



# PHYSICS

## BOOKS - AIIMS PREVIOUS YEAR PAPERS

### AIIMS 2006

#### Physics

1. In refraction, light waves are bent on passing from one medium to the second

medium, because, in the second medium

- A. the frequency in different
- B. the coefficient of elasticity is different
- C. the speed is different.
- D. the amplitude is smaller.

**Answer: C**



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2. Two spheres of same size, one of mass  $2kg$  and another of mass  $4kg$ , are dropped simultaneously from the top of Quata Minar ( $height = 72m$ ). When they are  $1m$  above the ground, the two spheres have the same.

- A. momentum
- B. kinetic energy
- C. potential energy
- D. acceleration

**Answer: D**



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3. The moment of inertia of a rod about an axis through its centre and perpendicular to it, is  $\frac{1}{12}ML^2$  (where,  $M$  is the mass and  $L$  is length of the rod). The rod is bent in the middle, so that two halves make an angle of  $60^\circ$ . The moment of inertia of the bent rod about the same axis would be

A.  $\frac{1}{48}ML^2$

B.  $\frac{1}{12}ML^2$

C.  $\frac{1}{24} ML^2$

D.  $\frac{ML^2}{8\sqrt{3}}$

**Answer: B**



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4. A boat at anchore is rocked by waves whose crests are  $100m$  apart and velocity is  $25m / s$

The boat bounces up once in every

A.  $2500 s$

B. 75s

C. 4s

D. 0.25 s

**Answer: C**



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5. By sucking a straw a student can reduce the pressure in his lungs to  $750\text{mm}$  of  $\text{Hg}$  (density =  $13.6\text{kg}/\text{cm}^3$ ) Using the

straw, he can drink water from a glass up to a maximum depth of :

A. 10 cm

B. 75 cm

C. 13.6 cm

D.  $1.36\text{cm}$

**Answer: C**



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6. Two parallel large thin metal sheets have equal surface charge densities ( $\sigma = 26.4 \times 10^{-12} \text{C}/\text{m}^2$ ) of opposite signs.

The electric field between these sheets is

A.  $1.5 \text{N}/\text{C}$

B.  $1.5 \times 10^{-10} \text{N}/\text{C}$

C.  $3. \text{N}/\text{C}$

D.  $3 \times 10^{-6} \text{N}/\text{C}$

**Answer: C**



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7. The magnetic flux has the dimension

A.  $[LA]$

B.  $[L^2 A]$

C.  $[LT^{-1} A]$

D.  $[L^{-2} T^{-1} A]$

**Answer: B**



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8. A wire mesh consisting of very small squares is viewed at a distance of  $8\text{cm}$  through a magnifying converging lens of focal length  $10\text{cm}$ , kept close to the eye. The magnification produced by the lens is:

A. 5

B. 8

C. 10

D. 20

**Answer: A**



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9. Hard  $X$  -rays for the study of fractures in bones should have a minimum wavelength of  $10^{-11}m$ . The accelerating voltage for electrons in  $X$  -ray machine should be

A.  $< 124.2kV$

B.  $> 1242kV$

C. between 60 kV and 70 kV

D.  $= 100kV$

**Answer: B**



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**10.** Photoelectric emission occurs only when the incident light has more than a certain minimum

A. wavelength

B. frequency

C. amplitude

D. angle of incidence.

**Answer: B**



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**11.** A lens is made of flint glass (refractive index = 1.5). When the lens is immersed in a liquid of refractive index 1.25, the focal length:

- A. increases by a factor of 1.25
- B. increases by a factor of 2.25
- C. increases by a factor of 1.2
- D. decreases by a factor of 1.2

**Answer: B**



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**12.** The voltage of clouds is  $4 \times 10^6 V$  with respect to ground. In a lightning strike lasting  $100ms$ , a charge of  $4C$  is delivered to the ground. The power of lightning strike is

