PHYSICS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 70

Physics

1. Energy levels A,B,C of a certain atoms corresponding to increasing values of energy level i.e., $E_A < E_B < E_C$. If λ_1, λ_2 and λ_3 are

the wavelengths of radiations corresponding to the transitions C to B,B to A and C to A respectively which of the following statement is correct?

A. $\lambda_3 = \lambda_1 + \lambda_2$

B. $\lambda_3 = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$

C. $\lambda_3 = \sqrt{\lambda_1 \lambda_2}$

D. $\lambda_3 = \sqrt{\lambda_1^2 + \lambda_2^2}$

Answer: B

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2. An ammeter, voltmeter and a resistor are connected in series to a cell and the readings are noted as I and V. If another resistor R is connected in parallel with a voltmeter, then

A. I and V increase

B. I increases

C. I and V will remain same

D. I decreases

Answer: B

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3. The resonant frequency of a circuit is f. If the capacitance is made 4 times the initial values, then the resonant frequecy will become

A. $\frac{f_0}{4}$

B. $2f_0$

C. f_0

D. $\frac{f_0}{2}$

Answer: D

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4. Two cars P and Q start from a point at the same time in a straight line and their position are represented by $x_p(t) = at + bt^2$ and $x_Q(t) = ft - t^2$. At what time do the cars have the same velocity ?

A. $\frac{a-f}{1+b}$

B. $\frac{a+f}{2(b-1)}$

C. $\frac{a+f}{2(l+b)}$

D. $\frac{f-a}{2(l+b)}$

Answer: D

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5. A rocket is fired with a speed $u = 3\sqrt{gR}$ from the earth surface . What will be its speed at interstellar space ?

A. zero

B. $\sqrt{2gR}$

C. $\sqrt{7gR}$

D. $\sqrt{3gR}$

Answer: C

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6. A black rectangular surface of area A emits energy E per second at $27^{\circ}C$. If length and breadth are reduced to one third of initial

value and temperature is raised to $327^\circ C$, then energy emitted per second becomes

A. $\frac{4E}{9}$

B. $\frac{7E}{9}$

C. $\frac{10E}{9}$

D. $\frac{16E}{9}$

Answer: D

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7. The ratio of the speed of sound in nitrogen gas to that in helium gas, at 300K is

A. $\sqrt{\frac{2}{7}}$

B. $\sqrt{\frac{1}{7}}$

C. $\frac{\sqrt{3}}{5}$

D. $\frac{\sqrt{6}}{5}$

Answer: C

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8. A very long straight conducting wire, lying along the z-axis, carries a current of 2A. The integral $\oint \overrightarrow{B} . d \overrightarrow{l}$ is computed along the straight line PQ, where P has the coordinates $(2cm, 0, 0)$ and Q has the coordinates $(2cm, 2cm, 0)$. The integral has the magnitude (in SI units)`

A. zero

B. $8\pi \times 10^{-7}$

C. $2\pi \times 10^{-7}$

D. $\pi \times 10^{-7}$

Answer: D

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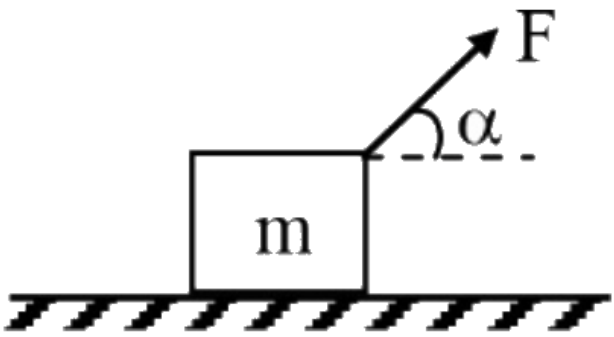
9. At the instant $t = 0$, a force $F = kt$ (k is a constant) acts on a small body of mass m resting on a smooth horizontal surface. The time, when the body leaves the surface is



A. $mgk \sin \alpha$

B. $\frac{k \sin \alpha}{mg}$

C. $\frac{mg \sin \alpha}{k}$

D. $\frac{mg}{k \sin \alpha}$

Answer: D

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10. Assuming that about $20MeV$ of energy is released per fusion reaction $._1 H^2 + ._1 H^3 \rightarrow ._0 n^1 + ._2 He^4$, the mass of

