

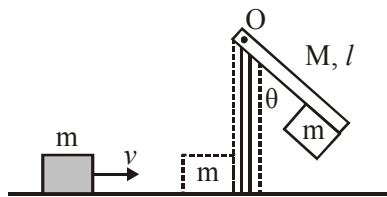
15. A uniform thin rope of length 12 m and mass 6 kg hangs vertically from a rigid support and a block of mass 2 kg is attached to its free end. A transverse short wavetrain of wavelength 6 cm is produced at the lower end of the rope. What is the wavelength of the wavetrain (in cm) when it reaches the top of the rope ?

- (1) 9 (2) 12 (3) 6 (4) 3

Official Ans. by NTA (2)

16. A block of mass $m = 1$ kg slides with velocity $v = 6$ m/s on a frictionless horizontal surface and collides with a uniform vertical rod and sticks to it as shown. The rod is pivoted about O and swings as a result of the collision making angle θ before momentarily coming to rest. If the rod has mass $M = 2$ kg, and length $l = 1$ m, the value of θ is approximately :

(Take $g = 10$ m/s²)



- (1) 69° (2) 63° (3) 55° (4) 49°

Official Ans. by NTA (2)

17. In a Young's double slit experiment, light of 500 nm is used to produce an interference pattern. When the distance between the slits is 0.05 mm, the angular width (in degree) of the fringes formed on the distance screen is close to :

- (1) 0.07° (2) 0.17° (3) 1.7° (4) 0.57°

Official Ans. by NTA (4)

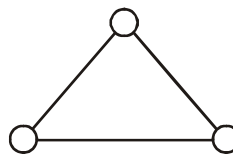
18. Magnitude of magnetic field (in SI units) at the centre of a hexagonal shape coil of side 10 cm, 50 turns and carrying current I (Ampere) in

units of $\frac{\mu_0 I}{\pi}$ is :

- (1) $250\sqrt{3}$ (2) $5\sqrt{3}$
 (3) $500\sqrt{3}$ (4) $50\sqrt{3}$

Official Ans. by NTA (3)

19.



Consider a gas of triatomic molecules. The molecules are assumed to be triangular and made of massless rigid rods whose vertices are occupied by atoms. The internal energy of a mole of the gas at temperature T is :

- (1) $\frac{9}{2}RT$ (2) $\frac{3}{2}RT$
 (3) $\frac{5}{2}RT$ (4) $3RT$

Official Ans. by NTA (4)

20. Two isolated conducting spheres S_1 and S_2 of

radius $\frac{2}{3}R$ and $\frac{1}{3}R$ have $12 \mu C$ and $-3 \mu C$

charges, respectively, and are at a large distance from each other. They are now connected by a conducting wire. A long time after this is done the charges on S_1 and S_2 are respectively :

- (1) $6 \mu C$ and $3 \mu C$
 (2) $+4.5 \mu C$ and $-4.5 \mu C$
 (3) $3 \mu C$ and $6 \mu C$
 (4) $4.5 \mu C$ on both

Official Ans. by NTA (1)

21. A bakelite beaker has volume capacity of 500 cc at 30°C. When it is partially filled with V_m volume (at 30°) of mercury, it is found that the unfilled volume of the beaker remains constant as temperature is varied. If $\gamma_{(\text{beaker})} = 6 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$ and $\gamma_{(\text{mercury})} = 1.5 \times 10^{-4} \text{ } ^\circ\text{C}^{-1}$, where γ is the coefficient of volume expansion, then V_m (in cc) is close to _____.

Official Ans. by NTA (20)

22. A cricket ball of mass 0.15 kg is thrown vertically up by a bowling machine so that it rises to a maximum height of 20 m after leaving the machine. If the part pushing the ball applies a constant force F on the ball and moves horizontally a distance of 0.2 m while launching the ball, the value of F (in N) is ($g = 10 \text{ ms}^{-2}$)_____.

Official Ans. by NTA (150)

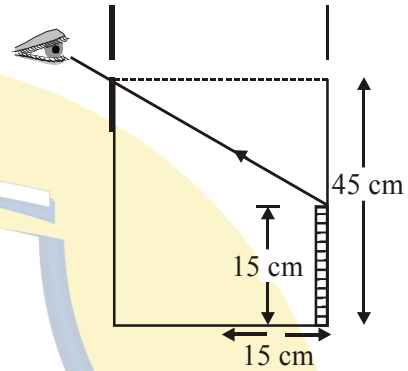
23. When a long glass capillary tube of radius 0.015 cm is dipped in a liquid, the liquid rises to a height of 15 cm within it. If the contact angle between the liquid and glass is close to 0° , the surface tension of the liquid, in milliNewton m^{-1} , is [$\rho_{\text{liquid}} = 900 \text{ kgm}^{-3}$, $g = 10 \text{ ms}^{-2}$] (Give answer in closest integer)_____.

Official Ans. by NTA (101)

24. A person of 80 kg mass is standing on the rim of a circular platform of mass 200 kg rotating about its axis as 5 revolutions per minute (rpm). The person now starts moving towards the centre of the platform. What will be the rotational speed (in rpm) of the platform when the person reaches its centre_____.

Official Ans. by NTA (9)

25. An observer can see through a small hole on the side of a jar (radius 15 cm) at a point at height of 15 cm from the bottom (see figure). The hole is at a height of 45 cm. When the jar is filled with a liquid up to a height of 30 cm the same observer can see the edge at the bottom of the jar. If the refractive index of the liquid is $N/100$, where N is an integer, the value of N is_____.



Official Ans. by NTA (158)