



**INDIAN SCHOOL DARSAIT
DEPARTMENT OF PHYSICS**

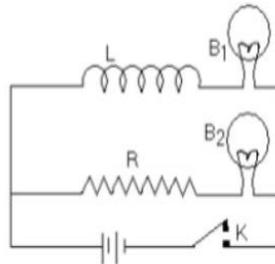


Subject: PHYSICS	CHAPTER: ELECTROMAGNETIC INDUCTION	Date of Worksheet: 14.8.18
Resource Person: SUSAN ANIL		Worksheet # 6
Name of the Student: _____	Class & Division: _____	Roll Number: ___

1. A metallic rod held horizontally along east-west direction, is allowed to fall under gravity. Will there be an induced e.m.f. at its ends? (2013) 1
2. Two identical loops, one of copper and other of constantan are removed from a magnetic field within the same interval. In which loop will the induced e.m.f. be greater? 1
3. Self-inductance of an air cored inductor increases from 0.01mH to 10mH on introducing an iron core in it. What is the relative permeability of the core used? 1
4. Define the SI unit of inductance. 1
5. When a magnet falls through a vertical coil, will its acceleration be different from 'acceleration due to gravity'? 1
6. The motion of a copper plate is damped when it is allowed to oscillate between the pole pieces of a magnet. State the cause of this damping. 1
7. A magnetic field of flux density 10T acts normal to a coil of 50 turns having 100cm² area. Find e.m.f. induced, if the coil is removed from the magnetic field in 0.1s. 2
8. A square loop of side 10cm and resistance 0.7Ω is placed vertically in the east-west plane. A uniform magnetic field of 0.1T is set up across the plane in the north-east direction. The magnetic field is decreased to zero in 0.7s at a steady rate. Determine the magnitudes of induced e.m.f. and current during this time interval. 2
9. A train is running due north with a constant speed of 90km/h on a horizontal track. If the vertical component of earth's magnetic field is 3x10⁵ Wb/m², calculate the e.m.f. induced across the axle of the train of length 1.25m. 2
10. A 0.5m long metal rod PQ completes the circuit as shown in figure. The area of the circuit is perpendicular to the magnetic field of flux density 0.15T. If the resistance of the total circuit is 5ohm, calculate the force need to move the rod in the direction as indicated with a constant speed of 2m/s. 2
11. If a rate of change of current of 4A/s is induces an e.m.f. of 20mV in a solenoid, what is the self-inductance of the solenoid? 2

12. A circuit contains two inductors in series with self-inductances L_1 and L_2 and mutual inductance M . Obtain a formula for the equivalent inductance in the circuit. 2

13. The figure shows an inductor L and a resistor R connected in parallel to a battery through a switch. The resistance of R is same as that of the coil that makes L . two identical bulbs are put in each arm of the circuit. 2



- (a) Which of the bulbs lights up earlier, when K is closed?
 (b) Will the bulbs be equally bright after sometime?

14. A wire of 40cm long, bent into rectangular loop 15cmx5cm, is placed perpendicular to the magnetic field, whose flux density is 0.08Wb/m^2 . Within 0.5s, the loop is changed into 10cm square and flux density increases to 1.4Wb/m^2 . Calculate the value of induced e.m.f. 3

15. A conducting rod of length L with one end pivoted is rotated with a uniform angular speed ω in a vertical plane normal to a uniform magnetic field B . Deduce expression for e.m.f. induced in this rod. 3

16. A circular loop of radius 0.3cm lies parallel to a much bigger circular loop of radius 20cm. The centre of the small loop is on the axis of the bigger loop. The distance between their centres is 15cm. 3

- (a) What is the flux linking the bigger loop, if a current of 2A flows through the smaller loop?
 (b) Obtain the mutual inductance of the two loops.

17. A rectangular coil of area 0.05m^2 consisting of 2000turns rotates about an axis parallel to its long side, making 2100 revolutions per minute in a field of 0.1T. What is the maximum e.m.f. induced in the coil? Also find the instantaneous e.m.f. when the coil is 30° to the field. 3

18. Two circular coils are placed coaxially with their centres coinciding. Obtain an expression for mutual inductance of the arrangement. 3