

A pendulum clock loses 12 s a day if the temperature is 40°C and gains 4 s a day if the temperature is 20°C . The temperature at which the clock will show correct time, and the coefficient of linear expansion (α) of the metal of the pendulum shaft are respectively :

(JEE MAIN 2016)

- A 30°C ; $\alpha = 1.85 \times 10^{-3}/^{\circ}\text{C}$
- B 55°C ; $\alpha = 1.85 \times 10^{-2}/^{\circ}\text{C}$
- C 25°C ; $\alpha = 1.85 \times 10^{-5}/^{\circ}\text{C}$
- D 60°C ; $\alpha = 1.85 \times 10^{-4}/^{\circ}\text{C}$

Time lost/gained by a clock per day $\Rightarrow \frac{1}{2} \alpha \Delta T \times 86400 \text{ sec.}$

A.T.Q. Case 1: $12 = \frac{1}{2} \alpha (40 - \theta) \times 86400 - \textcircled{1}$

Case 2: $4 = \frac{1}{2} \alpha (\theta - 20) \times 86400 - \textcircled{2}$

On dividing $\textcircled{1}$ by $\textcircled{2}$

$\boxed{\theta = 25^\circ\text{C}} \Rightarrow \text{Option (c) satisfies}$

(You may find ' α ' by putting $\theta = 25^\circ\text{C}$ in $\textcircled{1}$ or $\textcircled{2}$ but no need to find in exam for time saving.)