**Department of Electronics & Communication Engineering**

(Faculty of Technology, Dharmsinh Desai University, Nadiad)

**Academic Year: 2022 - 2023**

**TUTORIAL – 4**

**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 conductor of length 70 cm carries a current of 8 Amp. placed at right angles to a magnetic field of strength 2 Wb/m2. Calculate the force in newtons exerted on it. If the force causes the conductor to move at a velocity of 50 m/s, find the emf induced in it.
2. A coil having an inductance of 40 mH is carrying current of 10 A. find the self induced emf in the coil, when the current is (i) reduced to zero in 0.03 s (ii) reversed in 0.05 s.
3. The self inductance of a coil of 400 turns is 0.25 H. If 70% of the flux is linked with a second coil of 8500 turns, calculate (a) the mutual inductance between the coils
4. The combined inductance of two coils connected in series is 0.75H and 0.25H, depending on the relative direction of current in coils. If one of the coils, when isolated, has a self-inductance of 0.15H, then calculate mutual inductance and coefficient of coupling.
5. The number of turns in a coil is 300. When a current of 1.5 A flows in this coil, the flux in the coil is 0.3 mWb. When this current is reduced to zero in 2 milliseconds, the voltage induced in a coil lying in the vicinity of coil is 60 volts. If the coefficient of coupling between the coils is 0.55. Find self inductances of the two coils, mutual inductance & no .of turns in the second coil.
6. Coils P and Q with 55 and 550 turns respectively, are wound side by side on a closed iron circuit of cross section 50 cm2 and mean length 1.25 m. Estimate (1) mutual inductance between the coils (2) self inductance of each coil and (3) emf induced in both the coils, when current in coil P grows steadily from 0 to 5 A in 0.01 sec. Take relative permeability of iron is 800.

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