DC Circuits - 4310901

Question Bank

Unit – 5 Magnetism & Electromagnetism

Magnetism

1. Define the terms with their unit
    a. Magnetic Flux
    b. Magnetic Field
    c. Magnetic Flux Density
    d. Magnetic Field Intensity
    e. Permeability
    f. Reluctance
2. Write down characteristics of magnetic field lines.
3. Write & explain Coulomb's laws of magnetic force.
4. Write a short note on magnetic materials.
5. What is magnetic hysteresis? Draw and explain hysteresis loop.
6. Compare electric circuit and magnetic circuit.
7. Derive the equation for energy stored in magnetic field.

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Electromagnetism

1. What is electromagnet?
2. Define the terms with their unit
    a. Magneto Motive Force (MMF)
    b. leakage flux
    c. Hopkinson's leakage coefficient
3. Write Faraday's laws of Electromagnetic Induction.
4. State Fleming's Right-Hand Rule.
5. State Fleming's Left-Hand rule.
6. State & explain Lenz's Law
7. Explain self-induced emf and mutual induced emf.
8. Write equation of statically induced emf and dynamically induced emf.
9. Explain the factors affecting the self-induced EMF.
10. State conditions for production of dynamically induced EMF.
11. Compare dynamically and statically induced emf.
12. Explain any two methods to determine co-efficient of self inductance.
13. Obtain the equation of coupling co-efficient $K=M/\sqrt{L1L2}$ between the two coils.
14. Write the equation of equivalent inductance when two coils are connected in
    (i) Series addition
    (ii) Series opposition
15. Give the classification of inductor.

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Problems

1. An iron ring having average circumference of 50 cm and 4 cm2 cross sectional area is wound with a coil of 500 turns and 20 Ω resistance. This winding is given 24 V D.C. supply and relative permeability of iron is 800, calculate
   (i) MMF produced in coil
   (ii) Reluctance of ring

2. A ring of mean diameter of 30 cm is wound with 200 turns of copper wire carrying the current of 2 A. The cross-sectional area of the ring is 12 cm^2 and its relative permeability is 1000. Determine the flux established.

3. A coil of 600 turns produces flux of 2 mWb when it carries a current of 4A. Calculate the co-efficient of self-inductance of the coil.

4. Resistance of an inductive coil is 100 Ω. It is wound on a non-magnetic former having 1m length & 20 sq. cm. cross sectional area. There are 1600 turns in the coil. Find:
   (i) inductance of the coil
   (ii) energy stored when uniform current of 10A flows through it.

5. A ring of having cross sectional area of 22 cm^2 and average diameter of 1.8 m is made from iron. A coil having 400 turns is wound over this ring. Calculate the current required to produce 3.0 mWb magnetic field. The relative permeability of iron is 800.

6. Two coils having 300 and 600 turns and diameter of 25 cm and cross-sectional area of 625 cm2 are wound on a magnetic circuit. The relative permeability of magnetic circuit is 1600 and constant. Calculate
   (i) self-inductance of both the coil
   (ii) Mutual inductance if the coupling co efficient is 0.5.

7. Coil A and B with 50 and 500 turns respectively are wound side by side on a close circuit of cross section 50 cm2 and mean length of 1.2 meter. Estimate
   (i) self-inductance of each coil
   (ii) mutual inductance between coils
   (iii) EMF induced in coil A if the current in coil B grows steadily from 0 to 5 Amp. In 0.01 sec. Assume μ_r of iron as1000.