Continue → EC-16

MJC-2/ Sem-2/ Unit-2/ Phy/ EC-17/ UKS

If OT represents the resultant vector, then $A\sin\phi$ will given the projection along Y-axis and $A\cos\phi$ gives the projection along the X-axis.

$$A\sin\phi = 0 + a\sin 2\delta + a\sin 4\delta + \cdots + a\sin 2(n-1)\delta$$

$$= a(\sin 2\delta + \sin 4\delta + \cdots + \sin 2(n-1)\delta \quad \text{--- (1)}$$

Similarly,

$$A\cos\phi = a + a\cos 2\delta + a\cos 4\delta + \cdots + a\sin 2(n-1)\delta$$

$$= a[1 + \cos 2\delta + 4\delta + \cdots + \sin 2(n-1)\delta] \quad \text{--- (2)}$$

Now, multiplying equation (2) by $2\sin\delta$, we get,

$$2A\cos\phi\sin\delta = 2a\sin\delta[1 + \cos 2\delta + \cos 4\delta + \cdots + \sin 2(n-1)]\delta$$

$$= a[2\sin\delta + 2\cos 2\delta\cdot\sin\delta + 2\cos 4\delta\sin\delta + 2\cos 2(n-1)\delta\sin\delta]$$

$$= a[2\sin\delta + (\sin 3\delta - \sin\delta) + (\sin 5\delta - \sin 3\delta) + \cdots \sin(2n-1)\delta - \sin(2n-3\delta)]$$

$$= a[\sin\delta + \sin(2n-1)\delta]$$

$$= a[\sin n\alpha \cdot \cos(n-1)\delta$$ → continue