PHYSICS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 11

Physics

1. The magnetic moment of a magnet is $3.6 \times 10^{-3} A.m^2$. Its pole strength is 120mili amp.M`. Its magnetic length is

A. 3cm

B. 0.3 cm

C. 3.3 cm

D. 33 cm

Answer: A

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2. An isolated soap bubble is kept in a container in which the pressure is maintained at P_0 . The bubble is given some charge due to

which its radius increases to R_0 . If the surface tension of the soap bubble is T, then the charge given to the bubble is

A. $Q = 8\pi r\sqrt{rT\varepsilon_0}$

B. $Q = 8\pi r\sqrt{2rT\varepsilon_0}$

C. $Q = 4\pi r\sqrt{2rT\varepsilon_0}$

D. $Q = 4\pi r\sqrt{rT\varepsilon_0}$

Answer: B

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3. A 200 Ω resistance has a certain colour code as per standard colour coding. If one replaces the red colour by green in the code, the new resistance will be

A. 500Ω

B. 400Ω

C. 300Ω

D. 100Ω

Answer: A

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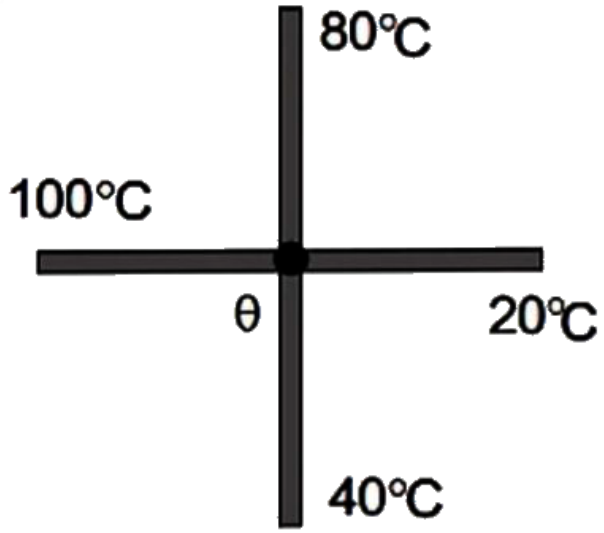
4. Four identical heat conductors are connected as shown in the figure. The temperature θ of the junction is [rods are insulated from the sides]



A. $30^\circ C$

B. $15^\circ C$

C. $60^\circ C$

D. $70^\circ C$

Answer: C

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5. A block starts moving up a fixed inclined plane of inclination $60^\circ C$ with a velocityof $20ms^{-1}$ and stops after 2s. The approximate

value of the coefficient of friction is $[g = 10ms^{-2}]$

A. 3

B. 3.3

C. 0.27

D. 0.33

Answer: C

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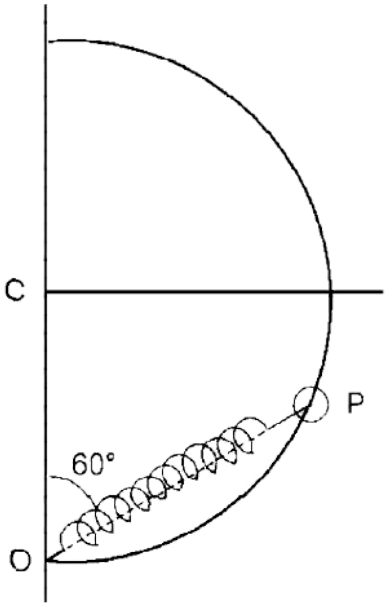
6. A smooth semicircular wire-track of radius R is fixed in a vertical plane. One end of a massless spring of natural length $3R/4$ is attached to the lowest point O of the wire-track. A small ring of mass m, which can slide on the track, is attached to the other end of the spring. The ring is held stationary at point P such that the spring makes an angle of 60° with the vertical. The spring constant $K = mg/R$. Consider the instant when the ring is released, and (i) draw the free body diagram of the ring, (ii) determine the

tangential acceleration of the ring and the normal reaction.



A. $\frac{3mg}{8}$

B. mg

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

D. $\frac{3mg}{4}$

Answer: A

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7. One slit of a double slit experiment is covered by a thin glass plate of refractive index 1.4, and the other by a thin glass plate of the refractive index 1.7. The point on the screen where the central maximum fall before the glass plate was inserted, is now occupied

by what had been the fifth bright fringe was seen before. Assume the plate have the same thickness t and wavelength of light 480 nm. Then find the value of t in μm.

