PHYSICS

BOOKS - AIIMS PREVIOUS YEAR PAPERS

AIIMS 2016

Physics

1. A man is at a distance of 6 m from a bus. The bus begins to move with a constant

acceleration of $3ms^{-2}$. In order to catch the bus, the minimum speed with which the man should run towards the bus is

A. $2ms^{-1}$

B. $4ms^{-1}$

C. $6ms^{-1}$

D. $8ms^{-1}$

Answer: C

2. If $\vec{A}$ and $\vec{B}$ are non-zero vectors which obey the relation $\left|\vec{A} + \vec{B}\right| = \left|\vec{A} - \vec{B}\right|$, then the angle between them is

A. $0°$

B. $60°$

C. $90°$

D. $120°$

Answer: C

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3. In a Fraunhofer diffraction at single slit of width d with incident light of wavelength 5500Å, the first minimum is observed, at angle 30°. The first secondary maximum is observed at an angle θ =

A. $\dfrac{\sin^{-1}(1)}{\sqrt{2}}$

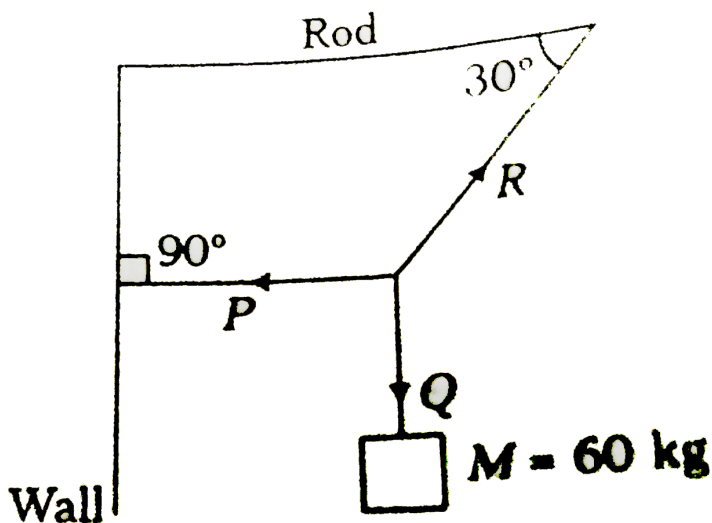B. $\dfrac{\sin^{-1}(1)}{4}$

C. $\dfrac{\sin^{-1}(3)}{4}$

D. $\dfrac{\sin^{-1}(\sqrt{3})}{2}$

Answer: C

4. A body of mass 60 kg suspended by means of three strings, P, Q and R as shown in the figure is in equlibrium. The tension in the string P is

A. 130.9 g N

B. 60 g N

C. 50 g N

D. 103.9 g N

Answer: D

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5. The angular amplitude of a simple pendulum is θ_0. The maximum tension in its string will be

A. $mg(1 - \theta_0)$

B. $mg(1 + \theta_0)$

C. $mg(1 - \theta_0^2)$

D. $mg(1 + \theta_0^2)$

Answer: D

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6. Three identical charges are placed at the vertices of an equilateral triangle. The force experienced by each charge, (if $k = \dfrac{1}{4}\pi\varepsilon_0$) is

A. $2K\dfrac{q^2}{r^2}$

B. $\dfrac{Kq^2}{2r^2}$

C. $\sqrt{3}K\dfrac{q^2}{r^2}$

D. $\dfrac{Kq^2}{\sqrt{2}r^2}$

Answer: C

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7. A voltmeter of resistance 20000Ω reads 5 volt. To make it read 20 volt, the extra resistance required is

A. 40000Ω in parallel

B. 60000Ω in parallel

C. 60000Ω in series

D. 40000Ω in series

Answer: C

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8. Light wave enters from medium 1 to medium 2. Its velocity in 2nd medium is double from 1st.

