Electrical Transformers and Rotating Machines 4th edition Herman Solutions Manual

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Unit 1 MAGNETISM

Objectives

- Discuss the properties of permanent magnets.
- Discuss the difference between the axis poles of the earth and the magnetic poles of the earth.
- Discuss the operation of electromagnets.
- Determine the polarity of an electromagnet when the direction of the current is known.
- Discuss the different systems used to measure magnetism.
- Define terms used to describe magnetism and magnetic quantities.

Answers to Review Questions

1. South Polarity
2. Lodestones
3. Repel each other
4. Using the left-hand rule.
5. Flux Density – A measurement of the strength of a magnetic field.
   Permeability – The measure of a material's willingness to become magnetized.
   Reluctance – Resistance to magnetism.
   Saturation – The maximum line of magnetic force a material can hold.
   Coercive Force – A material's ability to retain magnetism.
   Residual Magnetism – The amount of magnetic force remaining in a piece of material after the magnetizing force has been removed.
6. 27,800 dynes

Unit 2 MAGNETIC INDUCTION

Objectives

- Discuss magnetic induction.
- List factors that determine the amount of polarity of an induced voltage.
- Discuss Lenz's law.
- Discuss an exponential curve.
- List devices used to help prevent inductive voltage spikes.

Answers to Review Questions

1. The direction of current flow.
2. The amount of current flow.

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3. 1. The number of turns of wire.
   2. The strength of the magnetic field.
   3. The speed of the cutting action.
4. 100,000,000
5. It has the effect of adding turns in series causing the induced voltage in each to add.
6. 5
7. 63.2%
8. 0.0417 second
9. 750.6 volts (250.6 × 3)
10. Diode

Unit 3 INDUCTANCE IN ALTERNATING CURRENT CIRCUITS

Objectives

- Discuss the properties of inductance in an alternating current circuit.
- Discuss inductive reactance.
- Compute values of inductive reactance and inductance.
- Discuss the relationship of voltage and current in a pure inductive circuit.
- Be able to compute values for inductors connected in series or parallel.
- Discuss reactive power (VARs).
- Determine the Q of a coil.

Answers to Review Questions

1. 0°. Current and voltage are in phase.
2. 90°
3. Inductance of the inductor and the frequency.
4. 2.4 Henrys (0.6 × 4)
5. 0.0214 Henry ($1/L_T = 1/0.05 + 1/0.06 + 1/0.1$)
6. 79.17 Ω ($L_T = 0.06 + 0.05 + 0.1$; $L_T = 0.21$ H; $X_L = 377 \times 0.21$)
7. 0.737 H [$X_L = 400$ Ω (240/0.6); $L = 400/2 \times \pi \times 1000$]
8. 0.354 amp ($X_L = 2 \times \pi \times 60 \times 3.6$) ($I = 480/1357.2$)
9. 0.424 amp
10. 1666.3 Ω ($L = 250/2 \times \pi \times 60$) ($X_L = 2 \times \pi \times 400 \times 0.663$)

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