PHYSICS

NTA MOCK TESTS ENGLISH

NTA JEE MOCK TEST 19

Physics

1. In hydrogen spectrum the wavelength H_a of line is 656 nm whereas in the spectrum of a distant galaxy. H_a line wavelength is 706 nm.

Estimated speed of the galaxy with respect to earth is:

A. $1.2 \times 10^7 ms^{-1}$

B. $2.2 \times 10^7 ms^{-1}$

C. $3 \times 10^7 ms^{-1}$

D. $1.9 \times 10^7 ms^{-1}$

Answer: B

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2. 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 `1000 photons incident is able to eject electron. The potential on sphere will be

A. 1 V

B. 2V

C. 3V

D. zero

Answer: C

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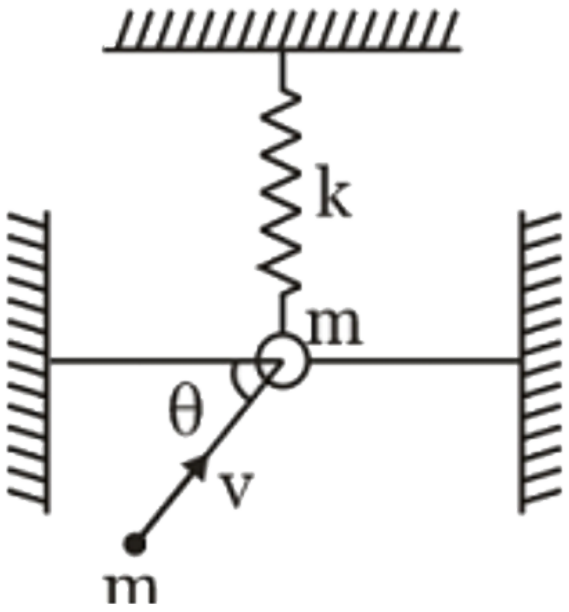
3. An underformed spring of spring constant k is connected to a bead of mass m which can move along a frictionless rod as shown in the figure. If the particle strikes the bead at an angle of 45° with the horizontal and sticks to it, then the maximum elongation of the spring

after the collision is



A. $\frac{v}{4}\sqrt{\frac{m}{2k}}$

B. $\frac{v}{2}\sqrt{\frac{m}{k}}$

C. $\frac{v}{2}\sqrt{\frac{m}{2k}}$

D. $\frac{v}{4}\sqrt{\frac{m}{k}}$

Answer: B

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4. A deflection magnetometer is placed with its arm along the east-west direction (tan A position) and a short bar magnet is placed symmetrically along its axis at some distance with its north pole pointing towards east. In this position the needle of the magnetometer shows a deflection of 60°. If we double the

distance of the bar magnet, then the deflection will be

A. $\sin^{-1}\left[\frac{\sqrt{3}}{8}\right]$

B. $\cos^{-1}\left[\frac{\sqrt{3}}{8}\right]$

C. $\tan^{-1}\left[\frac{\sqrt{3}}{8}\right]$

D. $\cot^{-1}\left[\frac{\sqrt{3}}{8}\right]$

Answer: C

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5. The masses of three copper wires are in the ratio 2:3:5 and their lengths are in the ratio 5:3:2. Then, the ratio of their electrical resistance is

A. $1:9:15$

B. $2:3:5$

C. $5:3:2$

D. $125:30:8$

Answer: D

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6. A potential difference of $0.75V$ applied across a galvanometer causes a current of 15 mA to pass through it. If can be converted into ammeter of range of 25 A , the requried shunt should be

A. 0.8Ω

B. 0.93Ω

C. 0.03Ω

D. 2.0Ω

Answer: C

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7. In an AC circuit the instantaneous values of emf and current are $e = 200 \sin 300t$ volt and $i = 2 \sin\left(300t + \frac{\pi}{3}\right)$ amp The average power consumed (in watts) is

A. 200

B. 100

C. 50

D. 400

Answer: B

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8. The plates of a parallel plate capacitor are charged upto 200V. A dielectric slab of thickness 4mm is inserted between its plates. Then, to maintain the same potential difference between the plates of the capacitor,

the distance between the plates is increased by 3.2mm. the dielectric constant of the dielectric slab is

A. 1

B. 4

C. 5

D. 6

Answer: C

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9. A point charge q is placed at a distance of r from the centre O of an uncharged spherical shell of inner radius R and outer radius 2R. The electric potential at the centre of the shell will be

A. $\frac{1}{4\pi\varepsilon_0}\left(\frac{q}{2R}\right)$

B. $\frac{1}{4\pi\varepsilon_0}\left(\frac{4q}{3R}\right)$

C. $\frac{1}{4\pi\varepsilon_0}\left(\frac{5q}{6R}\right)$

D. $\frac{1}{4\pi\varepsilon_0}\left(\frac{5q}{3R}\right)$

Answer: C

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10. A cord of length $64m$ is used to connected a $100kg$ astronaut to spaceship whose mass is much larger than that of the astronuat. Estimate the value of the tension in the cord. Assume that the spaceship is orbiting near earth surface. Assume that the spaceship and the astronaut fall on a straight line from the

earth centre. the radius of the earth is $6400km$.

