PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 10

Paper 1 Physics Chemistry

1. A rigid body of moment of inertia l has an angular acceleration α. If the instantaneous

power is P then, the instantaneous angular velocity of the body is

A. $Pl\alpha$

B. $P/l\alpha$

C. Pl/α

D. $P\alpha/l$

Answer: B

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2. A ray of light travelling in water is incident on its surface open to air. The angle of incidence is θ, which is less than the critical angle. Then there will be

A. only a reflected ray and no refracted ray

B. only a reflected ray and no reflected ray

C. a reflected ray and refracted ray and the angle between then would be less than $180^\circ - 2\theta$

D. a reflected ray and a refracted ray and the angle between then would be greater than $180^\circ - 2\theta$

Answer: C

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3. if average velocity becomes 4 times, then what will be the effect on rms velocity at the temperature?

A. 1.4 times

B. 4 times

C. 2 times

D. $\frac{1}{4}$ times

Answer: B

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4. The plane face of a planoconvex lens is silvered. If μ be the refractive index and R, the radius of curvature of curved surface, then the

system will behave like a concave mirror of radius of curvature

A. μR

B. $\frac{R}{(\mu - 1)}$

C. $\frac{R^2}{\mu}$

D. $\left[\frac{\mu + 1}{(\mu - 1)}\right] R$

Answer: B

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5. Two stretched strings of same material are vibrating under the force vibration having sae tension in fundamental mode. The ratio of their frequencies is 1:4 and ratio of the length of the vibrating segments is 1:8 the, the ratio of the radii of the strings is

A. $2:1$

B. $20:1$

C. $12:5$

D. $32:1$

Answer: D

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6. Binding energy of satellite is $4 \times 10^8 J$. Its potential energy is

A. $-4 \times 10^8 J$

B. $-8 \times 10^8 J$

C. $8 \times 10^8 J$

D. $4 \times 10^8 J$

Answer: B

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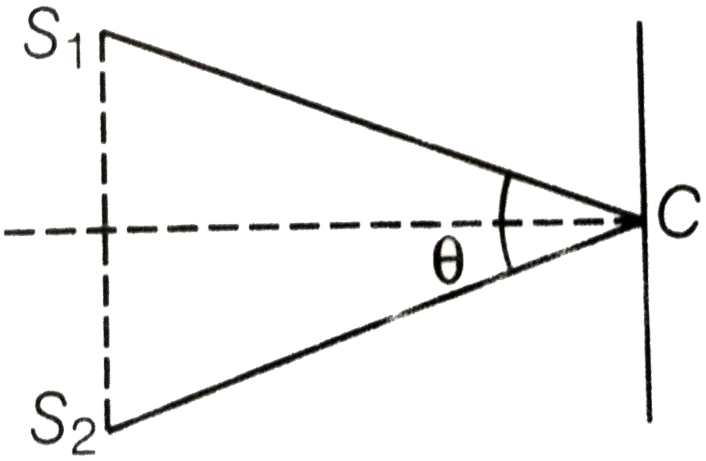
7.



Young's double slit experimental arrangement is shown in figure. If λ is the wavelength of

light used and $\angle S_1 C S_2 = \theta$, then the fringe width will be

A. $\frac{\lambda}{\theta}$

B. $\frac{\lambda}{2\theta}$

C. $\lambda\theta$

D. $\frac{2\lambda}{\theta}$

Answer: A

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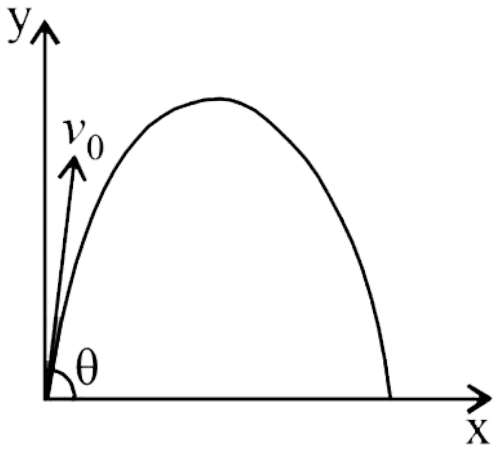
8. A small particle of mass m is projected at an angle θ with the x- axis with an initial velocity v_0 in the $x-y$plane as shown in the figure . At a time $t < \dfrac{v_0 \sin\theta}{g}$, the angular momentum of the particle is

where $\hat{i}, \hat{j}$ and $\hat{k}$ are unit vectors along x, y and z - axis respectively.



