GANPAT UNIVERSITY
U. V. PATEL COLLEGE OF ENGINEERING
B.TECH. SEM-I
2ES103: BASIC OF ELECTRICAL ENGINEERING
CH. 4ELECTROMAGNETIC INDUCTION
7: ASSIGNMENT &TUTORIAL

Part – I Multiple Objective Questions (MCQ)

1. The induced voltage across a stationary conductor in a stationary magnetic field is
A) zero **B)** reversed in polarity
C) increased **D)** decreased

2. The direction of electro-magnetically induced emf is determined by
A) Fleming's right hand rule **B)** Lenz's law
C) Right hand rule **D)** Both (A) and (B)

3. The self-induction of a coil N turns is proportion to
A) N **B)** N^2
C) 1/N **D)** $1/N^2$

4. A 1 H inductance carrying of 3 A will store energy of
A) 3 watts **B)** 4.5 w-s
C) 3 joules **D)** 9 watts

5. The inductance of a coil is _____the reluctance of the magnetic path.
A) Independent of **B)** Directly proportional to
C) Inversely proportional to **D)** None of the above

6. The area of hysteresis loop is a measure of
A) Magnetic flux **B)** permeance
C) mmf per cycle **D)** Energy loss per cycle

7. An emf induced in a coil due to change of current in a neighbouring coil is known as:
A) Self induced emf **B)** Speed emf
C) Mutually induced emf **D)** All of the above

8. The coefficient of coupling of two coils is proportional to
A) L_1L_2 **B)** $\sqrt{L_1L_2}$
C) $\frac{1}{\sqrt{L_1L_2}}$ **D)** $\frac{1}{L_1L_2}$

9. The maximum mutual inductance between the coils is given by
A) L_AL_B **B)** L_A/L_B
C) $\sqrt{L_AL_B}$ **D)** $(L_AL_B)^2$

10. Conductance is analogous to
A) Flux **B)** Reluctance
C) Permeance **D)** Current

Part – II Shorts Questions(1 & 2 Marks)(Only for Preparation)

1. What is meant by coefficient of coupling between the coils?
2. Define "Self inductance" and "Mutual inductance".
3. State Faraday's laws of electromagnetic induction.
4. What is Lenz's law?
5. What is difference between a statically induced emf and dynamically induced emf?

Part – III Long Examples

1. The mean periphery of the steel ring is 50 cm and the cross-sectional area is 4 cm^2. Calculate the ampere turns necessary to produce flux of 0.6 mWb. If a saw cut of 2 mm is made in the ring and if the mmf remains constant, calculate the new value of the flux. Take μ_r of steel as 1200.

   Ans: 497.36 AT, 0.1035 mWb

2. A coil is uniformly wound with 300 turns over a steel ring of relative permeability 900 and having a mean diameter of 20 cm. The steel ring is made of a bar having cross-section of diameter 2 cm. If coil has a resistance of 50 Ω and connected to 250 V dc, calculate (i) MMF (ii) Field Intensity (iii) Reluctance and (iv) Total flux.

   Ans: (i) 1500 AT (ii) 2387.3 AT/m (iii) 17.684 x 10^5 AT/Wb (iv) 0.848 mWb

3. Coils A and B with 500 and 600 turns respectively are wound side by side on a closed iron circuit of cross section 50 cm^2 and mean length of 1.2 m. Estimate (i) mutual inductance between the coils (ii) self-inductance of each coil. Assume μ_r of iron as 1000.

   Ans: (i) 0.157 H (ii) 13.1 mH, 1.88 H (iii) 78.5 V

Part – IV Long Questions(Only For Preparation)

1. Two coils are connected in series. Derive expressions for net inductance of the coils in (i) series aiding connection (ii) series opposing connection.
2. show that $K = \frac{M}{\sqrt{L_1 L_2}}$, $K \leq 1$
3. Obtain the relation $L=\frac{L_1 L_2 - M^2}{L_1 + L_2 + 2M}$ when two inductors are connected in parallel such that the mutually induced emf opposes the self induced emfs.
4. Explain self inductance and derive the methods for finding self inductance.
5. Derive the equitation of Rise in current for Inductive circuit.

***Notes: Students have to write only Part I and Part III.**