A. $2.4\mu m$

B. $4.8\mu m$

C. $8\mu m$

D. $16\mu m$

Answer: C

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8. A small satellite of mass m is revolving around earth in a circular orbit of radius r_0 with speed v_0 . At certain point of its orbit, the direction of motion of satellite is suddenly changed by angle $\theta = \cos^{-1}(3/5)$ by turning its velocity vector , such that speed remains constant. The satellite consequently goes to elliptical orbit around earth. the ratio of speed at perigee to speed at apogee is

A. 3

B. 9

C. $1/3$

D. $1/9$

Answer: B

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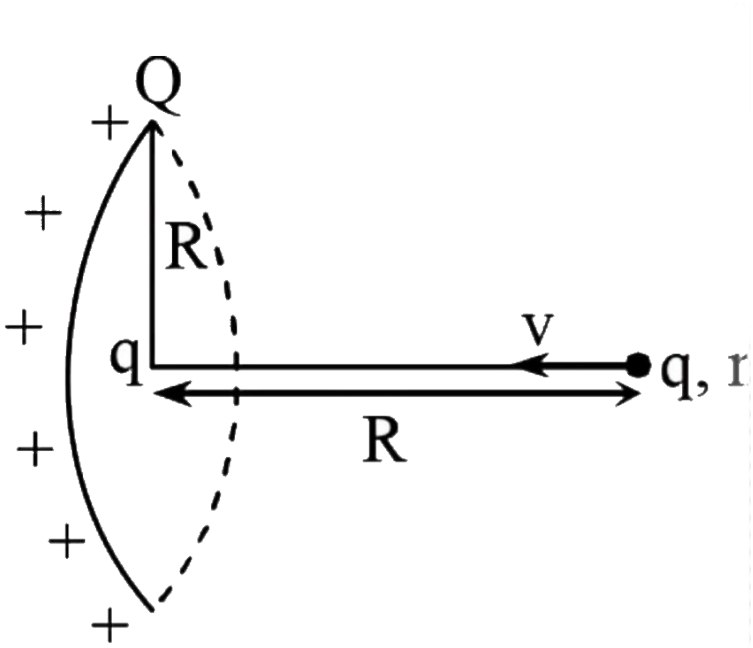
9. The minimum velocity v with which charge q should be projected so that it manages to reach the centre of the ring starting from the

position shown in figure is



A. $v = \sqrt{\frac{kQq}{mR}(2-\sqrt{2})}$

B. $v = \sqrt{\frac{kQq}{2mR}(2-\sqrt{2})}$

C. $v = \sqrt{\frac{kQq}{mR}}$

D. $v = \sqrt{\frac{kQq}{\sqrt{2}mR}(1-\sqrt{2})}$

Answer: A

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10. An AC is given by the equation $i = i_1 \cos \omega t + i_2 \sin \omega t$. The r.m.s. current is given by

A. $\frac{i_1 + i_2}{\sqrt{2}}$

B. $\frac{|i_1 + i_2|}{\sqrt{2}}$

C. $\sqrt{\frac{i_1^2 + i_2^2}{2}}$

D. $\sqrt{\frac{i_1^2 + i_2^2}{\sqrt{2}}}$

Answer: C

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11. Two particles of masses m and 3m approach each other with different velocities. After collision, the particle of mass m has velocity $\vec{v}$ in their centre of mass frame. Velocity of particle of mass 3m in the centre of mass frame is

A. $-2\overrightarrow{v}$

B. $-\frac{\overrightarrow{v}}{2}$

C. $-\frac{\overrightarrow{v}}{3}$

D. $\frac{\overrightarrow{v}}{4}$

Answer: C

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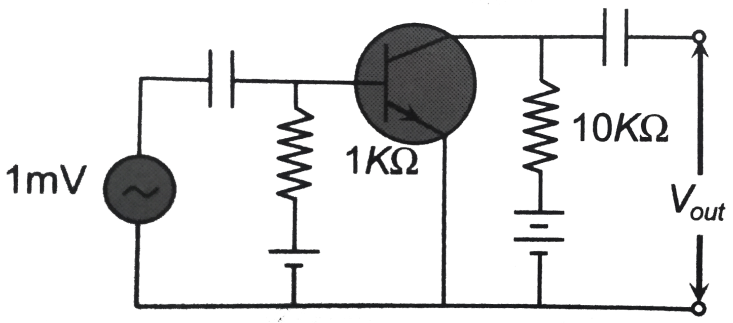
12. In the following common emitter configuration an NPN transistor with current

gain $\beta = 100$ is used. The output voltage of the amlifier will be



A. 10mV

B. 0.1V

C. 1.0 V

D. 10V

Answer: C

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13. After 280 days, the activity of a radioactive sample is 6000 dps. The activity reduces to 3000 dps after another 140 days. The initial activity of the sample in dps is

