



## PHYSICS

### BOOKS - AIIMS PREVIOUS YEAR PAPERS

#### AIIMS 2014

#### Physics

1. A closely wound solenoid of 2000 turns and area of cross-section  $1.5 \times 10^{-4} m^2$  carries a current of 2.0 a. it suspended through its centre and perpendicular to its length, allowing it to turn in a

horizontal plane in a uniform magnetic field  $5 \times 10^{-2}$  tesla making an angle of  $30^\circ$  with the axis of the solenoid. The torque on the solenoid will be:

A.  $3 \times 10^{-3} N - m$

B.  $1.5 \times 10^{-3} N - m$

C.  $1.5 \times 10^{-3} N - m$

D.  $3 \times 10^{-2} N - m$

**Answer: C**



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2. A freshly prepared radioactive source of half-life  $2h$  emits radiation of intensity which is 64 times the permissible safe level. The minimum time after which it would be possible to work safely with this source is

A. 12 h

B. 24 h

C. 6 h

D. 130 h

**Answer: A**



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3. A ball is dropped from a high rise platform  $t = 0$  starting from rest. After  $6s$  another ball is thrown downwards from the same platform with a speed  $v$ . The two balls meet at  $t = 18s$ . What is the value of  $v$ ?

A. 74 m/s

B. 64 m/s

C. 84 m/s

D. 94 m/s

**Answer: A**



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4. The thermo emf  $E$  (in volts) of a certain thermocouple is found to vary with  $Q$  (in  $^{\circ}C$ ) according to equation  $\left(E = 20Q - \frac{Q^2}{20}\right)$ , where  $Q$  is temperature of the hot junction, the cold junction being kept at  $0^{\circ}C$ . Then the neutral temperature of the thermocouple is

A.  $300^{\circ}C$

B.  $400^{\circ}C$

C.  $100^{\circ}C$

D.  $200^{\circ}C$

**Answer: D**



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5. The maximum vertical distance through which a full dressed astronaut can jump on the earth is 0.5m. Estimate the maximum vertical distance through which he can jump on the motion, which has a mean density  $\frac{2}{3}$  rd that of the earth and radius one-quarter that of the earth.

A. 1.5 m

B. 3 m

C. 6 m

D. 7.5 m

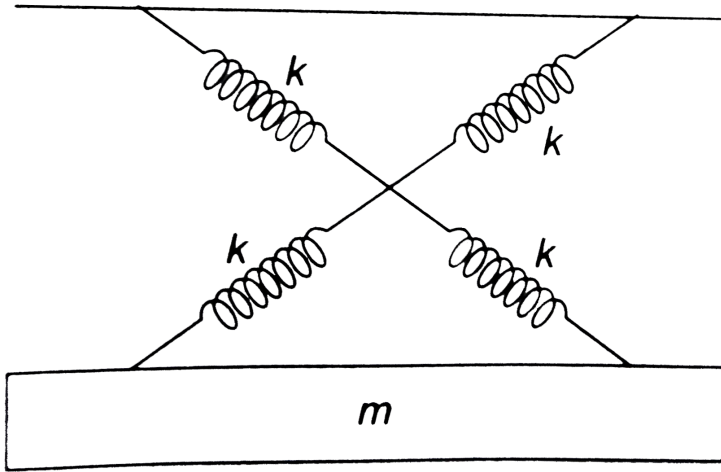
**Answer: B**



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6. As shown in figure in a simple harmonic motion oscillator having identical four springs has time

period



A.  $T = 2\pi \sqrt{\frac{m}{4k}}$

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

C.  $T = 2\pi \sqrt{\frac{m}{k}}$

D.  $T = 2\pi \sqrt{\frac{m}{8k}}$

Answer: C



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7. If there were a smaller gravitational effect, which of the following forces do you think would alter in some respect