A. $\frac{1}{2}mgv_0t^2, \cos\theta\hat{i}$

B. $-mgv_0t^2\cos\theta\hat{j}$

C. $mgv_0t\cos\theta\hat{k}$

D. $-\frac{1}{2}mgv_0t^2\cos\theta\hat{k}$

Answer: D

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9. Differential equation for a particle performing linear SHM is given by

$\frac{d^2x}{dt^2} + 3 \times = 0$, where x is the displacement of the particle. The frequency of oscillatory motion is

A. $\frac{1}{\pi\sqrt{2}}$ per sec

B. $\frac{\sqrt{3}}{2\pi}$ per sec

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

D. $\frac{a\sqrt{2}}{\pi}$ per sec

Answer: B

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10. In forward bias the width of depletion layer is

A. decreases with increase in potential barrier voltage

B. increases with increase in potential barrier voltage

C. independent of potential barrier voltage

D. none of the above

Answer: A


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11. The stirng stretched by tension T and length L vibrates in resonance with a tuning fork of frequency n. the tension in the stretched string is increased by 69% and length of string reduced by 35%. Then, the frequency of vibrating string is

A. n

B. $1.5n$

C. $2n$

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

Answer: C

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12. Two beams A and B, of plane polarized light with mutually perpendicular planes of polarization are seen through a polaroid. From the position when the beam a has maximum intensity (and beam B has zero ntensity), a rotation of polaroid through 30°

makes the two beams appear equally bright. If the initial intensities of the two beams are I_A and I_B respectively, then $\frac{I_A}{I_B}$ equals:

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13. The electrical conductivity of a semiconductor increases when electromagnetic radiation of wavelength shorter than $2480nm$ is incident on it. The band gap in (eV) for the semiconductor is.

A. 0.9

B. 0.7

C. 0.5

D. 1.1

Answer: C

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14. In a potentiometer the null point is received at nth wire. If now we have to change the null poinnt (n+1)th wire, what should we do?

A. Attach resistance in series with battery

B. increase resistance in main circuit

C. decrease resistance in main circuit

D. decrease applied emf

Answer: B

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15. A man slides down on a telegraphic pole with an acceleration equal to one-fourth of acceleration due to gravity.The frictional force

between man and pole is equal to (in terms of man's weight W)

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

B. $\frac{w}{2}$

C. $\frac{3w}{4}$

D. w

Answer: C

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16. 10,000 small balls, each weighing 1 gm , strike one square cm of area per second with a velocity 100 m/s in a normal direction and rebound with the same velocity. The value of pressure on the surface will be

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

B. $2 \times 10^5 Nm^{-2}$

C. $10^7 Nm^{-2}$

D. $2 \times 10^7 Nm^{-2}$

Answer: D

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17. A projectile is projectile with velocity kv_e in vertically upward direction from the ground into the space (v_e is escape velocity and $k < 1$). If air resistance is considered to be negligible then the maximum height from the centre of earth to which it can go, will be : (R =raduis of earth)

A. $\frac{R}{k^2+1}$

B. $\frac{R}{k^2-1}$

C. $\frac{R}{1-k^2}$

D. $\frac{R}{k+1}$

Answer: C

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18. Two blocks each of mass M are connected to the ends of a light frame as shown in figure. The frame si rotated about the vertical line of symmetry. The rod breaks if the tension in it exceeds T_0. Find the maximum frequency with

which the frame may be rotted without breaking the rod.

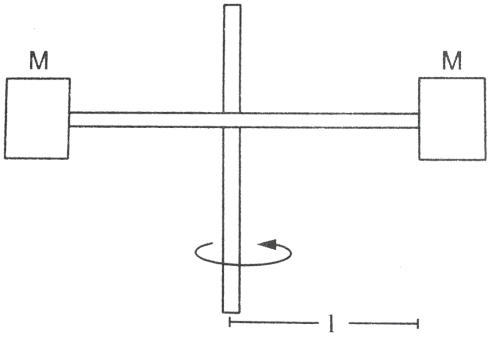

Figure 7-W6

A. $\frac{1}{2\pi}\left(\frac{To}{2Ml}\right)^{1/2}$

B. $\frac{1}{4\pi}\left(\frac{To}{Ml}\right)^{1/2}$

C. $\frac{1}{2\pi}\left(\frac{To}{Ml}\right)^{1/2}$

D. $\frac{1}{4}\left(\frac{To}{Ml}\right)^{1/2}$

Answer: C

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19. Two vectors are given by $A = 3\hat{i} + \hat{j} + 3\hat{k}$ and $B = 3\hat{i} + 5\hat{j} - 2\hat{k}$.