$._1 H^2$ consumed per day in a future fusion reactor of powder $1MW$ would be approximately

A. 0.001 g

B. 0.1 g

C. 10.0 g

D. 1000 g

Answer: B

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11. A block is hanged from spring in a cage. Elongation in spring is 'x_1' and 'x_2' when cage moves up and down respectively with same acceleration. The expansion in spring when the cage move horizontally with same acceleration -

A. $\frac{x_1 + x_2}{2}$

B. $\sqrt{\frac{x_1^2 x_2^2}{2}}$

C. $\sqrt{\frac{x_1^2 + x_2^2}{2}}$

D. $\sqrt{x_1 x_2}$

Answer: C

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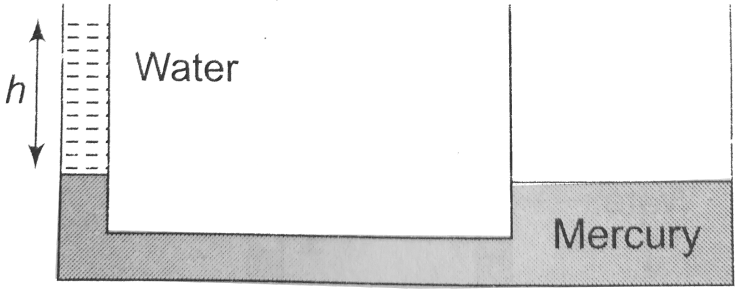
12. Two communicating vessels contain mercury. The diameter of one vessel in n times larger then the diameter of the other. A column of water of height h is poured into the left vessel. The mercury level will rise in the right hand vessel (s = relative density of

mercury and ρ = density of water) by



A. $\frac{n^2 h}{(n+1)^2 s}$

B. $\frac{h}{(n^2+1)s}$

C. $\frac{h}{(n+1)^2 s}$

D. $\frac{h}{n^2 s}$

Answer: B

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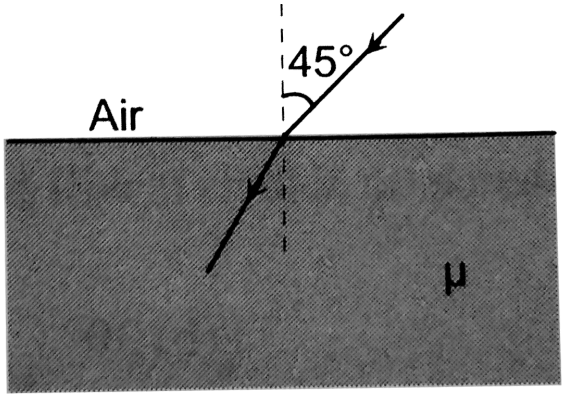
13. In the figure shown , for an angle of incidence 45°, at the top surface , what is the minimum refractive index needed for the internal reflection at vertical face ?



A. $\frac{\sqrt{2}+1}{2}$

B. $\sqrt{\frac{1}{2}}$

C. $\sqrt{\frac{3}{2}}$

D. $\sqrt{2}+1$

Answer: C

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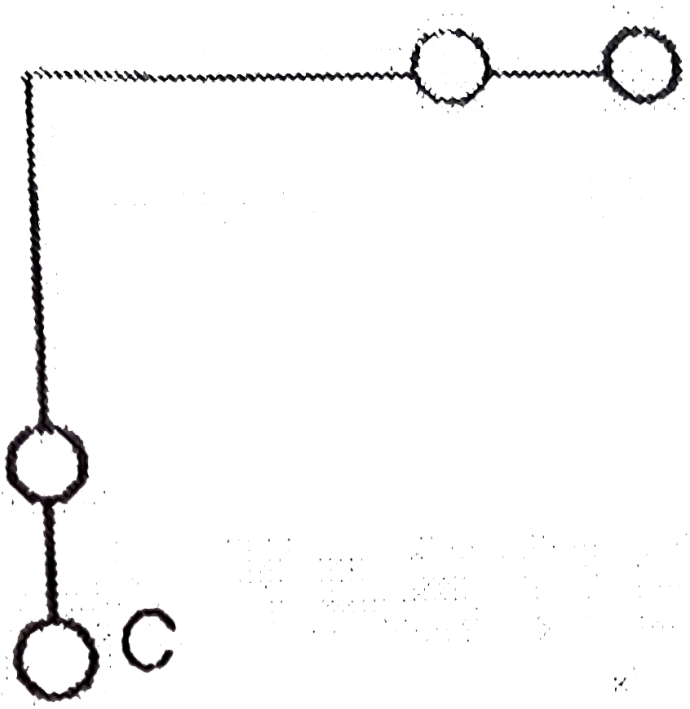
14. A weightless rod of length l carries two equal masses m one fixed at the end and other in the middle ofhte rod. The rod can revolve in a vertical plane about A. Then, horizontal velocity which must be imparted to end C of