For total internal reflection the angle of incidence must be greater than

A. $30°$

B. $60°$

C. $45°$

D. $90°$

Answer: A

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9. The temperature of a body is increased from $-73°C$ to $327°C$. Then the ratio of emissive power is

A. $1/9$

B. $1/27$

C. 27

D. 81

Answer: D

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10. Time period of pendulum, on a satellite orbiting the earth, is

A. $1/\pi$

B. zero

C. π

D. infinity

Answer: D

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11. Tend identical cells each of potential E and internal resistance r are connected in series to form a closed circuit. An ideal voltmeter connected across three cells, will read

A. 10E

B. 3E

C. 13E

D. 7E

Answer: B

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12. Two charge spheres separated at a distance d exert a force F on each other. If they are immersed in a liquid of dielectric constant K=2, then the force (if all conditions are same) is

A. F/2

B. F

C. 2F

D. 4F

Answer: A

13. A gun of mass 10kg fires 4 bullets per second. The mass of each bullet is 20 g and the velocity of the bullet when it leaves the gun is $300ms^{-1}$. The force required to hold the gun while firing is

A. 6N

B. 8N

C. 24N

D. 240N

Answer: C

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14. Water is filled in a container upto height 3m. A small hole of area 'a' is punched in the wall of the container at a height 52.5 cm from the bottom. The cross sectional area of the container is A. If $a/A = 0.1$ then v^2 is (where

v is the velocity of water coming out of the hole)

A. $50m^2s^{-2}$

B. $40m^2s^{-2}$

C. $51.5m^2s^{-2}$

D. $50.5m^2s^{-2}$

Answer: A

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15. A transparent cube of $15cm$ edge contains a small air bubble. Its apparent depth when viewed through one face is $6cm$ and when viewed through the opposite face is $4cm$. Then the refractive index of the material of the cube is

A. 2.0

B. 1.5

C. 1.6

D. 2.5

Answer: B

16. A stone of mass $0.3kg$ attched to a $1.5m$ long stirng is whirled around in a horizontal cirlcle at a speed of 6 m/s The tension in the string is

A. 10 N

B. 20 N

C. 7.2 N

D. 30 N

Answer: C

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17. A ball is dropped from the top of a building 100 m high. At the same instant another ball is thrown upwards with a velocity of $40ms^{-1}$ from the bottom of the building. The two balls will meet after.

A. 3 s

B. 2 s

C. 2.5 s

D. 5 s

Answer: C

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18. If linear momentum if increased by 50% then kinetic energy will be increased by

A. 0.5

B. 1

C. 1.25

D. 0.25

Answer: C

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19. The additional kinetic energy to be provided to a satellite of mass m revolving around a planet of mass M, to transfer it

forms a circular orbit of radius R_1 to another

of radius $R_2 (R_2 > R_1)$ is

A. $GmM \left(\dfrac{1}{R_1^2} - \dfrac{1}{R_2^2} \right)$

B. $GmM \left(\dfrac{1}{R_1} - \dfrac{1}{R_2} \right)$

C. $2GmM \left(\dfrac{1}{R_1} - \dfrac{1}{R_2} \right)$

D. $\dfrac{1}{2} GmM \left(\dfrac{1}{R_1} - \dfrac{1}{R_2} \right)$

Answer: D

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20. A sphere of mass 10 kg and radius 0.5 m rotates about a tangent. The moment of inertia of the sphere is

A. $5kgm^2$

B. $2.7kgm^2$

C. $3.5kgm^2$

D. $4.5kgm^2$

Answer: C

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21. The displacement of a particle executing SHM is given by y=0.5 sint cm . The maximum speed of the particle si

A. $200cms^{-1}$

B. $100cms^{-1}$

C. $50cms^{-1}$

D. $5.25cms^{-1}$

Answer: C

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22. A Steady current flows in a metalic conductor of non uniform cross section. The quantity/quantities which remain constant along the length of the conductor is/are

    A. Electric field

    B. Drift velocity

    C. Current

    D. Current density

Answer: C

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23. Horizontal and vertical components of earth's magnetic field at a place are equal. The angle of dip at that place is _____.

A. $30°$

B. $75°$

C. $60°$

D. $45°$

Answer: D

24. Focal length of objective and eye piece of telescope are 200 cm and 4 cm respectively. What is the length of telescope for normal adjustment?