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

B. $2 \times 10^{-2}N$

C. $4 \times 10^{-2}N$

D. $5 \times 10^{-2}N$

Answer: A

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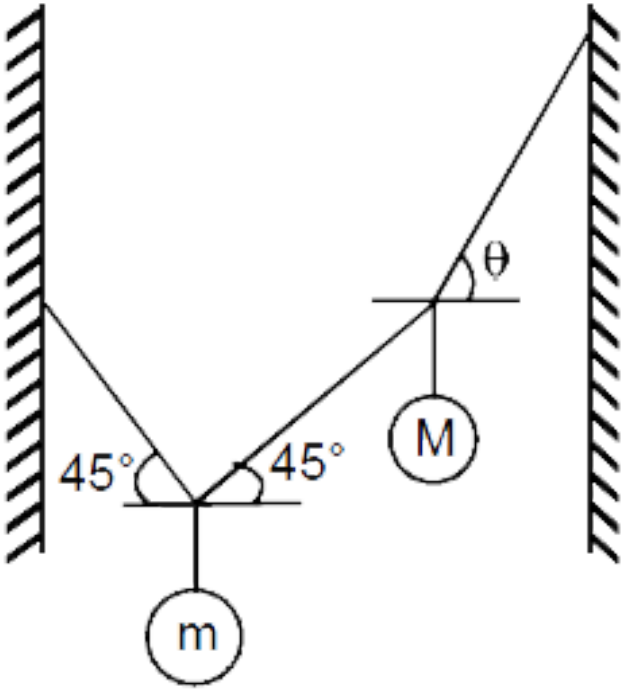
11. Two masses m and M are attached to the strings as shown in the figure. If the system is in equilibrium, then



A. $\tan\theta = 1 + \frac{2M}{m}$

B. $\tan\theta = 1 - \frac{2m}{M}$

C. $\tan\theta = 1 - \frac{M}{2m}$

D. $\tan\theta = 1 - \frac{m}{2M}$

Answer: A

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12. Ice starts forming in lake with water at $0^\circ C$ and when the atmospheric temperature is $-10^\circ C$. If the time taken for $1cm$ of ice be 7

hours. Find the time taken for the thickness of ice to change from $1cm$ to $2cm$

A. 7 hours

B. 14 hours

C. 10.5 hours

D. 21 hours

Answer: D

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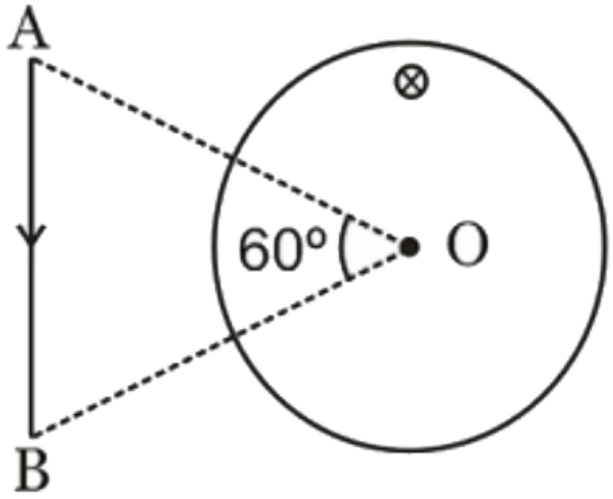
13. A very long cylindrical wire is carrying a current I_0 distriuted uniformly over its cross-section area. O is the centre of the cross-section of the wire and the direction of current in into the plane of the figure. The value $\int_A^B \vec{B} . \vec{dl}$ along the path AB (from A to B) is



