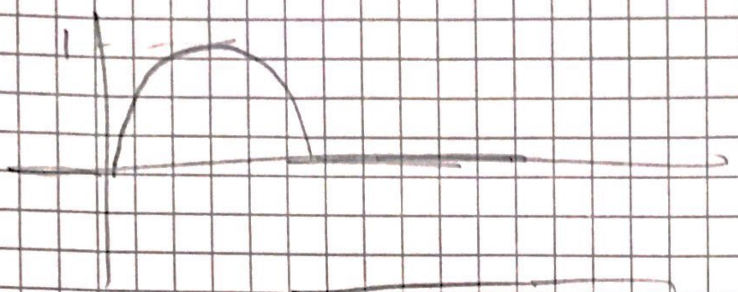
Assume our rectified wave as follows:




$$\longrightarrow \sin x, \quad 0 < x < \pi$$

$$RMS = \sqrt{\frac{1}{T}\int_0^T v^2(t)\, dt}$$

↳ for our case: $RMS_{real} = \sqrt{\frac{1}{2\pi}\int_0^{\pi} \sin^2 x\, dx}$

$$\sin^2 x = \frac{1-\cos 2x}{2} \Rightarrow RMS_{real} = \sqrt{\frac{1}{2\pi}\int_0^{\pi}\left(\frac{1-\cos 2x}{2}\right)}$$

1 .... $\Rightarrow \boxed{RMS_{real} = \frac{1}{2}}$

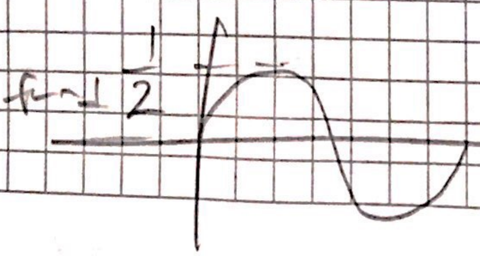
↳ to find fund wave:

$$a_1 = \frac{1}{\pi}\int_0^{\pi} \underbrace{\sin(t)\cos t}_{\frac{\sin(2t)}{2}}\, dt \longrightarrow \boxed{0}$$

$$b_1 = \frac{1}{\pi}\int_0^{\pi} \sin^2 t\, dt, \quad \sin^2 t = \frac{1-\cos 2t}{2}$$

$$\boxed{b_1 = \frac{1}{2}}$$

so, fund wave $\longrightarrow \boxed{\frac{1}{2}\sin(x)}$




fund's rms

$$\boxed{RMS_{fund} = \frac{1}{2\sqrt{2}}}$$

2 ....

CamScanner ile tarandı

Subject :

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$$THD = \frac{\sqrt{I_{s\,rms}^2 - I_{1\,rms}^2}}{I_{1\,rms}}$$

from (1):

$$I_{s\,rms} = RMS_{rect} = \frac{1}{2}$$

from (2):

$$I_{1\,rms} = RMS_{fund} = \frac{1}{2\sqrt{2}}$$

$$\Rightarrow \quad THD = \frac{\sqrt{RMS_{rect}^2 - RMS_{fund}^2}}{RMS_{fund}}$$

$$THD = \frac{\sqrt{\frac{1}{4} - \frac{1}{8}}}{\frac{1}{2\sqrt{2}}} = \frac{\frac{1}{2\sqrt{2}}}{\frac{1}{2\sqrt{2}}}$$

$$\boxed{THD = 1}$$