1) Can a beam of white light when passed through a hollow prism give spectrum? Explain.

Spectrum is produced by the deviation of different color by the means of refraction. When the white light travels from air into the hollow prism, there is no change of medium, as prism has air inside. Thus a beam of white light does not give a spectrum on passing through a hollow prism.

2) Why do different components of white light deviate by a different

amounts when passed through a prism?

The rays of different colors have different speed in certain medium so the refractive index of the prism is different index of the prism is different for light of different colors. Thus the white light gets dispersed into different colors.

3) The angle of prism is 60 degrees. What is the angle of incidence for minimum deviation for the prism with refractive index $\sqrt{2}$.

Given,

refractive index $= \sqrt{2}$

Angle of prism $= 60^\circ$

$$\mu = \frac{\sin\left[\frac{A + \delta_m}{2}\right]}{\sin\left(\frac{A}{2}\right)} \quad \ldots (1)$$

$i = e$

$\Rightarrow i + e = A + \delta m$

$$i = \left[\frac{A + \delta_m}{2}\right] \quad \text{---- (2)}$$

By (1) & (2),

$$\mu = \frac{\sin(i)}{\sin\left(\frac{A}{2}\right)}$$

$$\sin(i) = \mu \times \sin\left(\frac{A}{2}\right)$$

$$= \sqrt{2} \times \sin\left(\frac{60}{2}\right)$$

$$= \sqrt{2} \times \sin 30$$

~~$\sin(i) = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$~~

$$\sin(i) = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$$

$$i = 45^\circ$$