

Instructions

1. Separate into groups of no more than three persons.
2. The group cannot be the same as your former group.
3. Only one submission is needed for each group.
4. **Write down all the steps** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
5. **Do not panic.**

Name	ID
Prapun	555

Find the average power of each of the signals given below.

$$1. g(t) = 2e^{j\omega t}$$

$\omega = 2\pi f_c$

We know that $g(t) = ce^{j(2\pi f_c t + \theta)} \Rightarrow P_g = |c|^2$.

Here, $c = 2$. Therefore, $P_g = 2^2 = 4$

$$2. g(t) = 2\cos(2t + 2^\circ)$$

A $\omega_1 = 2\pi f_1$

We know that $g(t) = A\cos(2\pi f_c t + \theta) \Rightarrow P_g = \frac{A^2}{2}$

Here, $A = 2$. Therefore, $P_g = \frac{2^2}{2} = \frac{4}{2} = 2$

$$3. g(t) = 2\cos(2t + 2^\circ) + 2\cos(2t + 2^\circ)$$

c_1 ω_1 c_2 ω_2

$\omega_1 = \omega_2 \Rightarrow f_1 = f_2 \Rightarrow$ we need to combine the two sinusoids first.

$$g(t) = 4\cos(2t + 2^\circ)$$

A

We know that $g(t) = A\cos(2\pi f_c t + \theta) \Rightarrow P_g = \frac{A^2}{2}$

Here, $A = 4$. Therefore, $P_g = \frac{4^2}{2} = \frac{16}{2} = 8$

$$4. g(t) = 2\cos(2t + 2^\circ) + 22\cos(22t + 22^\circ)$$

A_1 ω_1 A_2 ω_2

$\omega_1 \neq \omega_2 \Rightarrow f_1 \neq f_2$

We know that $g(t) = \sum_k A_k \cos(2\pi f_k t + \theta_k)$

$$\Rightarrow P_g = \frac{1}{2} \sum_k |A_k|^2$$

Here, $A_1 = 2$ and $A_2 = 22$.

Therefore, $P_g = \frac{2^2 + 22^2}{2} = \frac{4 + 484}{2} = 2 + 242 = 244$