A. Magnetic force

B. Electrostatic force

C. Viscous force

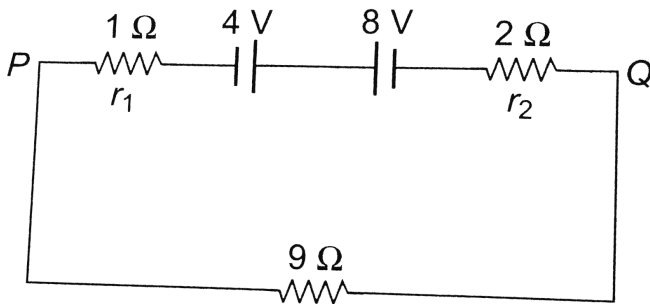
D. Archimede's uplift

**Answer: B**



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8. Two batteries of e.m.f.  $4V$  and  $8V$  with internal resistances  $1\Omega$  and  $2\Omega$  are connected in a circuit with a resistance of  $9\Omega$  as shown in figure. The current and potential difference between the points  $P$  and  $Q$



- A.  $\frac{1}{2}$ ,  $9V$
- B.  $\frac{1}{12}$ ,  $12V$
- C.  $\frac{1}{3}A$ ,  $3V$

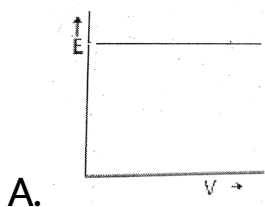
D.  $\frac{1}{6}A, 4V$

**Answer: C**

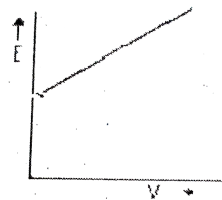


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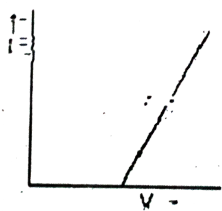
9. The correct graph respectively the relation between energy ( $E$ ) of photoelectrons and frequency  $\nu$  of incident light is



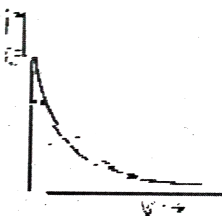
B.



C.



D.



**Answer: C**



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10. A body at a temperature of  $727^{\circ}C$  and having surface area  $5cm^2$ , radiations  $300J$  of energy each minute. The emissivity is (Given Boltzmann constant  $= 5.67 \times 10^{-8} Wm^{-2}K^{-4}$ )

A.  $e = 0.18$

B.  $e = 0.02$

C.  $e = 0.2$

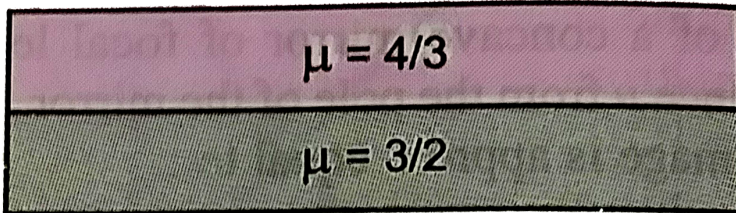
D.  $e = 0.15$

**Answer: A**



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11. Considering normal incidence of ray, the equivalent refractive index of combination of two slabs shown in Fig. is.



- A. 1.8
- B. 1.43
- C. 2
- D. None of the above

**Answer: B**



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12. Three particles having charges in the ratio of 2:3:5, produce the same point on the photographic film in Thomson's experiment. Their masses are in the ratio of

A. 2:3:5

B. 5:3:2

C. 15:10:6

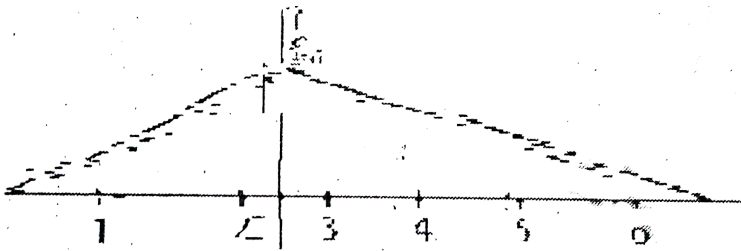
D. 3:5:2

**Answer: A**



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13. What will be ratio of speed in first two seconds to the speed in next 4s



A.  $\sqrt{2}:1$

B.  $3:1$

C.  $2:1$

D.  $1:2$



**Answer: C**



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**14.** A black body emit heat at the rate of  $20W$ , when its tempertaure is  $227^{\circ}C$  Another black body emits heat at the rate of  $15W$ , when its temperature is  $227^{\circ}C$ . Compare the area of the surface of the two bodies, if the surrounding is at  $NTP$

