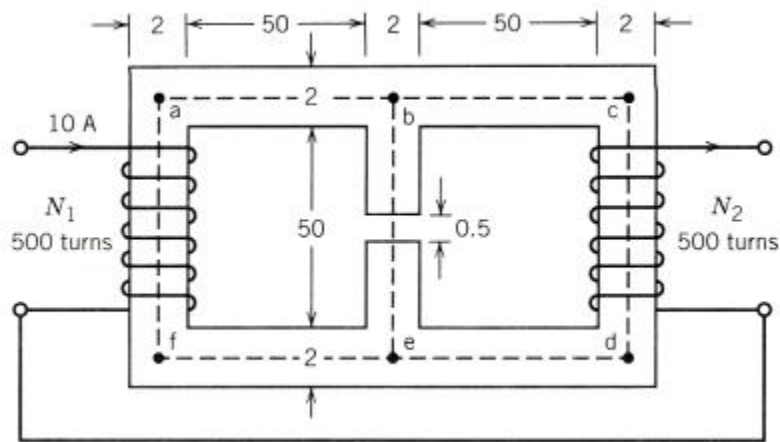1- In the magnetic circuit of following figure, the relative permeability of the ferromagnetic material is 1200. Neglect magnetic leakage and fringing. All dimensions are in centimeters, and the magnetic material has a square cross-sectional area. Determine the air gap flux, the air gap flux density, and the magnetic field intensity in the air gap.

2- Tests are performed on a 1φ, 10 kVA, 2200=220 V, 60 Hz transformer and the following results are obtained.

	Open-Circuit Test (high-voltage side open)	Short-Circuit Test (low-voltage side shorted)
Voltmeter 220 V 150 V	Voltmeter 220 V 150 V	Voltmeter 220 V 150 V
Ammeter 2.5 A 4.55 A	Ammeter 2.5 A 4.55 A	Ammeter 2.5 A 4.55 A
Wattmeter 100 W 215 W	Wattmeter 100 W 215 W	Wattmeter 100 W 215 W

2-1- Derive the parameters for the approximate equivalent circuits referred to the low-voltage side and the high-voltage side.

2-2- express the excitation current as a percentage of the rated current.

2-3- Determine the power factor for the no-load and short-circuit tests.