A. 160 MW

B. 80 MW

C. 20 MW

D. 500 MW

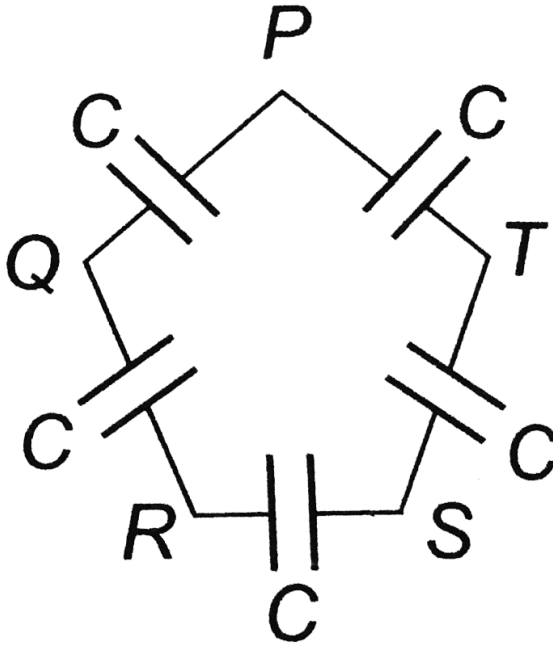
**Answer: A**



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**13.** Five capacitors, each of capacitance value  $C$  are connected as shown in the figure. The ratio of capacitance between  $P$  and  $R$ , and

the capacitance between  $P$  and  $Q$ , is.



A. 3:1

B. 5:2

C. 2:3

D. 1:1



**Answer: C**



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**14.** A stone thrown into still water, creates a circular wave pattern moving radially outwards. If  $r$  is the distance measured from the centre of the pattern. The amplitude of the waves varies as

A.  $r^{-1/2}$

B.  $r^{-1}$

C.  $r^{-2}$

D.  $r^{3/2}$

**Answer: A**



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**15.** For inelastic collision between spherical rigid bodies

A. the total kinetic energy is conserved

B. the total potential energy is conserved

C. the linear momentum is not conserved

D. the linear momentum is conserved.

**Answer: D**



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**16.** When a p-n diode is reverse biased, then

A. no current flows

B. the depletion region is reduced

C. the height of the potential barrier is reduced

D. the higher of the potential barrier is reduced.

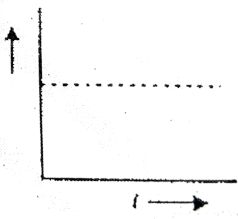
**Answer: B**



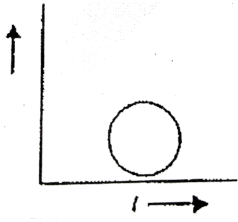
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17. Which of the following diagrams represent the variation of electric field vector with time for a circularly polarised light

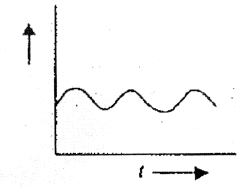
A.



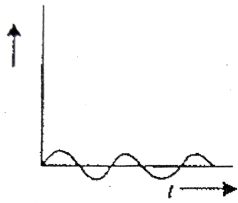
B.



C.



D.



**Answer: B**



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**18.** The operation of a nuclear reactor is said to be critical, if the multiplication factor ( $k$ ) has a value

A. 1

B. 1.5

C. 2.1

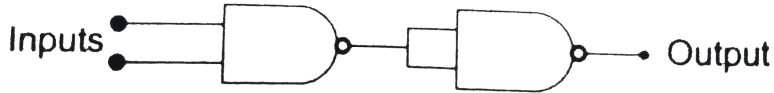
D. 2.5

**Answer: A**



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19. The circuit given below represents which of the logic operations?



A. AND

B. NOT

C. OR

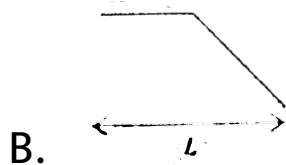
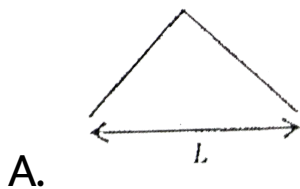
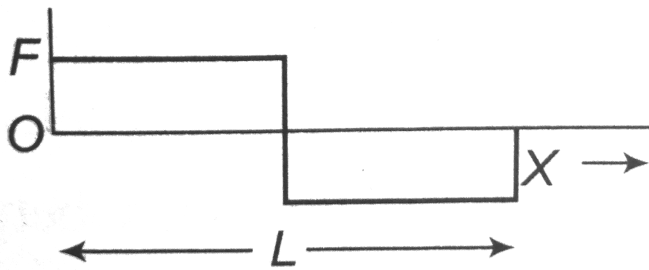
D. NOR

**Answer: A**



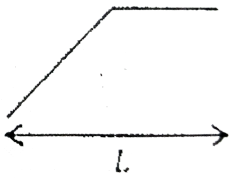
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20. A person used force ( $F$ ), shown in figure to move a load with constant velocity on given surface. Identify the correct surface profile:

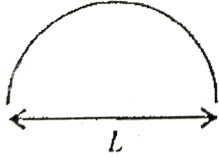




C.



