2. The moment of inertia of a body about a given axis is $1.2\ \text{kg m}^2$. Initially, the body is at rest. In order to produce a rotating kinetic energy of 1500 joules, an angular acceleration of $25\ \text{rad/sec}^2$ must be applied about that axis for a duration of
   a. 2s b. 4s c. 8s d. 10s

---

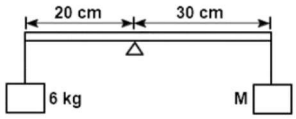
3. a. How will you distinguish between a boiled egg and a raw egg by spinning it on a table top?
   b. In a flywheel, most of the mass is concentrated at the rim. Why?
   c. Why Spokes are fitted in the bicycle wheel?
   d. A fan with blades takes longer time to come to rest than without blades. Why?
   e. How will you distinguish between a boiled egg and a raw egg by spinning it on a table top?
   f. Find the rotational kinetic energy of a ring of mass 9 kg and radius 3 m rotating with 240 rpm about an axis passing through its center and perpendicular to its plane.

---

**Day-4**

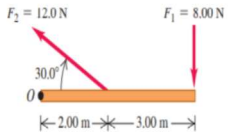
---

1. When torque acting upon a system is zero, which of the following will be constant?
   a. Force b. Linear Momentum c. Angular Momentum d. Impulse
2. A couple produce
   a. Purely linear motion c. No rotation
   b. Purely rotational motion d. Linear and rotational motion both
3. The value of $M$, as shown, for which the rod will be in equilibrium is:
   a. $1kg$ c. $2kg$
   b. 3kg d. $4kg$




---

4. a. Define the terms: torque and couple in rotational dynamics with necessary diagram.
   b. It is easier to open the cap of a bottle by the help of two fingers, why?
   c. A constant torque of $500Nm$ turns a wheel which has a moment of inertia $20kgm^2$ about its centre. Find the angular velocity gained in$2sec$ and the kinetic energy gained.
   d. Calculate net torque about point O for the two forces applied as shown in fig. The rod and both forces are in the plane of the page. $[Ans: -28N]$
   e. A body is rotating, is it necessary that external torque is acting on it?
   f. Speed of a body spinning about an axis increase from rest to 100 rev/sec in 5 secs if a constant torque of 20Nm is applied. The external torque is then removed and the body comes to rest in 100 secs due to friction. Calculate the frictional torque.




---

**Day-5**

---

1. A body of moment of inertia I rotating about an axis has angular momentum L, the rotational kinetic energy of the body is,
   a. $\frac{1}{2}\text{LI}$ b. $\frac{1}{2}\text{LI}^2$ c. $\frac{1}{2I}\text{L}^2$ d. 2LI
2. Two bodies have their moment of inertia I and 2I respectively about their axes of rotation. If their kinetic energies of rotation are equal, their angular moment will be in the ratio,
   a. $2:1$ b. $\sqrt{2}:1$ c. $1:\sqrt{2}$ d. $1:2$
3. If a gymnast on a rotating stool with his arms outstretched suddenly lowers his arms
   a. The angular velocity decreases
   b. The moment of inertia decreases
   c. The angular velocity remains constant
   d. The angular momentum increases

---

4. The principle of conservation of angular momentum is the fundamental law of nature.
   **a.** Define angular momentum. Write its vector expression.
   **b.** State and explain the principle of conservation of angular momentum with suitable example.
   **c.** A ballet dancer can increase of decrease her spinning rate by using the principle of conservation of angular momentum, how?
   **d.** The angular velocity of the earth around the sun increases, when it comes closer to the sun, why?