A. $\mu_0 I_0$

B. $-\frac{\mu_0 I_0}{6}$

C. $\frac{\mu_0 I_0}{6}$

D. $\frac{\mu_0 I_0}{3}$

Answer: B

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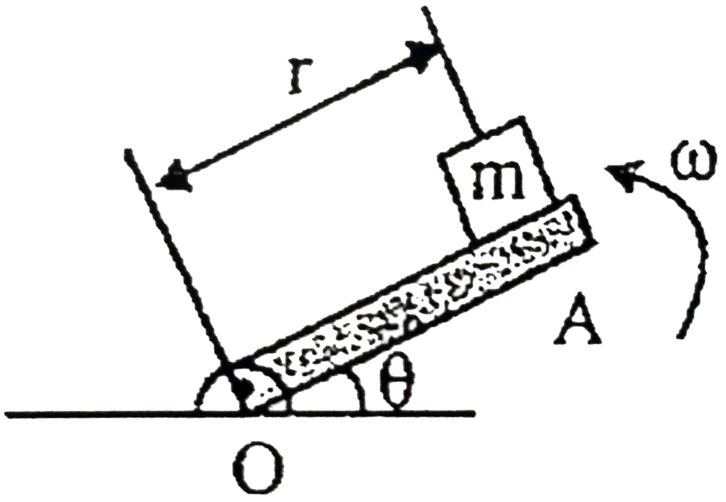
14. The inclined plane OA rotates in vertical plane about a horizontal axis through O with a constant counter clockwise velocity $\omega = 3$

rad/sec. As it passes the position $\theta = 0$, a small m=1 kg is placed upon it at a radial distance r=0.5 m. if the mass is observed to be at rest with respect to inclined plane. The value of static friction force at $\theta = 37^\circ$ between the mass and the incline plane



A. $\frac{3}{16}$

B. $\frac{9}{16}$

C. $\frac{4}{9}$

D. $\frac{5}{9}$

Answer: A

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15. The time period of oscillations of a block attached to a spring is t_1. When the spring is replaced by another spring, the time period of the block is t_2. If both the springs are

connected in series and the block is made to oscillate using the combination, then the time period of the block is

A. $T = t_1 + t_2$

B. $T^2 = t_1^2 + t_2^2$

C. $T^{-1} = t_1^{-1} + t_2^{-1}$

D. $T^{-2} = t_1^{-2} + t_2^{-2}$

Answer: B

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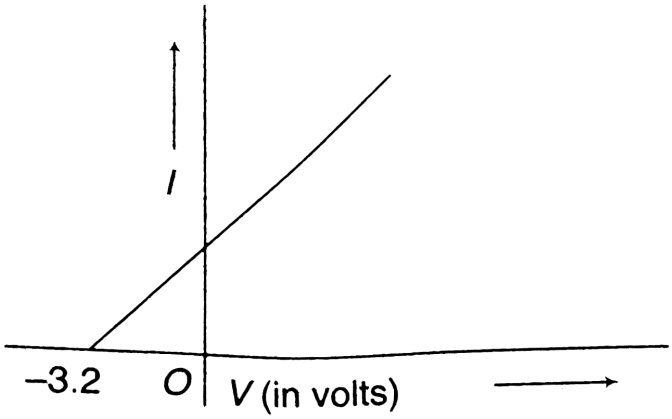
16. In a photoelectric experiment the relation between applied potential difference between cathode and anode V and the photoelectric current cathode and anode V and the photoelectric current I and was found to be shown in graph below. If planck's constant $h = 6.6 \times 10^{-34}$Js, the frequency of incident radiation would be nearly (in s^{-1})



A. $0.436 \times 10^{18} Hz$

B. $0.436 \times 10^{17} Hz$

C. $0.775 \times 10^{16} Hz$

D. $0.775 \times 10^{15} Hz$

Answer: C

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17. A liquid drop having surface energy E is spread into 512 droplets of same size. The final surface energy of the droplets is

A. 2E

B. 4E

C. 8E

D. 12E

Answer: C

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18. A vessel completely filled with water has holes 'A' and 'B' at depths 'h' and '3h' from the top respectively. Hole 'A' is a square of side 'L'

and 'B' is circle of radius 'r'. The water flowing out per second from both the holes is same. Then 'L' is equal to

A. $r^{\frac{1}{2}}(\pi)^{\frac{1}{2}}(3)^{\frac{1}{2}}$

B. $r(\pi)^{\frac{1}{4}}(3)^{\frac{1}{4}}$

C. $r(\pi)^{\frac{1}{2}}(3)^{\frac{1}{4}}$

D. $r^{\frac{1}{2}}(\pi)^{\frac{1}{3}}(3)^{\frac{1}{2}}$

Answer: C

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19. A thin prism of angle 15° made of glass of refractive index $\mu_1 = 1.5$ is combined with another prism of glass of refractive index $\mu_2 = 1.75$. The combination of the prisms produced dispersion without deviation. The angle of the second prism should be

A. 5°

B. 7°

C. $\frac{10^\circ}{3}$

D. 1.2°

Answer: C

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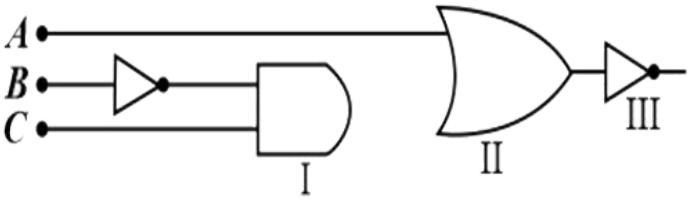
20. The outpout Y of the logic circuit shown in figure is best represented as