D.



**Answer: C**



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21. Three objects coloured black, gray and white can withstand hostile conditions upto  $2800^{\circ}C$ . These objects are thrown into a

furance where each of them attains a temperature of  $2000^{\circ}C$ . Which object will glow brightest?

- A. the white object
- B. the black object
- C. all glow with equal brightness
- D. gray object.

**Answer: B**



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22. Two balloons are filled, one with pure He gas and other by air, repectively. If the pressure and temperature of these ballons are same then the number of molecules per unit volume is:

- A. more in the He filled balloon
- B. same in both balloons
- C. more in air filled balloon
- D. in the ratio of 1:4

**Answer: B**



23. Flash light equipped with a new set of batteries, produces bright white light. As the batteries wear out

A. the light intensity gets reduced with no change in its colour

B. light colour changes first to yellow and the red with no change in intensity

C. it stops working suddenly while giving  
white light

D. colour changes to red and also intensity  
gets reduced.

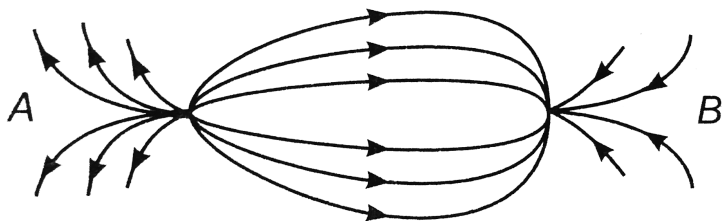
**Answer: D**



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**24.** The spatial distribution of the electric field due to charges ( $A, B$ ) is shown in figure.

Which of the following statements is correct?



A. A is + ve and B -ve and  $|A| > |B|$

B. A is -ve and B +ve,  $|A|=|B|$

C. both are +ve but  $A > B$

D. both are -ve but  $A > B$

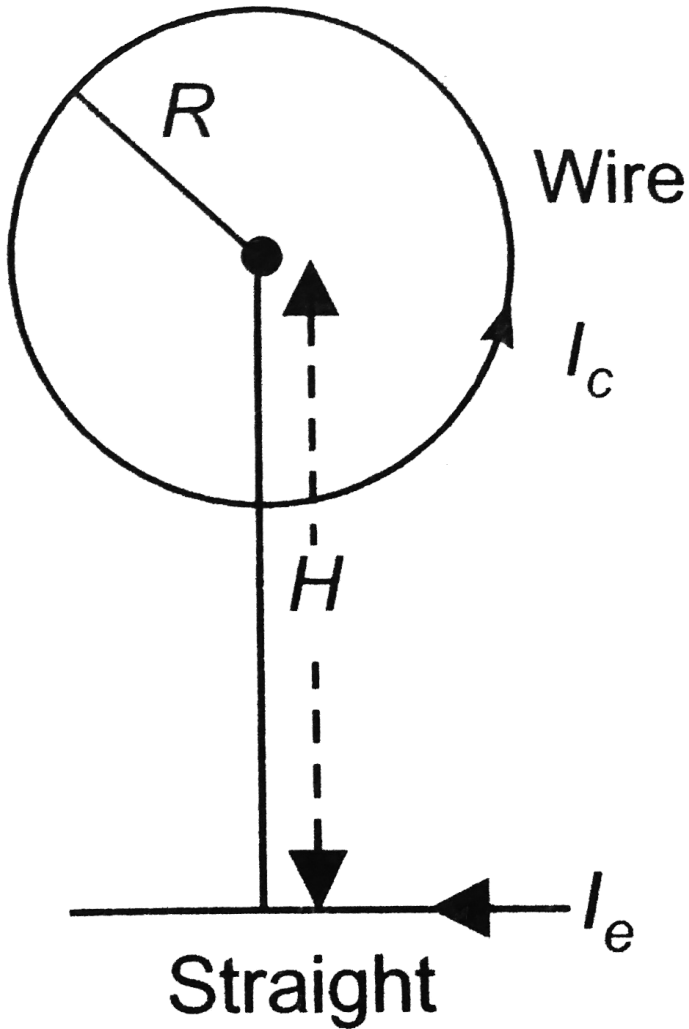
**Answer: A**



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**25.** Circular loop of a wire and a long straight wire carry current  $I_c$  and  $I_e$  respectively as shown in figure. Assuming that these are placed in the same plane. The magnetic field will be zero at the centre of the loop when the

separation  $H$  is:



A.  $\frac{I_e R}{I_e \pi}$



B.  $\frac{l_e R}{l_e \pi}$

C.  $\frac{\pi l_e}{l_e R}$

D.  $\frac{l_e \pi}{l_e R}$

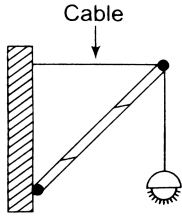
**Answer: A**



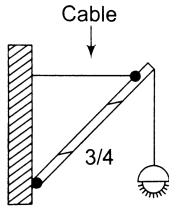
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**26.** If a street light of mass  $M$  is suspended from the end of a uniform rod of length  $L$  in different possible patterns as shown in figure,

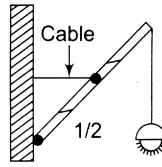
then:



(A)



(B)



(C)

A. pattern A is more sturdy

B. pattern B is more sturdy

C. pattern C is more sturdy

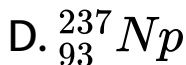
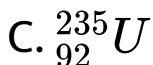
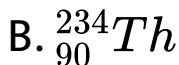
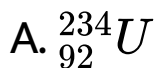
D. all will have same sturdiness.

**Answer: A**



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27.  ${}_{92}^{238}\text{U}$  has 92 protons and 238 nucleons. It decays by emitting an alpha particle and becomes:



**Answer: B**



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28. The fossil bone has a  $^{14}\text{C} : ^{12}\text{C}$  ratio, which is  $\left[\frac{1}{16}\right]$  of that in a living animal bone. If the half-life of  $^{14}\text{C}$  is 5730 years, then the age of the fossil bone is :

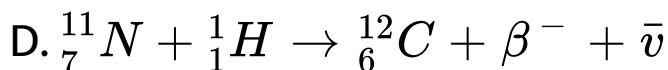
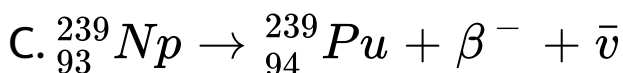
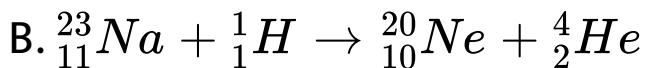
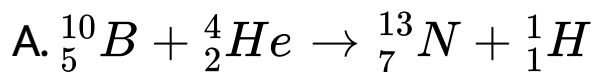
- A. 11460 years
- B. 17190 years
- C. 22920 years
- D. 45840 years

**Answer: C**



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29. Which one of the following is a possible nuclear reaction ?



**Answer: C**



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**30.** When a guitar is sounded with a 440 Hz tuning fork, a beat frequency of 5 Hz is heard. If the experiment is repeated with a tuning fork of 437 Hz, the beat frequency is 8 Hz. The string frequency (in Hz) is :-

A. 445

B. 435

C. 429

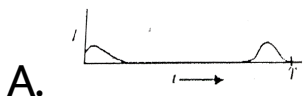
D. 448

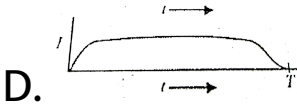
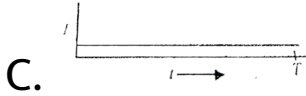
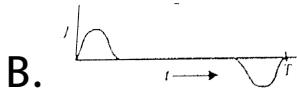
**Answer: A**



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**31.** A metallic ring is dropped down, keeping its plane perpendicular to a constant and horizontal magnetic field. The ring enters the region of magnetic field at  $t = 0$  and completely emerges out  $t = T$ s. The current in the ring varies as:





**Answer: B**

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32. If alpha, beta and gamma rays carry same momentum, which has the longest wavelength ?



A. alpha rays

B. beta rays

C. gamma rays

D. none all have same wavelength.

**Answer: D**



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**33.** An amplifier has a voltage gain  $A_v = 1000$ .

