# PHYSICS

## BOOKS - NTA MOCK TESTS

## NTA JEE MOCK TEST 72

**Physics**

**1.** The acceleration of electron in the first orbits of hydrogen atom is

A. $\dfrac{4\pi^2 m}{h^3}$

B. $\dfrac{h^2}{4\pi^2 mr}$

C. $\dfrac{h^2}{4\pi^2 m^2 r^3}$

D. $\dfrac{m^2 h^2}{4\pi^2 r^3}$

**Answer: C**

**2.** The coefficient of restitution between a snooker ball and the side cushion is $\frac{1}{3}$. If the ball hits the cushion and then rebounds at right angles to its original direction, show that the angles made with the side cushion by the direction of motion before and after impact are $60°$ and $30°$ respectively.

A. $\tan^{-1}\left(\frac{1}{3}\right)$

B. $\tan^{-1}\left(\sqrt{3}\right)$

C. $\cot^{-1}(3)$

D. $\cot^{-1}\left(\frac{1}{3}\right)$

**Answer: B**

**3.** A solid body rotest about a stationary axis, so that its angular velocity depends on the rotational angle $\phi$ as $\omega = \omega_0 - k\phi$ where $\omega_0$ and K are postitive constatns. At the moment $t = 0$, $\phi = 0$ Find the dependence of rotaions angle.

A. $k\omega_0 e^{-kt}$

B. $\dfrac{\omega_0}{k} e^{-kt}$

C. $\dfrac{\omega_0}{k}\left(1 - e^{-kt}\right)$

D. $\dfrac{k}{\omega_0}\left(e^{-kt} - 1\right)$

**Answer: C**

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**4.** A body takes 5 minutes for cooling from $50°C$ to $40°C$ Its temperature comes down to $33.33°C$ in next 5 minutes. Temperature of surroundings is

A. $15°C$

B. $20°C$

C. $25°C$

D. $10°C$

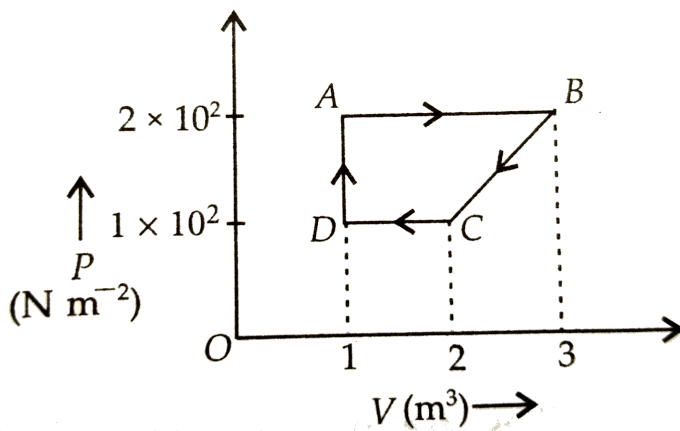Answer: B

**5.** A cyclic process is shown in the figure. Work done during the cyclic

process ABCDA is

A. 160 J

B. 150 J

C. 600 J

D. 900 J

**Answer: B**

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**6.** A cyclotron oscillator frequency is $10MHz$. What should be the operating magnetic field for accelerating protons? If the radius of its dees is $60cm$, what is the kinetic energy of the proton beam produced by the acceleration in $MeV$?

$\left(e = 1 \cdot 6 \times 10^{-19}C, m_p = 1 \cdot 67 \times 10^{-27}kg, 1MeV = 1 \cdot 6 \times 10^{-13}J\right)$

A. 9 MeV

B. 10 MeV

C. 7 MeV

D. 11 MeV

**Answer: C**

7. A person can throw a stone to a maximum height of h meter. The maximum distance to which he can throw the stone is:

A. $\dfrac{h}{2}$

B. h

C. 2h

D. 3h

**Answer: C**

**8.** Water from a hosepipe of radius 5 cm strikes a wall at a speed of $5ms^{-1}$ normally and stops. The force exerted on the wall in newton is

A. $13.5\pi$

B. $6.25\pi$

C. $62.5\pi$

D. $27\pi$

**Answer: C**

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**9.** The radioactive isotope X with a half-life of $10^9$ decays to Y which is stable. A sample of rocks was found to contain both the elements X and Y in the years ratio $1:7$. If initially, the quantity of Y in the rock was zero, then the age of the rocks is

