Q) If 1, ω, ω^2, ω^3......., ω^{n-1} are the n, n^{th} roots of unity, then

$(1 - \omega)(1 - \omega^2)$ ......$(1 - \omega^{n-1})$ = ___________.

Solution:

Since 1, ω, ω^2, ω^3......., ω^{n-1} are the n, n^{th} roots of unity, therefore, we have the identity

= $(x - 1)(x - \omega)(x - \omega^2)$ ...... $(x - \omega^{n-1}) = x^n - 1$ or

$(x - \omega)(x - \omega^2)$ ...... $(x - \omega^{n-1}) = x^n - 1 / x - 1$

= $x^{n-1} + x^{n-2}$ +...... + x + 1

Putting x = 1 on both sides, we get

$(1 - \omega)(1 - \omega^2)$ ...... $(1 - \omega^{n-1}) = n$