The voltage gain in  $dB$  is:

A. 30 dB

B. 60 dB

C. 3 dB

D. 20 dB

**Answer: B**



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**34.** When you make ice cubes, the entropy of water

A. does not change

B. increases

C. decreases

D. may either increase or decrease

depending on the process used.

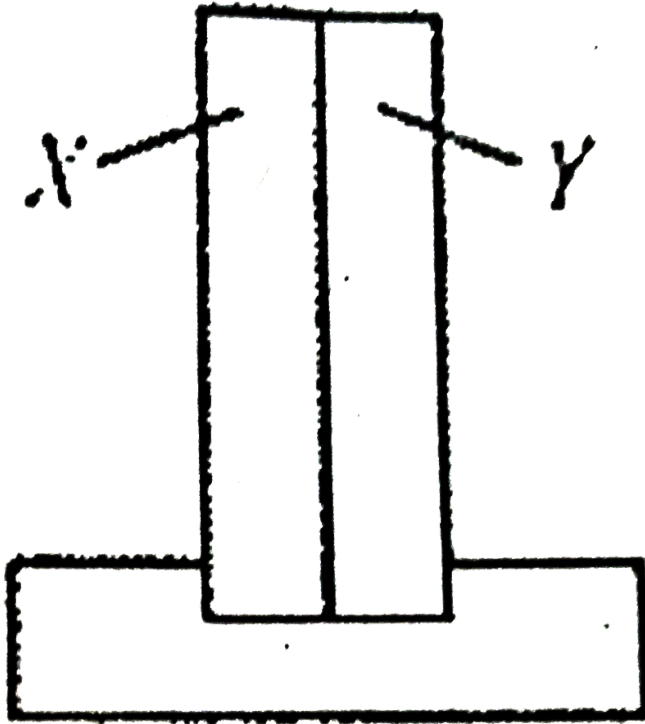
**Answer: C**



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**35.** A bimetallic strip consists of metals X and Y. It is mounted rigidly at the base as shown. The metal X has a higher coefficient of expansion compared to that for metal Y. When the

bimetallic strip is placed in a cold bath



- A. it will bend towards the right
- B. it will bend towards the left
- C. it will not bend but shrink

D. it will neither bend or shrink.

**Answer: B**



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**36.** For a wave propagating in medium, identify the property that is independent of the others.

A. velocity

B. wavelength

C. frequency

D. all these depend on each other.

**Answer: C**



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**37.** A leaf which contains only green pigments, is illuminated by a laser light of wavelength  $0.6328\mu m$ . It would appear to be

A. brown

B. black

C. red

D. green.

**Answer: B**



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**38.** A light emitting diode (*LED*) has a voltage drop of  $2V$  across it and passes a current of  $10mA$ . When it operates with a  $6V$



battery through a limiting resistor  $R$ . The value of  $R$  is

A.  $40k\Omega$

B.  $4k\Omega$

C.  $200\Omega$

D.  $400\Omega$

**Answer: D**



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**39.** The minimum potential difference between the base and emitter required to switch a silicon transistor ON is approximately?

A. 1V

B. 3 V

C. 5 V

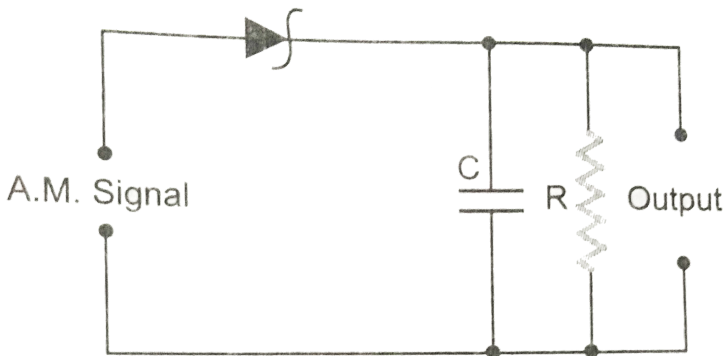
D. 4.2 V

**Answer: A**



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40. Fig. 10 (CF).1 is the circuit diagram of an AM demodulator. For good demodulation of AM signal of carrier frequency  $f$ , the value of  $RC$  should be



A.  $RC=1/f$

B.  $RC < 1/f$

C.  $RC \geq 1/f$

$$D. RC > 1/f$$

**Answer: D**



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**41. Statement-1 :** Electromagnetic waves with frequencies smaller than the critical frequency of ionosphere cannot be used for communications using sky wave propagation.

