Since the Truncation error for $g(x) = \cos x$ is given by:

Truncation error $\leq \frac{x^{2n+2}}{(2n+2)!}$

Now remember that *truncation error is always evaluated at some specific value in the given domain(*which unfortunately is not mentioned in lecture-02 at page-08*)*, so here choose $x = \pi$, then $\frac{x^{2n+2}}{(2n+2)!}$ becomes say: $f(n) = \frac{(\pi)^{2n+2}}{(2n+2)!}$.

Now truncation error *upto m-decimal places* is given by;

$f(n) < \frac{1}{2} \times 10^{-m}$

In particular for *5-decimal places:*

$f(n) < \frac{1}{2} \times 10^{-5}$

$\Longrightarrow \frac{(\pi)^{2n+2}}{(2n+2)!} < \frac{1}{2} \times 10^{-5}$

Now we verify the values of n for which the above inequality is satisfied. By using MAPLE, we can see that it is not true for $n = 1, 2, \cdots, 6$, but for $n = 7$ it starts working.

$$\begin{cases} \text{istrue}\left(f(1) < 0.5 \times 10^{-5}\right) = false \\ \text{istrue}\left(f(2) < 0.5 \times 10^{-5}\right) = false \\ \text{istrue}\left(f(3) < 0.5 \times 10^{-5}\right) = false \\ \text{istrue}\left(f(4) < 0.5 \times 10^{-5}\right) = false \\ \text{istrue}\left(f(5) < 0.5 \times 10^{-5}\right) = false \\ \text{istrue}\left(f(6) < 0.5 \times 10^{-5}\right) = false \\ \\ \text{istrue}\left(f(7) < 0.5 \times 10^{-5}\right) = true \end{cases}$$

$\therefore$ seven terms are needed in the expansion $g(x) = \cos x$ at $x = \pi$ for the *desired accuracy upto 5 decimal places.*