Find the third vector C iif $A = C - 3B = 0$.

A. $12\hat{i} + 14\hat{j} + 12\hat{k}$

B. $13\hat{i} + 17\hat{j} + 12\hat{k}$

C. $12\hat{i} + 16\hat{j} - 3\hat{k}$

D. $15\hat{i} + 13\hat{j} + 4\hat{k}$

Answer: C

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20. Two simple pendulums have time period T and $5T/4$. They start vibrating at the same instant from the mean position in the same phase. The phase difference (in rad) between them when the smaller pendulum completes one oscillation will be

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

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

Answer: D

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21. A flywheel is in the form of a uniform circular disc of radius $1m$ and mass $2kg$. The work which must be done on it to increase its

frequency of rotation from 5 to $10 rev/s$ is approximately

A. $1.5 \times 10^2 J$

B. $3.0 \times 10^2 J$

C. $1.5 \times 10^3 J$

D. $3.0 \times 10^3 J$

Answer: C

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22. A particle is displaced from a position $2\hat{i} - \hat{j} + \hat{k}(m)$ to another position $3\hat{i} + 2\hat{j} - 2\hat{k}(m)$ under the action of a force $2\hat{i} + \hat{j} - \hat{k}(N)$. The work done by the force is

A. 8

B. 10

C. 12

D. 16

Answer: A

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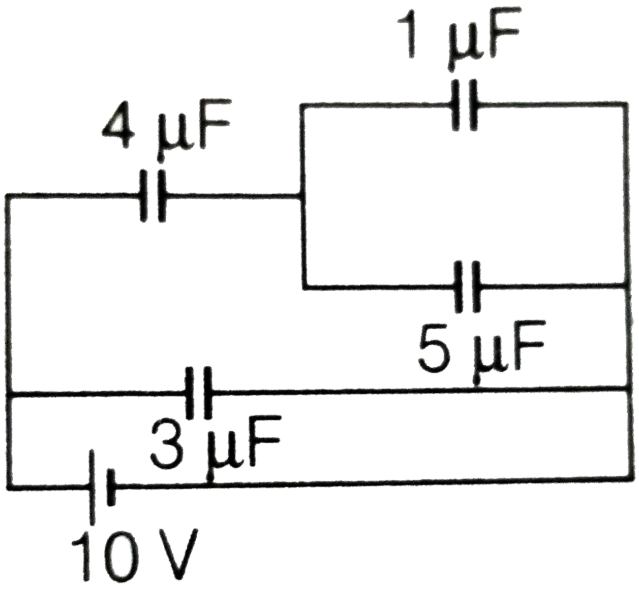
23. The cahrge on $4\mu F$ capacitor in the given circuit (in μC) is



A. 12

B. 24

C. 36

D. 32

Answer: B

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24. When two sound waves with a phase difference of $\pi/2$, and each having amplitude A and frequency ω, are superimposed on each other, then the maximum amplitude and frequency of resultant wave is

A. $\frac{A}{\sqrt{2}}, \frac{\omega}{2}$

B. $\frac{A}{\sqrt{2}}, \omega$

C. $\sqrt{2A}, \frac{\omega}{2}$

D. $\sqrt{2}A, \omega$

Answer: D

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25. Radius of one arm of hyddraulic lift is foud times off radius of other arm. What force

should be applied on narrow arm to lift 100 kg?

