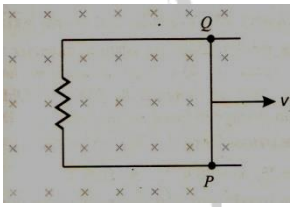
(10+2 PHYSICS-Assignment)

EMI

1) Derive an expression for mutual inductance of two long solenoid
2) Spark is produced when we switch off a fan
3) A copper rod of length L rotates with an angular speed w in a uniform magnetic field B. Find the emf developed between the two ends of the rod .The field is perpendicular to the motion of rod
3) A 0.5m 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 3 ohm. Calculate the force needed to move the rod in a direction as indicated with a constant speed of $2ms^{-1}$.



4) An aircraft with a wing span of 40 m flies with a speed of 1080 Kmh^{-1} in the eastward Direction at a constant altitude in the northern hemisphere where the vertical component of earth's magnetic field is 1.75×10^{-5} T. Find the emf induced between the tip of the wings
5) An air cored solenoid with length 30cm ,area of cross section $25cm^2$ and number of turn 500 carries a current of 2.5A. The current is suddenly switched off in a brief time of 10^{-3}s. How much the average back emf induced across the ends of the open switch in the circuit ? Ignore the variation of magnetic field near the ends of solenoid.
6) Self-induction is called the inertial of electricity. Why?`
7) *Will an induced emf developed in a conductor when moved in a direction parallel to* to the magnetic field.
8) What is the basic cause of induced emf
9) Write the dimensional formula for self- inductance and magnetic flux
10) A coil of area A is kept perpendicular in a uniform magnetic field B. If the coil is rotated by 180^0, what will be the change in magnetic flux
11) How does the mutual inductance of a pair of coils change, when (i)distance between the coils is increased and(ii)number of turns in the coils is increased? (2)

12) Two identical loops, one of copper and the other of aluminium are rotated with the same angular speed in the same magnetic field. Compare

(i)the induced emf and

(ii)the current produced in the two coils. Justify your answer.

13) State Lenz's law. Give one example to illustrate this law. The Lenz's law is a consequence of the principle of conservation of energy. Justify this statement.

14) Deduce an expression for the mutual inductance of two long coaxial solenoids but having different radii and different number of turns.

15) A metallic rod of length land resistance Ris rotated with a frequency v, with one end hinged at the centre and the other end at the circumference of a circular metallic ring of radius /, about an axis passing through the centre and perpendicular to the plane of the ring. A constant and uniform magnetic field ft parallel to the axis is present everywhere.

(a) Derive the expression for the induced emf and the current in the rod.

(b)Due to the presence of the current in the rod and of the magnetic field, find the expression for the magnitude and direction of the force acting on this rod.(c)Hence, obtain the expression for the power required to rotate the rod.

16) A wheel with 10 metallic spokes each 0.5m long is rotated with a speed of 120rev/min in a place normal to horizontal component of earth's magnetic field B_H at a place. If B_H =0.4G at the place what is the induced emf between the axle and rim of the wheel.

17) Calculate the mutual inductance between the two coils if the current 10A in the primary coil changes the flux by 500 Wb per turn in the secondary soil of 200 turns, Also determines the induced emf across the ends of the secondary coil in 0.5s

18) If the current in the primary circuit of a pair of coils changes from 10A to 0 in 0.1s, Calculate the induced emf in the secondary if the mutual inductance between the coils is 2H and the change of flux per turn in the secondary if it has 500 turns

19) A square loop of side 10 cm and resistance of 0.70 ohm is placed vertically in the east west plane. A uniform magnetic field of 0.10T is set up across the plane in the north east direction. The magnetic field is decreased to zero in 0.70s at a steady rate. Determines the magnitudes of induced emf and during this time interval

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