1. Mention the powder XRD peak positions for the prepared by SnO2 nanoparticles in methanol. (Use the diffractogram given in Slide no. 10).

2. Calculate the crystallite size using Scherrer's equation if: k = 0.9, λ = 1.0506 Å, FWHM = 0.5 radian, and θ = 11 degree

1. The peaks of the XRD graph are when

2θ = 26, 34, 38, 52 and 66 degrees

$\Rightarrow \theta$ = 13, 17, 19, 26 and 33 degrees

From Sherrer's equation the particle/grain sizes are:

$$= \frac{k \times \lambda}{\cos(\theta) \times FWHM}$$

$k = 0.9$

$\lambda = 1.0506 \times 10^{-10}$

$FWHM = 0.5$

For $\theta = 13°$

$$\text{Grain size} = \frac{0.9 \times 1.0506 \times 10^{-10}}{0.5 \times \cos(13)}$$

$$= \frac{1.89 \times 10^{-10}}{\cos(13)}$$

$$= 1.941 \times 10^{-10} \text{ m}$$

For $\theta = 17°$

$$\text{Grain size} = \frac{1.89 \times 10^{-10}}{\cos(17)}$$

$$= 1.977 \times 10^{-10} \text{ m}$$

For $\theta = 19°$

$$\text{Grain size} = \frac{1.89 \times 10^{-10}}{\cos(19)}$$

$$= 2 \times 10^{-10} \text{ m}$$

For $\theta = 26^\circ$

$$\text{Grain size} = \frac{1.89 \times 10^{-10}}{\cos(26)}$$

$$= 2.104 \times 10^{-10} \text{ m}$$

For $\theta = 33^\circ$

$$\text{Grain size} = \frac{1.89 \times 10^{-10}}{\cos(33^\circ)}$$

$$= 2.255 \times 10^{-10} \text{ m}$$

2. When $\theta = 11^\circ$

$$\text{Grain size} = \frac{1.89 \times 10^{-10}}{\cos(11)}$$

$$= 1.926 \times 10^{-10} \text{ m}$$