A. 16 : 1

B. 1 : 4

C. 12 : 1

D. 1: 12

**Answer: D**



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**15.** The pressure on a square plate is measured by measuring the force on the plate and the length of the sides of the plate by using the formula  $p = \frac{F}{l^2}$ . If the maximum errors in the measurement of force and length are 4 % and 2 % respectively. Then the maximum error in the measurement of pressure is

A. 0.01

B. 0.02

C. 0.08

D. 0.1

**Answer: C**



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**16.** The transfer ration of a transistor is 50. The input resistance of the transistor when used in the common -emitter configuration is  $1k\Omega$ . The peak value for an *A. C.* input voltage of  $0.01V$  peak is

A.  $0.25\mu A$

B.  $0.01\mu A$

C.  $500\mu A$

D.  $100\mu A$

**Answer: C**



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17. Four resistances  $10\Omega$ ,  $5\Omega$ ,  $7\Omega$  and  $3\Omega$  are connected so that they form the sides of a rectangle  $AB$ ,  $BC$ ,  $CD$  and  $DA$  respectively. Another resistance of  $10\Omega$  is connected across the

diagonal  $AC$ . The equivalent resistance between  $A$  and  $B$  is

A.  $2\Omega$

B.  $5\Omega$

C.  $7\Omega$

D.  $10\Omega$

**Answer: B**



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18. The velocity of a particle moving in the  $x - y$  plane is given by

$$\frac{dx}{dt} = 8\pi \sin 2\pi t \quad \text{and} \quad \frac{dy}{dt} = 5\pi \sin 2\pi t$$

where,  $t = 0$ ,  $x = 8$  and  $y = 0$ , the path of the particle is.

- A. a straight line
- B. a ellipse
- C. a circle
- D. a parabola

**Answer: B**



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19. A rod of length  $L$  is hinged from one end. It is brought to a horizontal position and released. The angular velocity of the rod, when it is in vertical position, is

A.  $\sqrt{\frac{2g}{L}}$

B.  $\sqrt{\frac{3g}{L}}$

C.  $\sqrt{\frac{g}{2L}}$

D.  $\sqrt{\frac{g}{l}}$

**Answer: B**



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20. A weight  $w$  is suspended from the midpoint of a rope, whose ends are at the same level. In order to make the rope perfectly horizontal, the force applied to each of its ends must be

- A. less than  $w$
- B. equal to  $w$
- C. equal to  $2w$
- D. infinitely large

**Answer: D**



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21. A particle moves along a curve of unknown shape but magnitude of force  $F$  is constant and always acts along tangent to the curve. Then

- A.  $F$  may be conservative
- B.  $F$  must be conservative
- C.  $F$  may be non-conservative
- D.  $F$  must be non-conservative

**Answer: D**



22. A block has been placed on an inclined plane with the slope angle  $\theta$ . Block slide down the plane at constant speed. The coefficient of Kinetic friction is equal to

A.  $\sin \theta$

B.  $\cos \theta$

C.  $g$

D.  $\tan \theta$

**Answer: D**



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23. A charge  $q$  is located at the centre of a cube.

The electric flux through any face is

A.  $\frac{\pi q}{6(4\pi\epsilon_0)}$

B.  $\frac{q}{6(4\pi\epsilon_0)}$

C.  $\frac{2\pi q}{6(4\pi\epsilon_0)}$

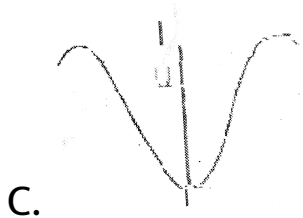
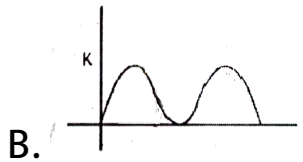
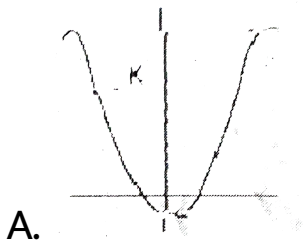
D.  $\frac{4\pi q}{\frac{1}{6}(4\pi\epsilon_0)}$

**Answer: D**

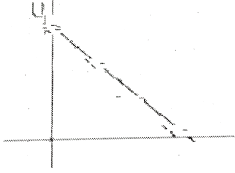


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24. During SHM, a particle has displacement  $x$  from mean position. If acceleration, Kinetic energy and potential energy are represented by  $a$ ,  $K$  and  $U$  respectively, then choose the appropriate graph



D.



