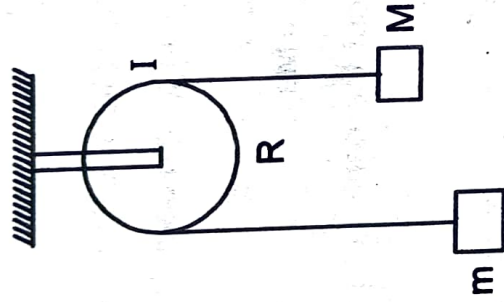
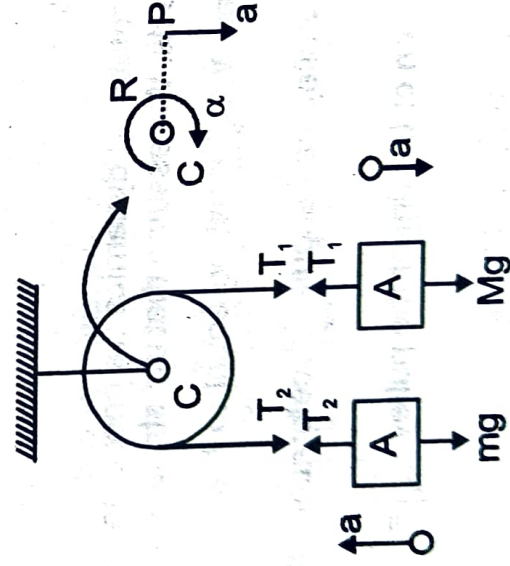


The pulley shown in figure has a moment of inertia I about its axis and its radius is R . Find the magnitude of the acceleration of the two blocks. Assume that the string is light and does not slip on the pulley.



Solution :

Suppose the tension in the left string is T_1 and that in the right string is T_2 . Suppose the block of mass M goes down with an acceleration a and the other block moves up with the same acceleration.



$$Mg - T_1 = Ma \quad \dots(\text{i})$$

$$T_2 - mg = ma \quad \dots(\text{ii})$$

$$T_1 R - T_2 R = I\alpha = Ia/R. \quad \dots(\text{iii})$$

Putting T_1 and T_2 from (i) and (ii) into (iii),

$$[M(g - a) - m(g + a)]R = I \frac{a}{R}$$

$$\text{which gives } \alpha = \frac{(M - m)gR^2}{I + (M + m)R^2}$$