A. 6000

B. 9000

C. 3000

D. 24000

Answer: D

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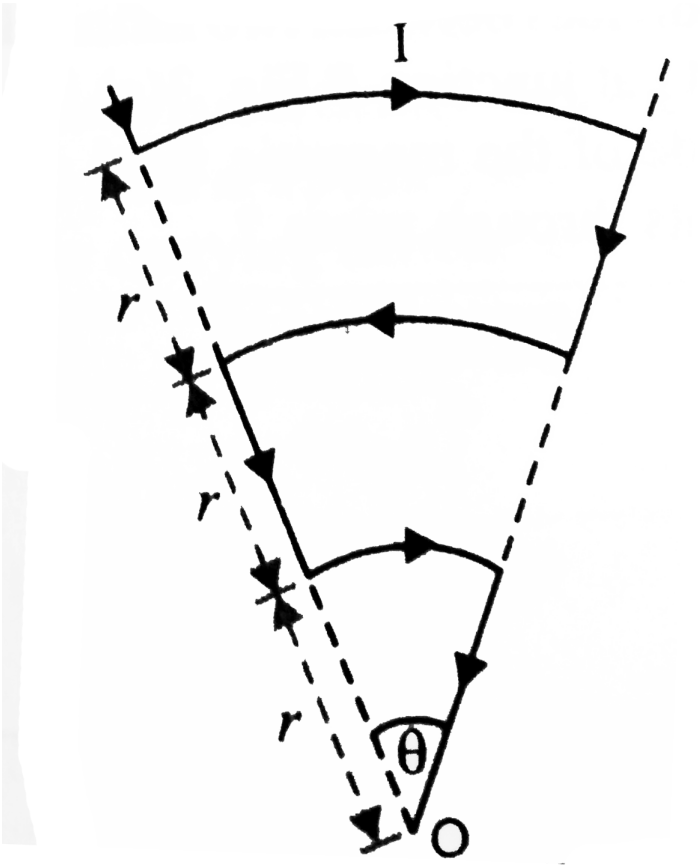
14. A conductor carrying current I is of the type as shown in figure. Find the magnetic field induction at the common centre O of all

the three arcs.



A. $\frac{5\mu i\theta}{24\pi R}$

B. $\frac{m_0 i\theta}{24\pi R}$

C. $\frac{11\mu_0 i\theta}{24\pi R}$

D. zero

Answer: A

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15. An electron of mass $'m'$ is accelerated through a potential difference of V and then it enters a magnetic field of induction B. Normal to the lines of force. Then the radius of the circular path is

A. $\sqrt{2eV/m}$

B. $\sqrt{2Vm/eB^2}$

C. $\sqrt{2Vm/eB}$

D. $\sqrt{2Vm/e^2B}$

Answer: B

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16. A pipe of length 1.5 m closed at one end is filled with a gas and it resonates at $30^\circ C$ in its fundamental with a tuning fork. Another pipe of the same length but open at both

ends and filled with air and it resonates in its fundamental with the same tuning fork. Calculate the velocity of sound at $0^{\circ}C$ in the gas, given that the velocity of sound in air is $360ms^{-1}$ at 30°.

A. $580m/s$

B. $683m/s$

C. $880m/s$

D. $743m/s$

Answer: B

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17. If the unit of force is 100 N, unit of length is 10m and unit of time is 100 s, what is the unit of mass in this system of units ?

A. 10^5 kg

B. 10^6 kg

C. $10^2 kg$

D. $10^3 kg$

Answer: A

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18. In a photoelectric effect experiment, stopping potential changes by 30 volt if we change frequency of the radiation. Then the magnitude of change in the frequency is : $\left(h = 6 \times 10^{-34} J - s\right)$