A. $2 \times 10^9 yr$

B. $3 \times 10^9 yr$

C. $6 \times 10^9 yr$

D. $7 \times 1^9 yr$

**Answer: B**

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**10.** Ratio of kinetic energy at mean position to potential energy at A/2 of a particle performing SHM

A. $2:1$

B. $4:1$

C. $8:1$

D. $1:1$

**Answer: B**

**11.** A silver of radius $4.8cm$ is suspended by a thread in the vacuum chamber . $UV$ light of wavelength $200nm$ is incident on the ball for some times during which a total energy of $1 \times 10^{-7}J$ falls on the surface . Assuming on an average one out of 103 photons incident is able to eject electron. The potential on sphere will be

A. 1 V

B. 2 V

C. 3 V

D. zero

**Answer: C**

**12.** Pressure inside two soap bubble are 1.02 and 1.03 atm . Then ratio of their volumes is

   A. $102:103$
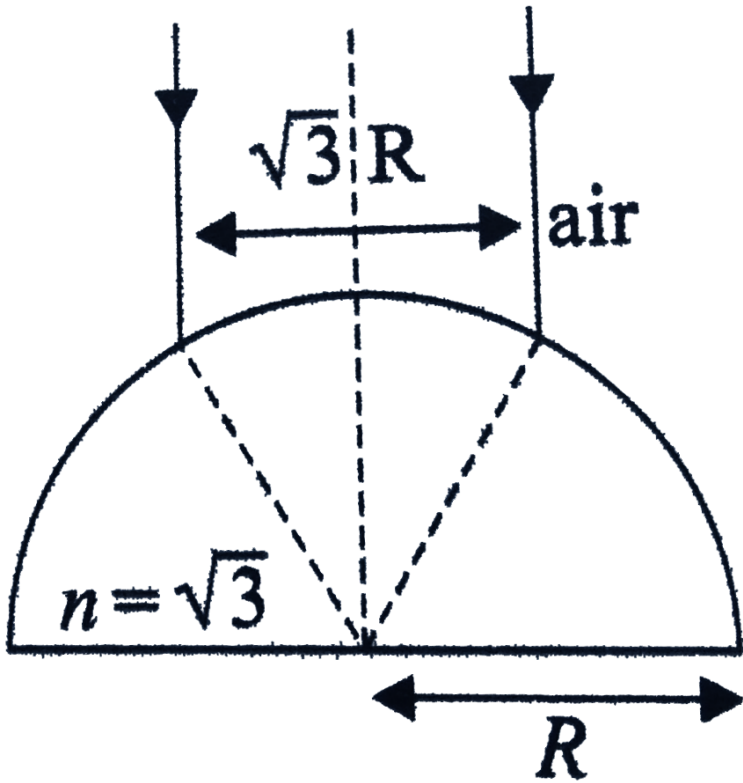
   B. $8:27$

   C. $(103)^3:(102)^3$

   D. $27:8$

**Answer: D**

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**13.** A light beam of diameter $\sqrt{3R}$ is incident symmetrically on a glass hemisphere of radius R and of refractive index $n = \sqrt{3}$ . Find radius of

the beam at the base of hemisphere.



$\sqrt{3}\,R$

air

$n = \sqrt{3}$

$R$

A. $\dfrac{R}{\sqrt{3}}$

B. $\dfrac{R}{2\sqrt{3}}$

C. $\dfrac{\sqrt{3}}{2}R$

D. $\dfrac{R}{2}$

**Answer: A**

14. A disc of mass 2 kg and radius 0.2 m is rotating with angular veocity $30 \text{ rad s}^{-1}$. What is angular velocity, if a mass of 0.25 kg is put on periphery of the disc?

