10. $\displaystyle\int \sin^4 6\theta\, d\theta = \int \left(\frac{1-\cos 12\theta}{2}\right)\left(\frac{1-\cos 12\theta}{2}\right) d\theta$

$$= \frac{1}{4}\int \left(1 - 2\cos 12\theta + \cos^2 12\theta\right) d\theta$$

$$= \frac{1}{4}\int \left(1 - 2\cos 12\theta + \frac{1+\cos 24\theta}{2}\right) d\theta$$

$$= \frac{1}{4}\int \left(\frac{3}{2} - 2\cos 12\theta + \frac{1}{2}\cos 24\theta\right) d\theta$$

$$= \frac{1}{4}\left(\frac{3}{2}\theta - \frac{1}{6}\sin 12\theta + \frac{1}{48}\sin 24\theta\right) + C = \frac{3}{8}\theta - \frac{1}{24}\sin 12\theta + \frac{1}{192}\sin 24\theta + C$$