A. $4 \times 10^{-15} s^{-1}$

B. $8 \times 10^{15} s^{-1}$

C. $10^{16} s^{-1}$

D. $18 \times 10^{15} s^{-1}$

Answer: B

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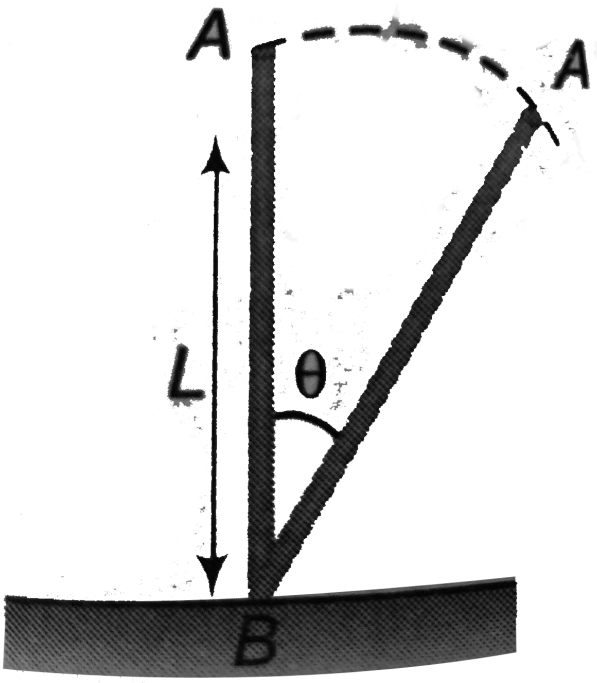
19.



A uniform rod of length L is free to rotate in a

vertical plane about a fixed horizontal axis through B. The rod begins rotating from rest. The angular velocity ω at angle θ is given as

A. $\sqrt{\frac{6g}{L}}\sin\theta$

B. $\sqrt{\frac{6g}{L}}\sin\frac{\theta}{2}$

C. $\sqrt{\frac{6g}{L}}\cos\frac{\theta}{2}$

D. $\sqrt{\frac{6g}{L}}\cos\theta$

Answer: B

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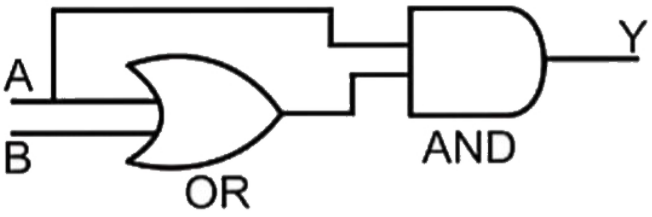
20. The output Y of the combination of logic gates shown is equal to



A. A

B. $\overline{A}$

C. $A + B$

D. AB

Answer: A

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21. A liquid having a coefficient of volume expansion γ is filled in a cylindrical vessel made out of glass having coefficient of lienar expansion $\alpha = \frac{\gamma}{5}$. At room temperature , the level of liquid in the vessel isl_0 and when the temperature is increased by ΔT, the level of liquid in the vessel becomes $l \approx l_0 = (1 + n\alpha\Delta T)$. What is the value of n ? [Given, $\alpha\Delta T < < 1$]

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22. A point object is placed at a distance of 10 cm and its real image is formed at a distance of 20 cm from a concave mirror. If the object is moved by 0.1 cm towards the mirror. The image will shift by about

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23. A cylindrical vessel of height 500mm has an orifice (small hole) at its bottom. The orifice is

initially closed and water is filled in it up to height H. Now the top is completely sealed with a cap and the orifice at the bottom is opened. Some water comes out from the orifice and the water level in the vessel becomes steady with height of water column being 200mm. Find the fall in height(in mm) of water level due to opening of the orifice.

[Take atmospheric pressure $= 1.0 \times 10^5 N/m^2$, density of water= $1000 kg/m^3$ and $g = 10 m/s^2$. Neglect any effect of surface tension.]

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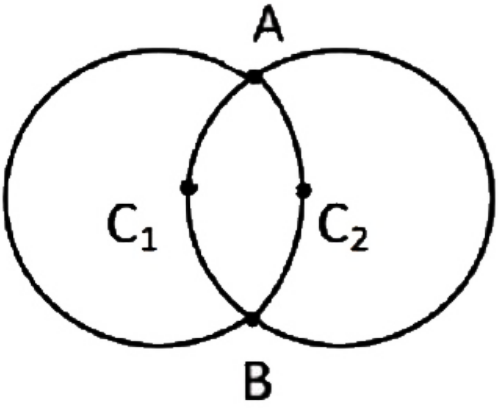
24. Two circular rings of identical radii and resistance 36Ω are placed as shown the figure. Conducting joints are made at points A and B and a cell of emf 20V is connected between these two points.What is the power (in W) delivered by the cell ?[C_1 and C_2 are the

centres of the two rings]



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25. A wooden cylinder of mass 20 g and area of cross-section $1cm^2$, having a piece of lead of mass 60g attached to its bottom, floats in water. The cylinder is depressed and then

released. The frequency of oscillation is $\frac{N}{\pi}S^{-1}$. Find the value of N. [Neglect the volume of water displaced by the lead piece, take $g = 9.8m/s^2$,density of water $\rho_w = 1gcm^{-3}$]

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