**Answer: C**



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25. The root mean square velocity of hydrogen molecule at  $27^{\circ}\text{C}$  is  $v_H$  and that of oxygen at  $402^{\circ}\text{C}$  is  $v_0$ , then

A.  $v_0 > v_H$

B.  $4v_0 = 9v_H$

$$C. 2v_0 = 3v_H$$

$$D. 9v_0 = 134V_H$$

**Answer: A**



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**26.** A charged spherical conductor of radius  $a$  and charge  $q$  is, surrounded by another charged concentric sphere of radius  $b$  ( $b > a$ ). The potential difference between conductors is  $V$ . When, the spherical conductor of radius  $b$  is discharged

completely, then the potential difference between conductor will be

A.  $V$

B.  $\frac{V_a}{b}$

C.  $\frac{q_1}{4\pi\epsilon_0 a} - \frac{q_2}{4\pi\epsilon_0 b}$

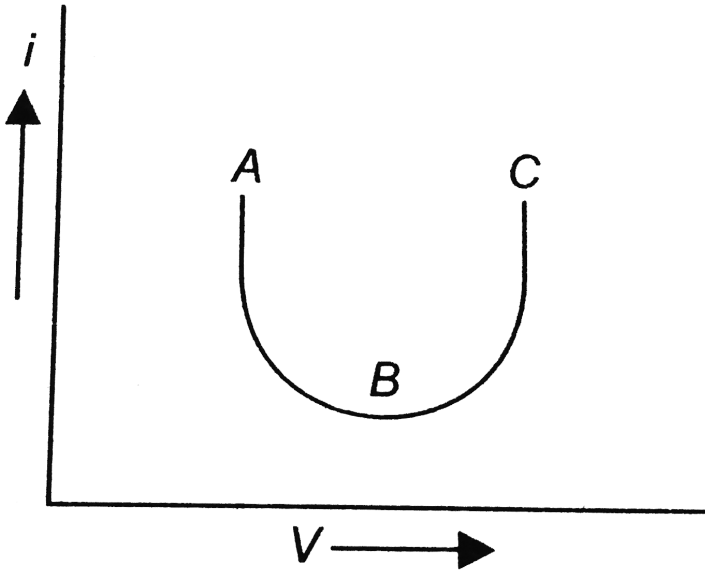
D. None of the above

**Answer: A**



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27. The current-voltage graph of a device is shown in figure. The resistance is negative in region.



A. AB

B. BC

C. ABC

D. None of these



**Answer: A**



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**28.** Silver and copper voltmeters are connected in parallel with a battery of emf  $12V$ . In 30 minutes,  $1g$  of silver and  $1.8g$  of copper are liberated. The power supplied by the battery is

( $Z_{Cu} = 6.6 \times 10^{-4} g/C$  and  $Z_{Ag} = 11.2 \times 10^{-4} g/C$ )

A. 720 J

B. 2.41 J

C. 24.12 J

D.  $4.34 \times 10^4 J$

**Answer: D**



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**29.** At a specific instant emission of radioactive compound is deflected in a magnetic field. The compound cannot emit

A. electron

B. protons

C.  $He^{2+}$

D. neutrons

**Answer: C**



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**30.** A magnet is cut in three equal parts by cutting it perpendicular to its length. The time period of original magnet is  $T_0$  in a uniform magnetic field  $B$ . Then, the time period of each part in the same magnetic field is

A.  $\frac{T_0}{2}$

B.  $\frac{T_0}{3}$

C.  $\frac{T_0}{4}$

D. None of these

**Answer: B**



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**31.** A 50 Hz AC current of crest value 1 A flows through the primary of a transformer. If the mutual inductance between the primary and secondary be 0.5 H, the crest voltage induced in the secondary is

A. 75 V

B. 150 V

C. 100 V

D. None of these

**Answer: C**



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**32.** When the length and area of cross-section both are doubled, then its resistance

A. unchanged

B. halved

C. daubled

D. qualdraupled

**Answer: A**



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**33.** According to Wien's law

A.  $\lambda_m T = \text{constant}$

B.  $\frac{\lambda_m}{T} = \text{constant}$

C.  $\lambda_m \sqrt{T} = \text{constant}$

D.  $\frac{\lambda_m}{\sqrt{7}} = \text{constant}$

**Answer: A**



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**34.** A source of light lies on the angle bisector of two plane mirrors inclined at angle  $\theta$ . The value of  $\theta$ , so that the light reflected from one mirror does not reach the other mirror will be.