A. 196 cm

B. 204 cm

C. 250 cm

D. 225 cm

Answer: B

25. A series resonant LCR circuit has a quality factor (Q-factor)=0.4. If $R = 2k\Omega, C = 0.1\mu F$ then the value of inductance is

A. 0.1 H

B. 0.064 H

C. 2 H

D. 5 H

Answer: B

26. The intensity ratio of the maxima and minima in an interference pattern produced by two coherent sources of light is $9:1$. The intensities of the used light sources are in ratio

A. $3:1$

B. $4:1$

C. $9:1$

D. $10:1$

Answer: B

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27. If particles are moving with same velocity ,

then maximum de - Broglie wavelength will be

for

A. Neutron

B. Proton

C. α particle

D. β particle

Answer: D

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28. An atom of mass number 15 and atomic number 7 captures an α − particle and then emits a proton. The mass number and atomic

number of the resulting product will respectively be.

A. 14 and 2

B. 15 and 3

C. 16 and 4

D. 18 and 8

Answer: D

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29. A Zener diode is specified having a breakdown voltage of 9.1 V with a maximum power dissipation of 364 mW. What is the maximum current that the diode can handle.

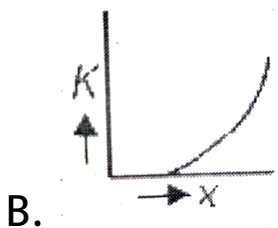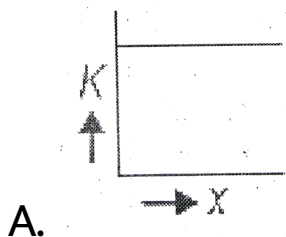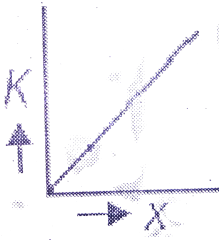   A. 40 mA

    B. 60 mA
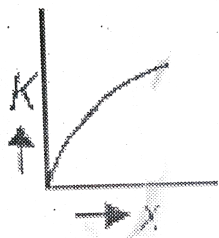
    C. 50 mA

    D. 45 mA

Answer: A

30. A body moves from rest with a constant acceleration. Which one of the following graphs represents the variation of its kinetic energy K with the distance travelled x?

A.

B.

C.

D.

Answer: C

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31. A mass M is suspended from a spring of

negiliglible mass the spring is pulled a little

and then released so that the mass executes simple harmonic oscillation with a time period T If the mass is increases by m the time period because $\left(\dfrac{5}{4}T\right)$,The ratio of $\dfrac{m}{M}$ is

A. $9/6$

B. $5/4$

C. $25/16$

D. $4/5$

Answer: A

32. A wave is represented by the equation $y = 0.5 \sin(10t - x)m$. It is a travelling wave propagating along the + x direction with velocity

    A. $10ms^{-1}$

    B. $20ms^{-1}$

    C. $5ms^{-1}$

    D. None of these

Answer: A

33. A transistor connected at common emitter mode contains load resistance of $5k\Omega$. If the input peak voltage is 5 mV and the current gain is 50, find the voltage gain.

A. 250

B. 500

C. 125

D. 50

Answer: A

34. The two coherent sources with intensity ratio β produce interference. The fringe visibility will be

A. $\dfrac{2\sqrt{\beta}}{1+\beta}$

B. 2β

C. $\dfrac{2}{(1+\beta)}$

D. $\dfrac{\sqrt{\beta}}{1 + \beta}$

Answer: A

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35. On increasing the temperature of a conductor, its resistance increases because

A. relaxation time increases

B. electron density decreases

C. relaxation time decreases
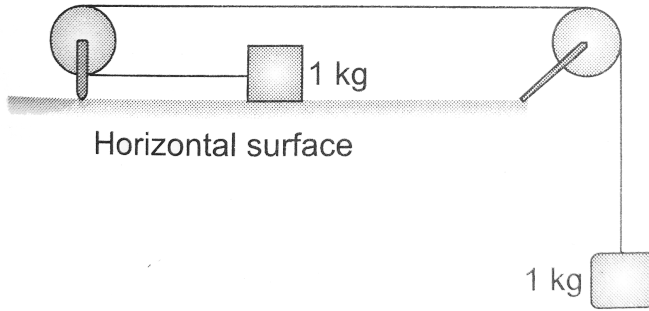
D. relaxation time remains constant

Answer: C

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36. Consider the system as shown in the figure. The pulley and the string are light and all the surfaces are frictionless. The tension in the

string is $\left(g = 10m/s^2\right)$.

