**Department of Electronics & Communication Engineering**

(Faculty of Technology, Dharmsinh Desai University, Nadiad)

**Academic Year: 2022 - 2023**

**TUTORIAL – 3**

**Subject:***(ESC101) BASIC ELECTRICAL ENGINEERING*

**Class :** *B. Tech. Sem.I (EC/CE/IT)*

**Topics :** *Introduction, Magnetic effect of electric current, Current carrying conductor in*

*magnetic field, Law of electromagnetic induction, Induced emf, Self-Inductance (L), Mutual Inductance (M), and Coupling coefficient between two magnetically coupled circuits (K)*

1. A mild steel ring has a radius of 50 mm and a cross-sectional area of 400 mm2. A current of  
   0.55 A flows in a coil wound uniformly around the ring and the flux produced is 0.15 mWb. If the relative permeability at this value of current is 500 find (a) the reluctance of the mild steel and (b) the number of turns on the coil.
2. An iron rod of 1 cm radius is bent to a ring of mean diameter 30 cm and wound with 450  
   turns of wire. An air gap of 0.1 cm is cut across the bent the ring. Assume the relative  
   permeability of iron as 1000. Find out the current a useful flux of 0.5  
   mWb if the leakage factor required to produce is 1.25.
3. A ring has a diameter of 30 cm and a cross-sectional area of 1.5 cm2. The ring  
   is made up of semicircular sections of cast iron and cast steel having same length,  
   with each joint having an air-gap of 0.2 mm. Find the total MMF required to  
   produce a flux of 8 × 10-4 Wb. The relative permeabilities of cast steel and cast iron  
   are 800 and 166 respectively. Neglect fringing and leakage effects.
4. Find the ampere-turns required to produce a flux of 0.4 mwb in the air gap of a  
   magnetic circuit which has an air gap of 0.55 mm. The iron ring has 4 cm2 cross  
   section. Magnetic Circuit has 60 cm mean length. Take µr = 1300 and leakage  
   coefficient = 1.15. Neglect Fringing.
5. A steel ring 20 cm radius and of circular cross-section 2 cm in radius has an air  
   gap of 1 mm length. It is wound uniformly with 1000 turns of wire carrying a  
   current of amperes. Neglect magnetic leakage & fringing. The air gap takes 55 % of  
   the total M.M.F. Find total reluctance.
6. A ring has mean diameter of 20 cm, a cross-section of 2 cm2 and has radial gap of 0.5 mm cut in it. It is uniformly wound with 1200 turns and having current of 1.5 A produce a flux of 0.25 mWb across a gap. Calculate relative permeability of iron. Neglect leakage.

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