A.  $\theta \geq 120^\circ$

B.  $\theta \geq 90^\circ$

C.  $\theta \leq 120^\circ$

D. None of the above

**Answer: A**



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**35.** A ruby laser produces radiations of wavelength,  $662.6nm$  in pulse whose duration are  $10^{-9}s$ . If the laser produces  $0.39J$  of energy per pulse, how many protons are produced in each pulse?

A.  $1.3 \times 10^9$



B.  $1.3 \times 10^{18}$

C.  $1.3 \times 10^{27}$

D.  $3.9 \times 10^{18}$

**Answer: B**



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**36.** Balmer given an equation for wavelength of

visible radiation of H-spectrum as  $\lambda = \frac{kn^2}{n^2 - 4}$ . The

value of k in terms of Rydbrum constant R is

A. R

B.  $4R$

C.  $R/4$

D.  $4/R$

**Answer: D**



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**37.** In  $\mu_e$  and  $\mu_h$  are electron and hole mobility.  $E$  be the applied electric field, the current density  $\tau$  for intrinsic semiconductor is equal to

A.  $n_i(\mu_e + \mu_h)E$

B.  $n_i e (\mu_e - \mu_h) E$

C.  $\frac{n_i e (\mu_e + \mu_h)}{E}$

D.  $\frac{E}{n_i e (\mu_e + \mu_h)}$

**Answer: A**



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**38.** The kinetic energy of the electron in an orbit of radius  $r$  in hydrogen atom is ( $e =$  electronic charge)

A.  $\frac{e^2}{r}$

B.  $\frac{e^2}{2r}$

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

D.  $\frac{e^2}{2r^2}$

**Answer: B**



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**39.** Three charged particles are collinear and are in equilibrium, then

A. all the charged particles have the same polarity

B. the equilibrium is unstable

C. all the charged particles cannot have the same polarity

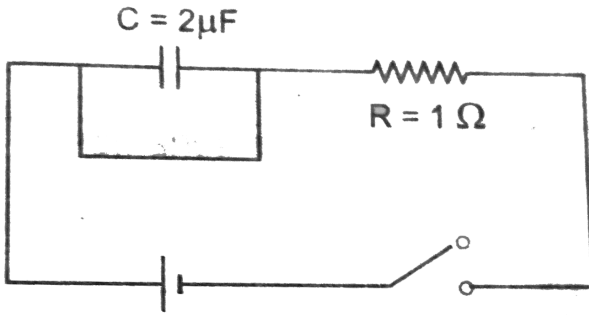
D. Both (b) and (c) are correct

**Answer: D**



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**40.** The capacitive time constant of the RC circuit shown in the figure.



A. zero

B. infinity

C. 2s

D.  $2 \mu\text{s}$

**Answer: B**



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41. Assertion : Mass of moving photon varies inversely as the wavelength .

Reason : Energy of the particle

$$= \text{Mass} \times (\text{Speed of light})^2$$

A. If both the Assertion and Reason are true

and reason explains the Assertion :

B. If both the Assertion and Reason are true but

reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: A**



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**42.** Assertion : A hollow metallic closed container maintained at a uniform temperature can act as a source of black body radiation.

Reason : All metals act as a black body.

- A. If both the Assertion and Reason are true and reason explains the Assertion :
- B. If both the Assertion and Reason are true but reason does not explain the Assertion :
- C. If Assertion is true but reason false



D. If Assertion is false but reason is true

**Answer: C**



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**43.** Assertion: The ratio of inertial mass to gravitational mass is equal to one.

Reason: The inertial mass and gravitational mass of a body are equivalent.

A. If both the Assertion and Reason are true  
and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: C**



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**44.** Assertion: In a stationary wave, there is no transfer of energy.

