

ECE 262: Electrical Machines I-CAT I. 03/06/2024

Duration: 1 Hrs. 3.00 PM – 4.00 PM

$$l_1 = 20 \text{ cm} = 0.2 \text{ m}$$
$$A_1 = 25 \text{ cm}^2 = 25 \times 10^{-4} \text{ m}^2$$

1. Distinguish between **magneto motive force** (m.m.f) and **Electromotive force**. [2 Mks]
2. A coil for a solenoid is 10 cm long and made up of 100 turns of wire. This wire has a dc resistance of 2.0 ohms. The solenoid is connected to a 100 V dc source. Find the MMF the coil produces and the magnetic field intensity. [4 Mks]
- *3. Explain commutation and state two methods of improving commutation. [2 Mks]
4. A coil of 1000 turns in linking a flux of 0.01 Wb, the flux is reversed in an interval of 0.1 S. Calculate the average value of emf induced in the coil. [3 Mks]
5. Compare the electric and magnetic circuits by their similarities and dissimilarities. [4 Mks]
6. A steel ring has a mean diameter of 20 cm, a cross-section of 25 cm², and a radial air gap of 0.8 mm cut across it. When excited by a current of 1 A through a coil of 1000 turns wound on the ring core it produces an air gap flux 1 mwb. Neglecting leakage and fringing. Calculate
 - i. relative permeability of steel and
 - ii. total reluctance of the magnetic circuit. [5 Mks]

$$\frac{E}{\text{mmf}} = \frac{m}{\text{mmf}}$$

Induced
EMF
Current

Reluctance =
magnetic flux

$$N = 1000$$
$$\phi = 0.01 \text{ Wb}$$

similarity

F

$$-0.01 - 0.01$$

$$x = \frac{P^2}{I^2}$$

$$L_1 = 10 \text{ cm} = 0.1 \text{ m}$$
$$N = 100$$

R

NI

$$V = IR$$

$$F = N \frac{d\phi}{dt}$$