

## Department of Electrical Engineering

**BEEG-1001**

**Electrical Engineering**

**Session:2021-22**

**(Magnetic circuit) Even Semester**

**Tutorial sheet: 1**

1. A coil of insulated wire of 500 turns and resistance of  $4\Omega$  is closely wound on an iron ring. The ring has a mean diameter of 0.25m and a uniform cross-sectional area of  $700 \text{ mm}^2$ . Calculate the total flux in the ring when a dc supply of 6V is applied at the ends of winding. Assume a relative permeability of 550.

**[Ans: 0.462mWb]**

2. A ring of mean diameter 30 cm is wound with 200 turns of copper wire carrying a current of 2 A. The x-section of the magnetic material of the ring is  $12 \text{ cm}^2$  and its relative permeability is 1,000. Determine the flux through it.

**[Ans: 0.64 m Wb]**

3. A rectangular shaped core is made of mild steel plate 15 mm x 20 mm cross-section. The mean length of the magnetic path is 18 cm. The exciting coil has 300 turns and current 0.7

A. Calculate :

- (i) Magnetic field intensity(H)
- (ii) Flux density
- (iii) Reluctance
- (iv) Flux of magnetic circuit.

Assume relative permeability of mild steel is 940.

**[Ans: (i) 1,166.67 AT/m, (ii) 1.378 T (iii)  $50.794 \times 10^{-4} \text{ AT/Wb}$  (iv)  $4.134 \times 10^{-4} \text{ Wb}$ ]**

4. An iron ring of mean diameter 10 cm is uniformly wound with 2000 turns of wire. When a current of 0.25 A is passed through the coil a flux density of 0.4 T is set up in the iron.

Find

- (a) the magnetic field intensity
- (b) the relative permeability of the iron under these conditions.

**[Ans: 1592 A/m, 200]**

5. What are the difference between electric and magnetic circuit?
6. Define the terms: (a) MMF (b) Field strength (c) Flux density (d) Relative permeability (e) Reluctance (f) Coercive force (g) residual flux density (h) leakage flux