Reason: There is no outward motion of the

disturbance from one particle to adjoining particle in a stationary wave.

A. If both the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: D**



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45. Assertion : In photoelectron emission the velocity of electron ejected from near the surface is larger than that coming from interior of metal.

Reason : The velocity of ejected electron will be zero.

A. If both the Assertion and Reason are true

and reason explains the Assertion :

B. If both the Assertion and Reason are true but

reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: c**



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**46.** Assertion : If the ice on the polar caps of the earth melts, then length of day will increase.

Reason : Moment of inertia of the earth increases, as ice on polar caps melts.

A. If both the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: A**



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**47.** Assertion. Dielectric polarization means formation of positive and negative charges inside the dielectric.

Reason. Free electrons are formed in this process.

A. If both the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: D**



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**48.** Assertion : Static crashes are heard on radio, when lightning flash occurs in the sky.

Reason : Electromagnetic waves having frequency of radiowave range, interfere with radiowaves.

- A. If both the Assertion and Reason are true and reason explains the Assertion :
- B. If both the Assertion and Reason are true but reason does not explain the Assertion :
- C. If Assertion is true but reason false
- D. If Assertion is false but reason is true

**Answer: A**



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**49.** Assertion : The satellites equipped with electronic devices are called active satellites.

Reason : Passive satellite works as active satellite

- A. If both the Assertion and Reason are true and reason explains the Assertion :
- B. If both the Assertion and Reason are true but reason does not explain the Assertion :
- C. If Assertion is true but reason false
- D. If Assertion is false but reason is true

**Answer: A**





**50.** Assertion : In He-Ne laser, population inversion takes place between energy levels of neon atoms.

Reason : The base to emitter region is forward biased.

- A. If both the Assertion and Reason are true and reason explains the Assertion :
- B. If both the Assertion and Reason are true but reason does not explain the Assertion :
- C. If Assertion is true but reason false
- D. If Assertion is false but reason is true

**Answer: B**



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**51. 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 the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: B**



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**52.** Assertion: Thermodynamics process in nature are irreversible.

Reason: Dissipative effects cannot be eliminated.

A. If both the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: C**



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**53.** Assertion: Crystalline solids can cause X-rays to diffract.

Reason: Interatomic distance in crystalline solids is of the order of  $0.1\text{nm}$ .

- A. If both the Assertion and Reason are true and reason explains the Assertion :
- B. If both the Assertion and Reason are true but reason does not explain the Assertion :
- C. If Assertion is true but reason false
- D. If Assertion is false but reason is true

**Answer: A**



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**54.** 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 the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: D**



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**55.** Assertion: Displacement of a body may be zero when distance travelled by it is not zero.

Reason: The displacement is the longest distance between initial and final position.

A. If both the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :



C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: C**



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**56.** Assertion : Magnetic field interacts with a moving charge and not with a stationary charge.

Reason : A moving charge produces a magnetic field.

- A. If both the Assertion and Reason are true and reason explains the Assertion :
- B. If both the Assertion and Reason are true but reason does not explain the Assertion :
- C. If Assertion is true but reason false
- D. If Assertion is false but reason is true

**Answer: A**



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**57. Assertion :** There is no current in the metals in the absence of electric field.

**Reason :** Motion of free electron are randomly.

A. If both the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: A**





**58.** Assertion :When height of a tube is less than liquid rise in the capillary tube, the liquid does not overflow.

Reason : Product of radius of meniscus and height of liquid in the capillary tube always remains constant.

A. If both the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: D**



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**59.** Assertion : Sound would travel faster on a not summer day than on a cold winter day,

Reason : Velocity of sound is directly proportional to the square of its absolute temperature.

A. If both the Assertion and Reason are true  
and reason explains the Assertion :

B. If both the Assertion and Reason are true but  
reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: A**



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**60.** Assertion. When charges are shared between any two bodies, no charge is really lost but some loss of energy does occur.

Reason. Some energy disappears in the form of heat, sparking etc.

A. If both the Assertion and Reason are true and reason explains the Assertion :

B. If both the Assertion and Reason are true but reason does not explain the Assertion :

C. If Assertion is true but reason false

D. If Assertion is false but reason is true

**Answer: C**



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