

# Key

EE 360

Student Name :

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A coil of 500 turns and resistance  $20 \Omega$  is wound uniformly on an iron ring of mean circumference of 50 cm and cross section  $4 \text{ cm}^2$ . It is connected to a 24-volt DC supply. Under these conditions, the relative permeability of iron is 800. Calculate the values of:

- (a) the magnetomotive force
- (b) the magnetic field intensity
- (c) the total flux in the iron
- (d) the reluctance of the ring

$$I = \frac{24}{20} = 1.2 \text{ A}$$

$$a) F = NI = 1.2 * 500 = 600 \text{ AT}$$

$$b) H = \frac{F}{l} = \frac{600}{0.5} = 1200 \text{ AT/m}$$

$$c) B = \mu H = \mu_0 \mu_r H = 4\pi * 10^{-7} * 800 * 1200 = 1.206 \text{ T}$$

$$\Phi = BA = 1.206 * 4 * 10^{-4} = 0.483 \text{ mWb}$$

$$d) R = \frac{l}{\mu A} = \frac{0.5}{4\pi * 10^{-7} * 800 * 4 * 10^{-4}} = 1.243 * 10^6 \text{ AT/Wb}$$