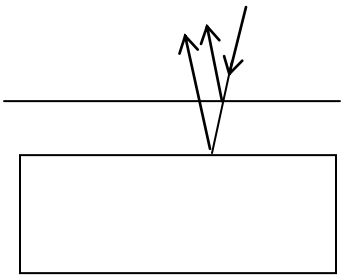
Q- A material having an index of refraction of 1.30 is used as an antireflective coating on a piece of glass (m = 1.5). What should be the minimum thickness of the film in order to minimize reflection of light of 500 nm.

This is the question of the interference through the thin films.



There are two reflected beams one from the upper surface of the coating and the other from the coating glass interface. The path difference for the two is twice of the thickness of the coating for normal view. As at both surfaces the reflection is from denser medium no additional path difference is to be taken. The thickness of the coating should be such that both beams interfere destructively.

The additional path traveled by the light in the coating is 2*t (t is thickness) and it is equivalent to the path difference $2*t*\mu$ in air. Hence for minimum reflection we have

$$2*t*\mu = \lambda/2$$

Or $$t = \lambda/(4\mu) = 500*10^{-9}/(4*1.30) = 9.615*10^{-8} \text{ m}$$