A. 26.5 N

B. 62.5 N

C. 6.25 N

D. 8.3 N

Answer: B

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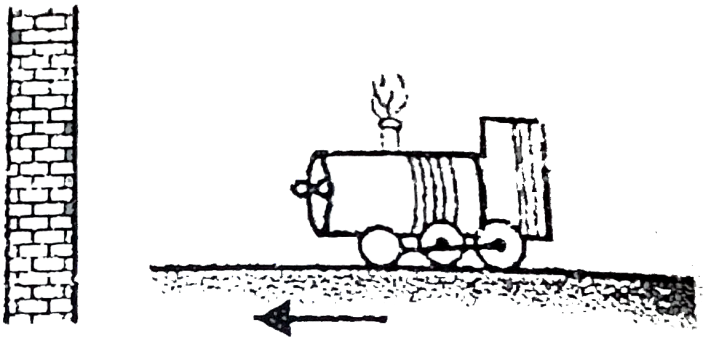
26. An engine driver moving towards a wall with velocity of $50ms^{-1}$ emits a note of frequnecy $1.2kHz$. The frequency of note after reflection from the wall as heard by the engine driver when speed of sound in air is $350ms^{-1}$ is :



A. 2.4 kHz

B. 0.24 kHz

C. 1.6 kHz

D. 1.2 kHz

Answer: C

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27. A drop of water of volume $0.05cm^3$ is pressed between two glass plates, as a consequence of which, it spreads and occupies an are of $40cm^2$. If the surface tension of

water is $70\text{dyne}/cm$, find the normal force required to separate out the two glass plates is newton.

A. 22.5 N

B. 45 N

C. 90 N

D. 450 N

Answer: B

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28. The frequency of the first harmonic of a string stretched between two points is 100 Hz . The frequency of the third overtone is

A. 200 Hz

B. 300 Hz

C. 400 Hz

D. 600 Hz

Answer: C

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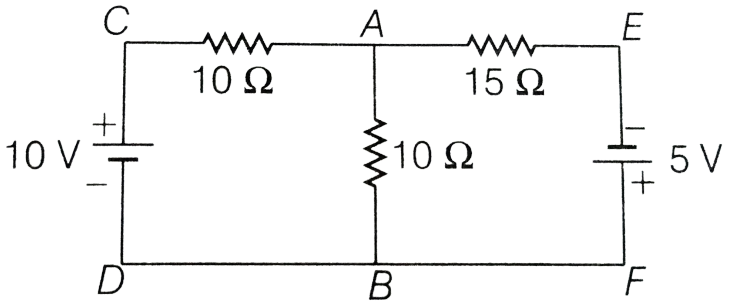

29.

ltBrgt A circuit is as shown in the figure. Then, the current from A to B is

A. $+500Ma$

B. $+250mA$

C. $-250mA$

D. $-500mA$

Answer: B

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30. In the absence of gree house effect, the temperature of the earth would have been

A. absolute zero

B. $16^\circ C$

C. $-18^\circ C$

D. $-30^\circ C$

Answer: C

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31. An inductive coil has resistance of 100Ω. When an ac signal of frequency $1000Hz$ is fed to the coil. The applied voltage leads the current by 45°. What is the inductance of the coil?

A. $\frac{1}{10\pi}$

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

C. $\frac{1}{40\pi}$

D. $\frac{1}{60\pi}$

Answer: B

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32. Eight equal drops of water are falling through air with a steady velocity of 10 cms^{-1}. If the drops combine to form a single drop big in size, then the terminal velocity of this big drop is

A. 80 cms^{-1}

B. 30 cms^{-1}

C. 10 cms^{-1}

D. 40 cms^{-1}

Answer: D

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33. The mutual inductance of a pair of coils, each of N turns, is M henry. If a current of I ampere in one of the coils is brought to zero in t second, the emf induced per turn in the other coil, in volt, will be

A. $\frac{Ml}{t}$

B. $\frac{NMl}{T}$

C. $\frac{MN}{<}$

D. $\frac{ML}{Nt}$

Answer: A

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34. Lights of two different frequencies whose photons have energies 1 and 2.5 eV, respectively, successively illuminate a metal

whose work function is 0.5 eV. The ratio of the maximum speeds of the emitted electrons

A. $1:5$

B. $1:4$

C. $1:2$

D. $1:1$

Answer: C

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35. An electron jumps from the first excited state to the ground stage of hydrogen atom..What will be the percentage change in the speed of electron ?