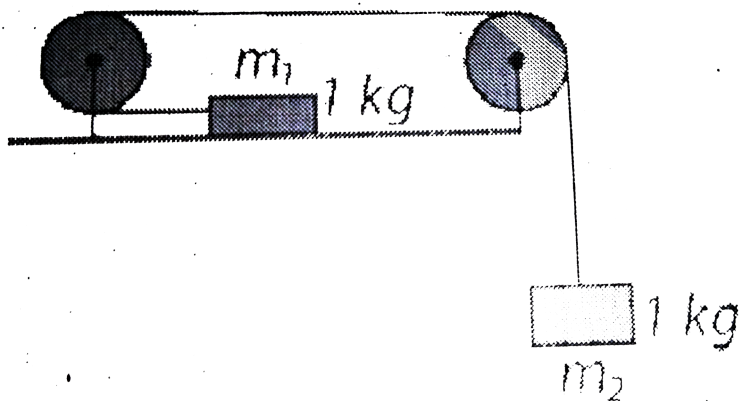1 kg

Horizontal surface

1 kg

A. 0 N

B. 1 N

C. 2 N

D. 5 N

Answer: D

37. The magnetic field at the centre O of the

are shown in the figure is

A. $2I\left(\sqrt{2} + \pi\right) \times \dfrac{10^{-7}}{r}$

B. $2I\left(\sqrt{2} + \dfrac{\pi}{4}\right) \times \dfrac{10^{-7}}{r}$

C. $I\left(\sqrt{2} + \pi\right) \times \dfrac{10^{-7}}{r}$

D. $I\left(\sqrt{2} + \dfrac{\pi}{4}\right) \times \dfrac{10^{-7}}{r}$
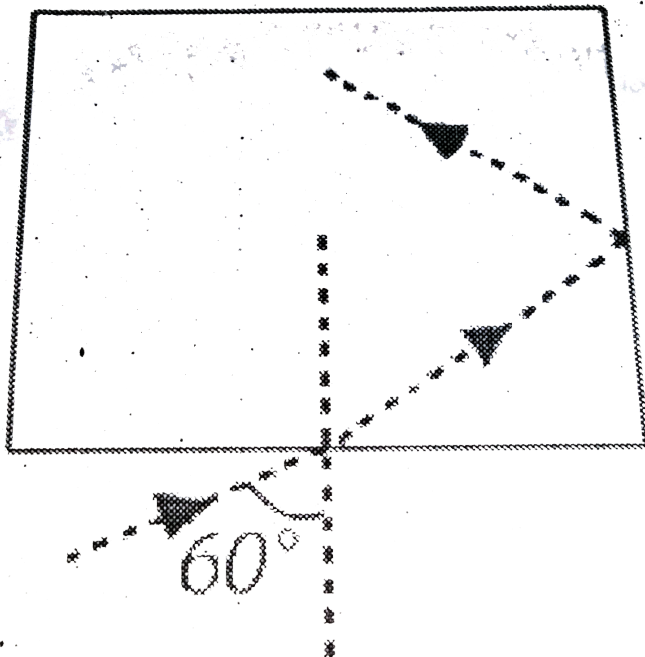
Answer: B

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38. For a situation shown in figure, find the refrective index of glass so that it will suffer

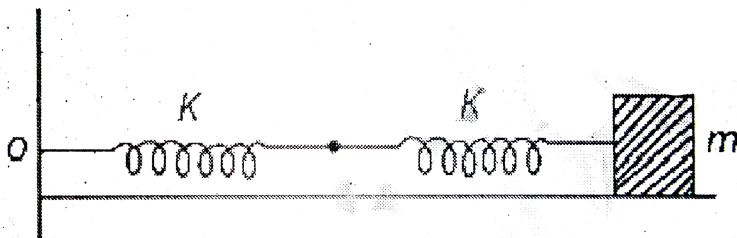total internal reflection at the vertical surface.