A. $24 \text{ rad s}^{-1}$

B. $36 \text{ rad s}^{-1}$

C. $15 \text{ rad s}^{-1}$

D. $26 \text{ rad s}^{-1}$

Answer: A

15. For a transistor the current amplification factor is 0.8 The transistor is connected in common emitter configuration, the change

in collector current when the base current changes by $6mA$ is

A. 6 mA

B. 4.8 mA

C. 24 mA

D. 8 mA

**Answer: C**

**16.** If the average kinetic energy of a molecule of hydrogen gas at 300 K is E , then the average kinetic energy of a molecule of nitrogen gas at the same temperature is

A. 7E

B. 14E

C. $\dfrac{E}{7}$

D. E

**Answer: D**

**17.** The sides of a rectangle are 7.01 m and $1.2 \times 10^1 m$. Taking the significant figures into account, the area of the rectangle is

A. $84.1m^2$

B. $84.00m^2$

C. $84.12m^2$

D. $84m^2$

**Answer: D**

**18.** Estimate the distance for which for which ray optics is good approximation for an aperture of $4mm$ and wavelength $400nm$.

A. 24 m

B. 40 m

C. 18 m

D. 30 m

**Answer: B**

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**19.** A pipe closed at one end has length 83 cm. The number of possible natural oscilations of air column whose frequencies lie below 1000 Hz are (take, velocity of sound in air 332 m/s)

A. 3

B. 4

C. 5

D. 6

**Answer: C**

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**20.** A particle of mass $'m'$ moves along the quarter section of the circular path whose centre is at the origin . The radius of the circular path is $'a'$. A force $\overrightarrow{F} = y\hat{i} - x\hat{j}$ newton acts on the particle, where $x, y$ denote the coordinates of position of the particle. Calculate the work done by this force in taking, the particle from point, $A(a, 0)$ to

point $B(0, a)$ along the circular path.
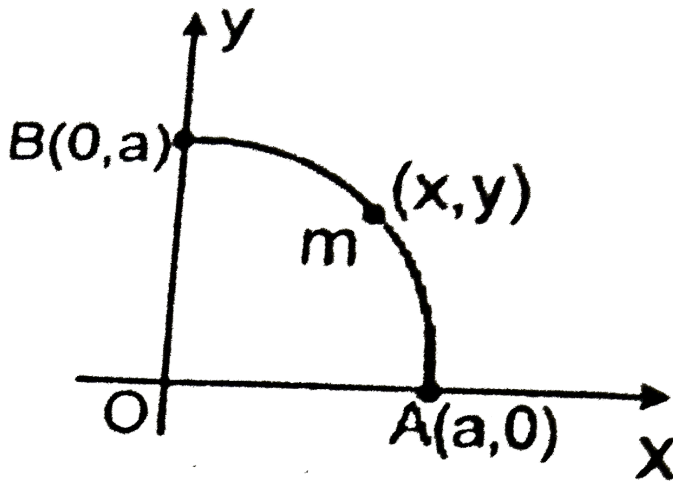


A. $\pi a^2 J$

B. $\dfrac{\pi a^2}{2} J$

C. $- \dfrac{\pi a^2}{2} J$

D. Zero

**Answer: C**

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**21.** In a hydrogen atube it is observed that through a given cross-section $3.13 \times 10^{15}$ electrons per sec, moving from right to left and $3.12 \times 10^{15}$ protons per sec are moving from left to right. The electric current in the discharge tube ad its direction is

**22.** In a magnetic field of $0.05T$, area of a coil changes from $101cm^2$ to $100cm^2$ without changing the resistance which is $2\Omega$. The amount of charge that flow during this period is

**23.** The total electrostatic energy stored in both the capacitors $(\text{in } \mu J)$ is

$-3$ V $\bullet$————||————||————
$\qquad$ $3\ \mu F$ $\quad$ $6\ \mu F$ $\quad$ $\overline{\underline{=}}$
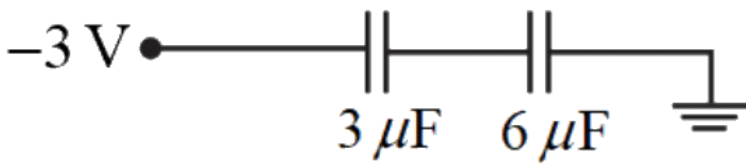
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**24.** A body released from a great height, falls freely towards the earth. Another body is released from the same height exactly one second later. Then the separation between two bodies, two seconds after the release for second body is.

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**25.** If a new planet is discovered rotating around Sun with the orbital radius double that of earth, then what will be its time period (in earth's days)

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