A bullet of mass 5 g, travelling with a speed of 210 m/s, strikes a fixed wooden target. One half of its kinetic energy is converted into heat in the bullet while the other half is converted into heat in the wood. The rise of temperature of the bullet if the specific heat of its material is 0.030 cal/(g – °C) (1 cal = 4.2×10^7 ergs) close to : (JEE MAIN 2020)

A 87.5 °C

B 83.3 °C

C 38.4 °C

D 119.2 °C

Given, $1\ cal = 4.2 \times 10^7$ ergs

Also, $\frac{1}{2}$ (Kinetic energy of bullet) = Energy converted into heat

$$\Rightarrow \left(\frac{1}{2} m v^2\right)\frac{1}{2} = ms\Delta T$$

$$\Rightarrow \Delta T = \frac{v^2}{4s}$$

$$= \frac{(210,00)^2}{4 \times 0.03 \times 4.2 \times 10^7}$$

(velocity in cm/s because calorie is given in ergs and not J)

$$\Rightarrow \boxed{\Delta T = 87.5\ ^\circ C}$$

Hence, rise of temperature of bullet = $87.5\ ^\circ C$