A. $\overline{A} + \overline{B}.\overline{C}$

B. $\overline{A} + \overline{B}.C$

C. $\overline{A} + B.\overline{C}$

D. $\overline{A}.B + \overline{C}$

Answer: D

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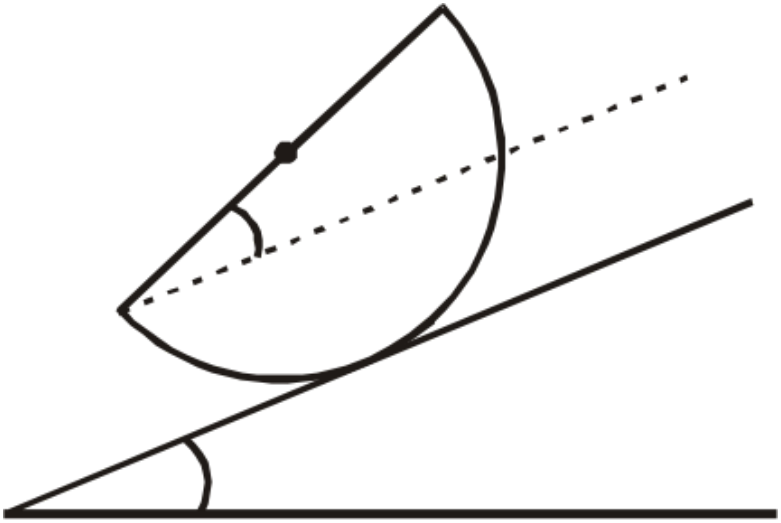
21. A uniform thin hemispherical shell is kept at rest and in equilibrium on an inclined plane of angle of inclination $\theta = 30^\circ$ as shown in figure. If the surface of the inclined plane is sufficiently rough to prevent sliding then the

angle α made by the plane of hemisphere with inclined plane is :



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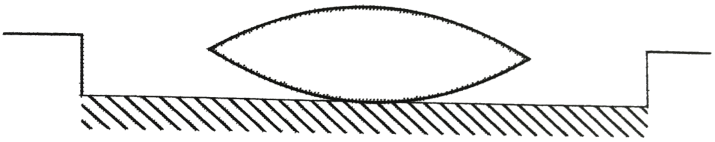
22. A thin biconvex lens of refractive index $3/2$ is placed on a horizontal plane mirror as shown in Figure . The space between the lens

and the mirror is then fille with water or refractive index $4/3$. It is found that when a point object is placed 15 cm above the lens on its principal axis, the object coincides with its own image. On representing with another liquid, the object and the image again coincide at a distance 25 cm from the lens. Calculate the refractive index of the liquid.



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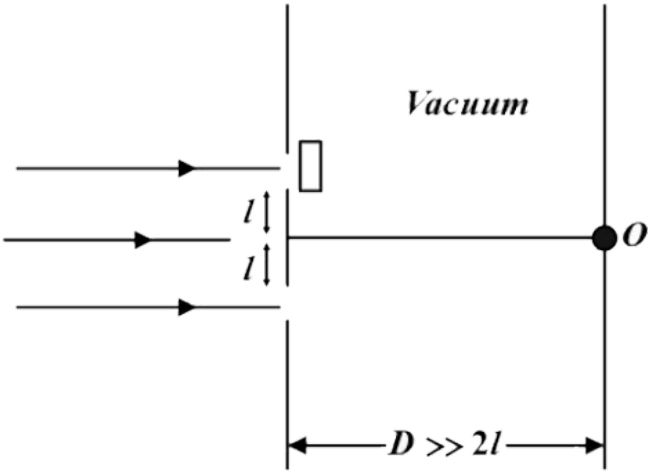
23. In young's double-slit experiment, both the slits produce equal intensities on a screen. A 100% transparent thin film of refractive index $\mu = 1.5$ is kept in front of one of the slits, due to which the intensity at the point O on the screen becomes 75% of its initial value. If the wavelength of monochromatic light is 720 nm, then what is the minimum thickness (in nm) of

the film?



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24. When the forwward bias voltage of a diode is changed from 0.6 V to 0.7 V the current changes from 5 mA to 15 mA. Then its forward bias resistance is

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25. Two sonometer wires A and B are fixed on a sonometer. The ratio of their lengths, diameters, densities and tensions are given below:

$$\frac{L_A}{L_B} = \frac{36}{35}, \frac{d_A}{d_B} = \frac{4}{1}, \frac{T_A}{T_B} = \frac{8}{1}, \frac{\rho_A}{\rho_B} = \frac{1}{2}$$

If the higher frequency among the two wires is 360 Hz, then what is the best freqency (in Hz) observed when the two wires are sounded together?

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