A. 1.732

B. 1.5

C. 1.31

D. 1.6

Answer: C

39. The frequency of oscillations of a mass m connected horizontally by a spring of spring constant k is 4 HZ. When the spring is replaced by two identical spring as shown in figure. Then the effective frequency is

A. $4\sqrt{2}$

B. 1.5
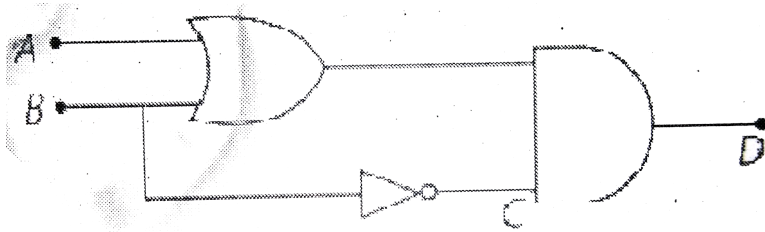
C. 1.31

D. $2\sqrt{2}$

Answer: D

40. The output for the given, circuit is

A. $(A + B) \cdot \overline{B}$

B. $(A \cdot B) \cdot \overline{B}$

C. $(A + B) \cdot B$

D. $(A \cdot B) \cdot B$

Answer: A

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41. Statement-1 : In an adiabatic process, change in internal energy of a gas is equal to work done on/by the gas in the process.

Statement-2 : This is because temp.of gas remains constant in an adiabatic process.

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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42. Assertion : In YDSE bright and dark fringe are equally spaced.

Reason : It only depends upon 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: C

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43. Assertion : Generally heavy nuclei are unstable.

Reason : It has more neutrons and protons.

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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44. Assertion In water, value of magnetic field decreases.

Reason: Water is a diamagnetic substance. When diamagnetic material is placed in

   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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45. Assertion : Heavy water is used as moderator in nuclear reactor.

Reason : Water cool down the fast neutron.

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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46. Assertion : Electron microscope has more resolving power than optical microscope.

Reason : We can control the energy of electron.

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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47. Assertion : Unlike electric force and gravitational forces, nuclear force has limited range.

Reason : Nuclear force do not obey inverse square law.

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

48. Assertion : The electromagnetic waves are transverse in nature.

Reason : Waves of wavelength 10 μm are radiowave and microwave.

    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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49. Assertion : When a charge particle moves in a circular path. It produces electromagnetic wave.

Reason : Charged particle has acceleration.

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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50. Assertion : When certain wavelength of light fall on metal surface it ejects electron.

Reason : Light was wave 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: B

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51. Assertion : Lines of force are perpendicular to conductor surface.

Reason : Generally electric field is perpendicular to equipotential surface.

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. Assertion : Magnetic field is useful in producing parallel beam of charged particle.

Reason : Magnetic field inhibits the motion of charged particle moving across it.

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

53. Assertion : KE is conserved at every instant of elastic collision.

Reason : NO deformation of matter occurs in elastic collision.

    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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54. Assertion : Magnetic field lines are continuous and closed.

Reason : Magnetic monopole does not exist.

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

55. Value of radius of gyration of a body depends on axis of rotation.

Radius of gyration is root mean square distance of particle of the body from the axis of rotation.

    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 : The graph of potential energy and kinetic energy of a particle in SHM with respect to position is a parabola.

Reason : Potential energy and kinetic energy do not vary linearly with position.

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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57. Statement I: The specific heat of a gas in an adiabatic process is zwero but it is infinite in an isothermal process.

Statement II: Specific heat of a gas is directly

proportional to heat exchanged with the system and inversely proportional to change in termperature.

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

58. Assertion: Electrons in the atom are held due to coulomb forces.

Reason: The atom is stable only because the centripetal force due to Coulomb's law is balanced by the centrifugal force.

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

59. Assertion : At resonance, LCR series circuit have a minimum current.

Reason : At resonance, in LCR series circuit, the current and e.m.f. are not in phase with each other.

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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60. Assertion : When an objecct is placed between two plane parallel mirrorrs, then all the images found are of equal intensity.

Reason : In case of plane parallel mirrorrs, only two images are possible.

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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