rod to deflect it to horizontal position is



A. $\sqrt{\frac{12}{5}gl}$

B. $\sqrt{3gl}$

C. $\sqrt{\frac{16}{5}gl}$

D. $\sqrt{2gl}$

Answer: A

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15. In a common emitter transistor amplifier, the output resistance is $500K\Omega$ and the current gain $\beta = 49$. If the power gain of the amplifier is 5×10^6, the input resistance is

A. 165Ω

B. 198Ω

C. 225Ω

D. 240Ω

Answer: D

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16. A calorimeter contains $0.2kg$ of water at $30^\circ C0.1kg$ of water at $60^\circ C$ is added to it, the mixture is well stirred and the resulting temperature is found to be $35^\circ C$. The thermal capacity of the calorimeter is:

A. $6300\ \mathrm{J\ K^{-1}}$

B. $1260\ \mathrm{J\ K^{-1}}$

C. $4200\ \mathrm{J\ K^{-1}}$

D. $3200\ \mathrm{J\ K^{-1}}$

Answer: B

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17. The dimensional formula of mobility is _____ .

A. $\left[M^{-1}L^{1}T^{2}A^{1}\right]$

B. $\left[M^1L^{-1}T^{-2}A^{-1}\right]$

C. $\left[M^1L^{-1}T^{-2}A^{-1}\right]$

D. $\left[M^{-1}L^0T^2A^1\right]$

Answer: D

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18. The intensity ratio of two coherent sources of light is p. They are interfering in some region and produce interference patten. Then the fringe visibility is

A. $\frac{1+P}{2\sqrt{P}}$

B. $\frac{2\sqrt{P}}{1+P}$

C. $\frac{P}{1+P}$

D. $\frac{2P}{1+P}$

Answer: B

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19. The fundamental frequency of a closed organ pipe of length $20cm$ is equal to the second overtone of an organ pipe open at

both the ends. The length of organ pipe open at both the ends is

A. 80 cm

B. 100 cm

C. 120 cm

D. 140 cm

Answer: C

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20. An engine of power $58.8kW$ pulls a train of mass $2 \times 10^5 kg$ with a velocity of $36kmh^{-1}$. The coefficient of static friction is

A. 0.3

B. 0.03

C. 0.003

D. 0.0003

Answer: C

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21. A 5000 kg rocket is set of vertical firing. The exhaust speed is $800 \quad ms^{-1}$. To give an initial upward acceleration of $20ms^{-2}$, the amount of gas ejected per second to supply the needed thrust will be (take, $g = 10ms^{-2}$)

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22. A particle describes a horizontal circle in a conical funne whoses inner surface is smooth

with speed of $0.5m/s$. What is the height of the plane of circle from vertex the funnel?

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23. A $10\mu F$ capacitor is charged to a potential difference of $50V$ and is connected to another uncharged capacitor in parallel. Now the common potential difference becomes 20 volt. The capacitance of second capacitor is

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24. A particle is projected from the earth's surface with a velocity of $50\ \mathrm{m\ s^{-1}}$ at an angle θ with the horizontal. After $2s$ it just clears a wall $5m$ high. What is the value of $55\sin\theta$? $(g = 10ms^{-2})$

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25. A proton, when accelerated through a potential differnece of V = 29.6 V, has a wavelength λ associated with it. An $\alpha-$ particle, in order to have the same λ, must be

accelerated through a potential difference of how many volts?

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