

Answers to Self-Reviews

- 13-1 a. true
b. true
13-2 a. 2000 Mx
b. $20 \mu\text{Wb}$

- 13-3 a. 3000 G
b. 0.3 T
13-4 a. true
b. false

Critical Thinking

- 13-26 A flux ϕ of $25 \mu\text{Wb}$ exists in an area of 0.25 m^2 . What is the flux density B in (a) gauss units; (b) teslas?

- 13-27 At the north pole of an electromagnet, the flux density B equals 5 T . If the area A equals 0.125 m^2 , determine the total number of flux lines ϕ in (a) maxwells; (b) webers.

- 13-12 Make the following conversions:

- a. 0.004 T to G.
b. 1000 G to T.
c. $1 \times 10^5 \text{ G}$ to T.
d. 10 T to G.

- 13-11 Make the following conversions:

- a. 4000 G to T.
b. $800,000 \text{ G}$ to T.
c. 600 G to T.
d. $10,000 \text{ G}$ to T.

- 13-10 Make the following conversions:

- a. 2.5 T to G.
b. 0.05 T to G.
c. $1 \times 10^{-4} \text{ T}$ to G.
d. 0.1 T to G.

- 13-9 Define (a) the gauss (G) unit of flux density, B ; (b) the tesla (T) unit of flux density, B .

SECTION 13-3 FLUX DENSITY (B)

- 13-8 A permanent magnet has a magnetic flux of $50,000 \text{ Mx}$. How many Webers (Wb) of magnetic flux does this correspond to?

- 13-7 An electromagnet produces a magnetic flux of $900 \mu\text{Wb}$. How many magnetic field lines does this correspond to?

- 13-6 A permanent magnet has a magnetic flux of $12,000 \mu\text{Wb}$. How many magnetic field lines does this correspond to?

- a. 0.00004 Wb to Mx.
b. 225 Mx to Wb.
c. $80,000 \text{ Mx}$ to Wb.
d. $650 \times 10^{-6} \text{ Wb}$ to Mx.

- 13-5 Make the following conversions:

- c. 70 Mx to Wb.
d. $30 \times 10^{-6} \text{ Wb}$ to Mx.

- 13-13 Make the following conversions:

- a. 0.0905 T to G.
b. 100 T to G.
c. $75,000 \text{ G}$ to T.
d. $1.75 \times 10^6 \text{ G}$ to T.

- 13-14 With a flux of 250 Mx through an area of 2 cm^2 , what is the flux density in gauss units?

- 13-15 A flux of $500 \mu\text{Wb}$ exists in an area, A , of 0.01 m^2 . What is the flux density in tesla units?

- 13-16 Calculate the flux density, in teslas, for a flux, ϕ , of $400 \mu\text{Wb}$ in an area of 0.005 m^2 .

- 13-17 Calculate the flux density in gauss units for a flux, ϕ , of $200 \mu\text{Wb}$ in an area of $5 \times 10^{-4} \text{ m}^2$.

- 13-18 With a magnetic flux, ϕ , of $30,000 \text{ Mx}$ through a perpendicular area of 6 cm^2 , what is the flux density in gauss units?

- 13-19 How much is the flux density in teslas for a flux, ϕ , of $160 \mu\text{Wb}$ through an area of 0.0012 m^2 ?

- 13-20 With a flux, ϕ , of $2000 \mu\text{Wb}$ through an area of 0.0004 m^2 , what is the flux density in gauss units?

- 13-21 For a flux density of 30 kG at the north pole of a magnet through a cross-sectional area of 8 cm^2 , how much is the total flux in maxwells?

- 13-22 The flux density in an iron core is $5 \times 10^{-3} \text{ T}$. If the area of the core is 10 cm^2 , calculate the total number of magnetic flux lines in the core.

- 13-23 The flux density in an iron core is 5 T . If the area of the core is 40 cm^2 , calculate the magnetic flux in weber units.

- 13-24 The flux density in an iron core is 80 kG . If the area of the core is 0.2 m^2 , calculate the magnetic flux in weber units.

- 13-25 If the flux density in 0.05 m^2 is 2000 G , how many magnetic field lines are there?