**Statement-2:** The refractive index of the

ionosphere becomes very high for frequencies higher than the critical frequency.

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer:**



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**42.** The binding energy per nucleon, for nuclei with atomic mass number  $A > 100$ , decreases with  $A$ .

The nuclear forces are weak for heavier nuclei.

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

**Answer: B**



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**43.** Assertion : In common base configuration, the current gain of the transistor is less than unity.

Reason : The collector terminal is revers biased for amplification.

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



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

**Answer: C**



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**44.** Assertion : In an isolated system the entropy increases.

Reason : The processes in an isolated system are adiabatic.

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: B**



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**45.** Assertion: Magnetic resonance imaging (MRI) is a useful diagnostic tool for producing images of various parts of human body.

Reason: Protons of various tissues of the human body play a role in MRI.

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: A**



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**46.** A judo fighter in order to throw his opponent on the mat tries to initially bend his opponent and then rotate him around his hip. As the mass of the opponent is brought closer

to the fighter's hip, the force required to throw the opponent is reduced.

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: A**



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**47.** Assertion : The rms velocity and most probable speeds of the molecules in a gas are same.

The Maxwell distribution curve for the speed of the molecules in a gas is symmetrical.

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

**Answer: D**





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**48.** Assertion : Use of ball bearings between two moving parts of a machine is a common practice.

Reason : Ball bearings reduce vibrations and provide good stability.

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

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

**Answer: C**



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**49.** Assertion: Standard optical diffraction cannot be used for discrimination between different X-ray wavelengths.

Reason: The grating spacing is not of the order of X-ray wavelengths.

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

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

the assertion

C. if assertion is true , but reason is false

D. both assertion and reason are false

statements.

**Answer: A**



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**50.** Assertion: Diamagnetic materials can exhibit magnetism.

Reason: Diamagnetic materials have permanent magnetic dipole moment.

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: D**



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**51. Assertion:** A man in a closed cabin falling freely does not experience gravity.

**Reason:** Inertial and gravitational mass have equivalence.

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

**Answer: B**



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**52. Statement-1:** The photoelectrons produced by a monochromatic light beam incident on a metal surface have a spread in their kinetic energies.

**Statement-2:** The work function of the metal varies as a function of depth from the surface.

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



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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: C**



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**53.** Assertion : The Carnot cycle is useful in understanding the performance of heat engines.

Reason : The Carnot cycle provides a way of determining the maximum possible efficiency achievable with reservoirs of given temperatures.

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

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

**Answer: A**



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**54.** Statement-I : A p-n junction with reverse bias can be used as a photodiode to measure light intensity.

Statement-II : In a reverse bias condition the current is small but it is more sensitive to changes in incident light intensity.

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: A**



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**55. Assertion :** Perspiration from human body helps in cooling the body.

**Reason :** A thin layer of water on the skin enhances its emissivity.

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: C**



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**56.** Assertion : When a glass of hot milk is placed in a room and allowed to cool, its entropy decreases.

Reason : Allowing hot object to cool does not violate the second law of thermodynamics.

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

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

C. if assertion is true , but reason is false



D. both assertion and reason are false statements.

**Answer: B**



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**57.** Cobalt-60 is useful in cancer therapy.

Cobalt-60 is source of  $\gamma$  – radiations capable of killing cancerous cell/

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: A**



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**58.** Statement-1: A thin stainless steel needle can lay floating on a still water surface.

Statement-2: Any object floats when the buoyancy force balances the weight of the object.

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

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

**Answer: B**



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59. Assertion : An emf  $\vec{E}$  is induced in a closed loop where magnetic flux is varied. The induced  $\vec{E}$  is not a conservative field.

Reason : The line intergral  $\vec{E} \cdot \vec{dl}$  around the closed loop is non-zero.

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

B. if both assertion and reason are true but reason is not the correct expalanation of

the assertion

C. if assertion is true , but reason is false

D. both assertion and reason are false

statements.

**Answer: A**



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**60.** Assertion : In optical fibre, the diameter of the core is kept small.

Reason : This smaller diameter of the core

ensures that the fibre should have incident angle more than the critical angle required for total internal reflection.

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

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

C. if assertion is true , but reason is false

D. both assertion and reason are false statements.

**Answer: A**



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