

Ques 4: calculate $\phi(n)$, where given
 $n = 12,580$ and $\phi(n)$ is total no
of $n \leq n$ such that $\gcd(n, n) = 1$.

Solution:-
So if we do this problem by ^{using} sets
PIE it will be very difficult, and lengthy
but since we have proved

$$\phi(n) = n (1 - \frac{1}{p_1}) (1 - \frac{1}{p_2}) \dots (1 - \frac{1}{p_k})$$

where p_1, \dots, p_k , are distinct prime
divisors of n .

$$\begin{aligned} \text{So } n &= 12,580 \\ &= 2 \times 2 \times 5 \times 17 \times 37 \end{aligned}$$

$$\text{So } p_1 = 2, p_2 = 5, p_3 = 17, p_4 = 37$$

$$\begin{aligned} \text{So } \phi(n) &= \phi(12,580) = 12580 \left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{5}\right) \left(1 - \frac{1}{17}\right) \left(1 - \frac{1}{37}\right) \\ &= 12580 \times \frac{1}{2} \times \frac{4}{5} \times \frac{16}{17} \times \frac{36}{37} \\ &= 2 \times 4 \times 16 \times 36 \\ &= 4608. \end{aligned}$$