a bullet of mass 20g fired from a gun of mass 5kg gives a recoil velocity of 0.2ms.if the bullet pierces to 0.05m of the target. find the force excerted by the bullet on the target

Solution

According to the law of conservation of energy

$$K(\text{bullet}) = \frac{mv^2}{2} = A(Work) = F\Delta l$$

According to the law of conservation of momentum

$$m\vec{v} + M\vec{V} = 0 \gg mv = MV \gg v = \frac{MV}{m}$$

So, the force excerted by the bullet on the target

$$F = \frac{\frac{mv^2}{2}}{\Delta l} = \frac{mv^2}{2\Delta l} = \frac{m\left(\frac{MV}{m}\right)^2}{2\Delta l} = \frac{M^2V^2}{2\,\Delta l\, m} = \frac{5^2 0.2^2}{2 * 0.05 * \ 20 * 0.001} = 500N$$