A. 0.25

B. 0.5

C. 1

D. 2

Answer: B

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36. The unit of Stefan's constant σ is

A. Wm^{-2}/k

B. Wmk^{-4}

C. Wm^{-2}/k^4

D. Mn^{-2}/k^4

Answer: C

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37. A long straight wire in the horizontal plane carries as curret of 75 A in north to south direction, magnitude and direction of field B at a point 3 m east of the wire is

A. $4 \times 10^{-6} T$, vertical up

B. $5 \times 10^{-6} T$, vertical down

C. $5 \times 10^{-6} T$, vertical up

D. $4 \times 10^{-6} T$, vertical down

Answer: C

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38. In Fresnel's biprism experiment, the source contains two wavelength 6000 Å and 5000 Å. The fourth order bright fringe of first wavelength is at a distance of 3 mm from the central band. The distance of the same order of bright band of second wavelength from the central band is

A. 2.5 mm

B. 4.5 mm

C. 3.6 mm

D. 3 mm

Answer: A

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39. The percentage errors in the measurement of length and time period of a simple pendulum are 1% and 2% respectively. Then, the maximum error in the measurement of acceleration due to gravity is

A. 0.08

B. 0.03

C. 0.04

D. 0.05

Answer: D

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40. For a telescope to have large resolving power the

A. focal length of its objective should be large

B. focal length of its eyepiece should be large

C. focal length of its eyepiece should be small

D. aperture of its objective should be large

Answer: D

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41. By mistake a voltmeter is connected in series an an ammeter is connected in parallel with a resistance in an electrical circuit. What will happen to the instrument?

A. Voltmeter is damaged

B. Ammeter is damaged

C. Both are damaged

D. None is damaged

Answer: D

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42. A bar magnet has a coercivity $8 \times 10^3 A/m$. It is desired to damagnetise it by inseting it inside a slenoid 6 cm long and having 60 turns. The current carreid by the solenoid should be

A. $8A$

B. $6A$

C. $4.5A$

D. $2A$

Answer: A

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43. An electron revolves in a circle of radius 0.4 Å with a speed of $10^5 m/s$. The magnitude of the magnetic field produced at the centre of the circular path due to the motion of the electron in W/m^2 is

A. 0.01

B. 10

C. 1

D. 0.005

Answer: C

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44. Starting from rest , a body slides down at 45° inclined plane in twice the time it takes to slide down the same distance in the absence of friction. The coefficient of friction between the body and the inclined plane is

A. 0.33

B. 0.25

C. 0.75

D. 0.8

Answer: C

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45. A radioactive substance decays to $\left(\frac{1}{16}\right)^m$ of its initial activity in 40 days. The half-life of

the radioacctive substance expressed in days is

A. 10

B. 20

C. 5

D. 2.5

Answer: A

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46. A black body radiates energy at the rate of EW/m^2 at a high temperature TK. When the temperature is reduces to half, the radiant energy will be

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

B. $\frac{E}{4}$

C. $4E$

D. $16E$

Answer: A

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47. A wire has breaking stress of $6 \times 10^5 N/m^2$ and a densiity of $3 \times 10^4 kg/m^3$. The length of the wire of the same material which will break under its own weight, (if $g = 10m/s^2$) is

A. 2000 m

B. 2500 m

C. 20 m

D. 2 m

Answer: D

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48. A rubber cord catapult has a cross-section area of $25mm^2$ and the initial length of rubber cord is 10 cm . It is stretched by 5 cm and then released to project a missile of mass 5 g. Taking , $Y_{\text{rubber}} = 5 \times 10^8 N/m^2$, velocity of the projected missile is

A. 20 m/s

B. 100 m/s

C. 250 m/s

D. 200 m/s

Answer: C

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49. A large number of liquid drops each of radius 'a' coalesce to form a single spherical drop of radish b. The energy released in the process is converted into kinetic energy of the

big drops formed. The speed of big drop will be

A. $\sqrt{\left[\frac{4T}{\rho}\left(\frac{1}{a}-\frac{1}{b}\right)\right]}$

B. $\sqrt{\left[\frac{2T}{\rho}\left(\left(\frac{1}{a}-\frac{1}{b}\right)\right]\right)}$

C. $\sqrt{\left[\frac{T}{\rho}\left(\frac{1}{a}-\frac{1}{b}\right)\right]}$

D. $\sqrt{\left[\frac{6T}{\rho}\left(\frac{1}{a}-\frac{1}{b}\right)\right]}$

Answer: D

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50. Unlike a laboratory sonometer, a stringed instrument is seldom plucked in the middle. Supposing a sitar string is plucked at about $\frac{1}{4}th$ of its length from the end. The most prominent harmonic would be

A. eight

B. fourth

C. third

D. second

Answer: D

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