

same

c) $T_2 > T_1$

d) $T_1 > T_2$

5. For a body moving in a circular path, the work done by the centripetal force is: [4]

a) Zero

b) Negative

c) Positive

d) Constant

6. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m. [4]

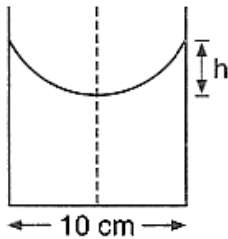
a) $6\hat{k}$ N m

b) $-6\hat{i}$ N m

c) $6\hat{j}$ N m

d) $6\hat{i}$ N m

7. A liquid is kept in a cylindrical vessel, which is rotated along its axis (vertical) as shown in figure. The liquid rises at the sides. If the radius of the vessel is 5 cm and speed of rotation is 120 rpm, the difference in the levels h of the liquid at the centre and sides is: [4]



a) 1 cm

b) 4 cm

c) 3 cm

d) 2 cm

8. When a metal rod is heated it expands because: [4]

a) the size of its atoms increases

b) atmospheric air rushes into it

c) the distance among its atoms increases

d) the actual cause is still unknown

9. When a gas enclosed in a closed vessel was heated so as to increase its temperature by 5°C , its pressure was seen to have increase by 1%. The initial temperature of the gas was nearly: [4]

a) 105°C

b) 500°C

c) 273°C

d) 227°C

10. A pendulum of length $l = 1$ m is released from $\theta_0 = 60^\circ$. The rate of change of speed of the bob at $\theta = 30^\circ$ is: ($g = 10$ m/s²) [4]

a) 5 m/s²

b) 10 m/s²

c) $5\sqrt{3}$ m/s²

d) 2.5 m/s²

11. A capacitor of capacity C_1 is charged upto potential V volt and then connected in parallel to an uncharged capacitor of capacity C_2 . The final potential difference across each capacitor will be: [4]

a) $\frac{C_1 V}{C_1 + C_2}$

b) $\left(1 - \frac{C_2}{C_1}\right) V$

c) $\left(1 + \frac{C_2}{C_1}\right) V$

d) $\frac{C_2 V}{C_1 + C_2}$


12. The magnetic field due to a straight conductor of uniform cross-section of radius a and carrying a steady current is represented by [4]

The ratio of the radii of the nuclei (assumed to be spherical) is:

- a) 8 : 27
- b) 2 : 3
- c) 3 : 2
- d) 4 : 9

20. The correct symbol for Zener diode is:

[4]

- a) 
- b) 
- c) 
- d) 

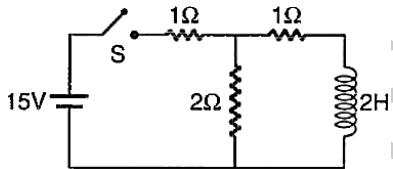
PHYSICS (Section-B)

21. Two unit negative charges are placed on a straight line. A positive charge 'q' is placed exactly at the mid-point between these unit charges. If the system of three charges is in equilibrium the value of q (in C) is: [4]

22. Acceleration due to gravity on moon is $\frac{1}{6}$ th of the acceleration due to gravity on earth. If the ratio of densities of earth (ρ_e) and moon (ρ_m) is $\left(\frac{\rho_e}{\rho_m}\right) = \frac{5}{3}$, then radius of moon R_m is kR_e . What will be the value of k? [4]

23. A particle of mass 0.1 kg is attached to one end of a mass-less spring of force constant 10 Nm^{-1} , lying on a frictionless horizontal plane. The other end of the spring is fixed. The particle starts moving horizontally from its equilibrium position at time $t = 0$ with an initial velocity u_0 . When the speed of the particle is $0.5u_0$, it collides elastically with a rigid wall. The time at which the particle passes through the equilibrium position for the second time is _____ s. (Take $\pi = 3.14$) [4]

24. Switch S is closed for long-time in the given figure. Find the current through the inductor just after switch S is opened. [4]



25. Starting at temperature 300 K, one mole of an ideal diatomic gas ($\gamma = 1.4$) is first compressed adiabatically from volume V_1 to $V_2 = \frac{V_1}{16}$. It is then allowed to expand isobarically to volume $2V_2$. If all the processes are quasi-static then the final temperature of the gas (in $^{\circ}\text{K}$) is (to the nearest integer) _____. [4]