4. i) $sin^2\ \frac{17\pi}{18} + sin^2\ \frac{5\pi}{8} + cos^2\ \frac{37\pi}{18} + cos^2\ \frac{3\pi}{8}$

$= sin^2\ \left(\pi - \frac{\pi}{18}\right) + sin^2\ \left(\pi\ - \frac{3\pi}{8}\right) + cos^2\left(2\pi + \frac{\pi}{18}\right) + cos^2\ \frac{3\pi}{8}$

$= sin^2\ \frac{\pi}{18} + sin^2\frac{3\pi}{8} + cos^2\ \frac{\pi}{18} + cos^2\ \frac{3\pi}{8}$

$= sin^2\ \frac{\pi}{18} + cos^2\ \frac{\pi}{18} + \ sin^2\frac{3\pi}{8} + \ cos^2\ \frac{3\pi}{8}$

$= \ 1 + 1 = 2$

4.ii)

$$sin^2\ \frac{\pi}{7} + sin^2\ \frac{5\pi}{14} + sin^2\ \frac{8\pi}{7} + sin^2\ \frac{9\pi}{14}$$

$$= sin^2\ \frac{\pi}{7} + sin^2\ (\frac{\pi}{2} - \frac{\pi}{7}) + sin^2\ (\pi + \frac{\pi}{7}) + sin^2(\frac{\pi}{2} + \frac{\pi}{7})$$

$$= sin^2\ \frac{\pi}{7} + sin^2\ (\frac{\pi}{2} - \frac{\pi}{7}) + sin^2\ (\pi + \frac{\pi}{7}) + sin^2(\frac{\pi}{2} + \frac{\pi}{7})$$

$$= sin^2\ \frac{\pi}{7} + cos^2\ \frac{\pi}{7} + sin^2\ \frac{\pi}{7} + cos^2\ \frac{\pi}{7}$$

$$= 1 + 1 = 2 \text{ Ans.}$$

4.iii)

$$cos^2\ \frac{\pi}{24} + cos^2\ \frac{19\pi}{24} + cos^2\ \frac{31\pi}{24} + cos^2\ \frac{37\pi}{24}$$

$$= cos^2\ \frac{\pi}{24} + cos^2\left(\pi - \frac{5\pi}{24}\right) + cos^2\left(\frac{3\pi}{2} - \frac{5\pi}{24}\right) + cos^2\left(\frac{3\pi}{2} + \frac{\pi}{24}\right)$$

$$= cos^2\ \frac{\pi}{24} + cos^2\ \frac{5\pi}{24} + sin^2\ \frac{5\pi}{24} + sin^2\ \frac{\pi}{24}$$

$$= 1 + 1 = 2 \text{ Ans.}$$

4.vii) $cos^2\ \frac{\pi}{8} + cos^2\ \frac{3\pi}{8} + cos^2\ \frac{5\pi}{8} + cos^2\ \frac{7\pi}{8}$

$= cos^2\ \frac{\pi}{8} + cos^2\ \frac{3\pi}{8} + cos^2\left(\pi - \frac{3\pi}{8}\right) + cos^2\left(\pi - \frac{\pi}{8}\right)$

$= cos^2\ \frac{\pi}{8} + cos^2\ \frac{3\pi}{8} + cos^2\frac{3\pi}{8} + cos^2\frac{\pi}{8}$

$= 2\left(\ cos^2\frac{\pi}{8} + cos^2\ \frac{3\pi}{8}\right)$

$= 2\left\{\ cos^2\frac{\pi}{8} + \ cos^2\left(\frac{\pi}{2} - \frac{\pi}{8}\right)\right\}$

$= 2\left(\ cos^2\frac{\pi}{8} + \ sin^2\ \frac{\pi}{8}\right)$

$= \ 1 + 1 = 2$

4.viii) $sin^2\ \frac{\pi}{4} + sin^2\ \frac{3\pi}{4} + sin^2\ \frac{5\pi}{4} + sin^2\ \frac{7\pi}{4}$

$= sin^2\ \frac{\pi}{4} + sin^2\left(\pi - \frac{\pi}{4}\right) + sin^2\left(\pi - \frac{\pi}{4}\right) + sin^2\left(2\pi - \frac{\pi}{4}\right)$

$= sin^2\ \frac{\pi}{4} + sin^2\ \frac{\pi}{4} + sin^2\ \frac{\pi}{4} + sin^2\ \frac{\pi}{4}$

$= 4\ sin^2\ \frac{\pi}{4}$

$= 4\left(sin\frac{\pi}{4}\right)^2$

$= 4\ (sin45°)^2$

$= 4\left(\frac{1}{\sqrt{2}}\right)^2$

$= 4\ \frac{1}{2} = 2\ Ans.$