage of the amplifier will be



A. 10mV

B. 0.1V

C. 1.0V

D. 10V

Answer: C



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41. Assertion : Temperature near the sea-coast are moderate.

Reason : Water has a high thermal conductivity.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: B



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42. The earth is slowing down and as a result the moon is coming nearer to it.

The angular momentum of the earth-moon system is not conserved.

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

- B. If both assertion and reason are true and the reason is not the correct explanation of the assertion
- C. If assertion is true but reason is false
- D. If both assertion and reason are false statements.

Answer: D



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43. Assertion : A tube light emits white light.

Reason : Emission of light in a tube takes place at a very high temperature.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: C



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44. Radioactive nuclei emit β^{-1} particles.

Electrons exist inside the nucleus.

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

explanation of the assertion

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

C. If assertion is true but reason is false

D. If both assertion and reason are false
statements.

Answer: C



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45. Assertion: The resistivity of a semiconductor increases with temperature.

Reason: The atoms of a semiconductor vibrate with larger amplitude at higher temperature thereby increasing its resistivity.

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

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

explanation of the assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: D



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46. Assertion: The coulomb force is the dominating force in the universe.

Reason: The coulomb force is weaker than the gravitational force.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: D



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47. Assertion: The length of the day is slowly increasing.

Reason: The dominant effect causing a slowdown in the rotation of the earth is the

gravitational pull of other planets in the solar system.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: D



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48. Assertion: Bohr had to postulate that the electrons in stationary orbits around the nucleus do not radiate.

Reason: According to classical physical all moving electrons radiate.

- A. If the both assertion and reason are true and the reason is the correct explanation of the assertion
- B. If both assertion and reason are true and the reason is not the correct explanation of the assertion
- C. If assertion is true but reason is false
- D. If both assertion and reason are false statements.

Answer: B



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49. Assertion: The possibility of an electric bulb fusing is higher at the time of switching ON and OFF.

Reason: Inductive effects produce a surge at the time of switch ON and OFF.

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

- B. If both assertion and reason are true and the reason is not the correct explanation of the assertion
- C. If assertion is true but reason is false
- D. If both assertion and reason are false statements.

Answer: A



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50. Assertion : The stars twinkle while the planets do not.

Reason : The stars are much bigger in size than the planets.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: B



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51. Assertion A beam of charged particles is employed in the treatment of cancer

Reason Charged particles on passing through a

material medium lose their energy by causing ionization of the atoms along their path.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: B



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52. Assertion: When a beetle moves along the sand within a few tens of centimeters of a sand scorpion, the scorpion immediately turns towards the beetle and dashes to it.

Reason: When a beetle disturbs the sand, it

sends pulses along the sand surface one set of pulses in longitudinal while other set is transvers.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: A



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53. Assertion: When a bottle of cold carbonated drink is opened, a slight fog forms around the opening.

Reason: Adiabatic expansion of the gas causes

lowering of temperature and condensation of water vapours.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: C



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54. Statement-1: The size of a hydrogen increases as it rises in air.

Statement-2: The material of the balloon can be easily stretched.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: B



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55. Assertion : Owls can move freely during night.

Reason : They have large number of rods on their retina.

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

- B. If both assertion and reason are true and the reason is not the correct explanation of the assertion
- C. If assertion is true but reason is false
- D. If both assertion and reason are false statements.

Answer: C



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56. Assertion : It is hotter over the top of a fire than at the same distance of the side.

Reason : Air surrounding the fire conducts more heat upward

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: C



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57. Assertion : The amplitude of an oscillation pendulum decreases gradually with time

Reason : The frequency of the pendulum decrease with time

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: C



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58. Assertion: Microwave communication is preferred to optical communication

Reason: Microwaves provide large number of channels and bandwidths as compared to optical signals.

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

- B. If both assertion and reason are true and the reason is not the correct explanation of the assertion
- C. If assertion is true but reason is false
- D. If both assertion and reason are false statements.

Answer: D



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59. Assertion : Neutrons penetrate matter more readily as compared to protons.

Reason : Neutrons are slightly more massive than protons.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: B



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60. Statement-1: in high latitude one sees colourful curtains of light hanging down from high altitudes.

Statement-2: The high energy charged

particles from the sun are deflected to polar regions by the magnetic field.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false statements.

Answer: A



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