

SIR CV RAMAN COACHING CENTRE IDAPPADI,SALEM 637101**XII- PHYSICS UNIT -4- PROBLEM QUESTIONS -2024****TOTAL MARK 35 M**

Date : 21.05.2024

Answer any seven questions (7 x 5 = 35 m)

1.A circular antenna of area 3 m^2 is installed at a place in Madurai. The plane of the area of antenna is inclined at 47° with the direction of Earth's magnetic field. If the magnitude of Earth's field at that place is $4.1 \times 10^{-5} \text{ T}$ find the magnetic flux linked with the antenna.

2 .A circular loop of area $5 \times 10^{-2} \text{ m}^2$ rotates in a uniform magnetic field of 0.2T . If the loop rotates about its diameter which is perpendicular to the magnetic field as shown in figure. Find the magnetic flux linked with the loop when its plane is (i) normal to the field (ii) inclined 60° to the field and (iii) parallel to the field.

3.A closed coil of 40 turns and of area 200 cm^2 , is rotated in a magnetic field of flux density 2 Wb m^{-2} . It rotates from a position where its plane makes an angle of 30° with the field to a position perpendicular to the field in a time 0.2 s . Find the magnitude of the emf induced in the coil due to its rotation.

4.The self-inductance of an air-core solenoid is 4.8 mH . If its core is replaced by iron core, then its self-inductance becomes 1.8 H . Find out the relative permeability of iron

5.A rectangular coil of area 70 cm^2 having 600 turns rotates about an axis perpendicular to a magnetic field of 0.4 Wb m^{-2} . If the coil completes 500 revolutions in a minute, calculate the instantaneous emf when the plane of the coil is (i) perpendicular to the field (ii) parallel to the field and (iii) inclined at 60° with the field.

6.An ideal transformer has 460 and 40,000 turns in the primary and secondary coils respectively. Find the voltage developed per turn of the secondary if the transformer is connected to a 230 V AC mains. The secondary is given to a load of resistance 104Ω . Calculate the power delivered to the load.

7.An inverter is common electrical device which we use in our homes. When there is no power in our house, inverter gives AC power to run a few electronic appliances like fan or light. An inverter has inbuilt step-up transformer which converts 12 V AC to 240 V AC . The primary coil has 100 turns and the inverter delivers 50 mA to the external circuit. Find the number of turns in the secondary and the primary current.

8. An electric power of 2 MW is transmitted to a place through transmission lines of total resistance $R = 40 \Omega$, at two different voltages. One is lower voltage (10 kV) and the other is higher (100 kV). Let us now calculate and compare power losses in these two cases.

9. A square coil of side 30 cm with 500 turns is kept in a uniform magnetic field of 0.4 T. The plane of the coil is inclined at an angle of 30° to the field. Calculate the magnetic flux through the coil.

10. An induced current of 2.5 mA flows through a single conductor of resistance 100Ω . Find out the rate at which the magnetic flux is cut by the conductor.

Prepared by

Dr .G.THIRUMOORTHY, M,SC,B.ED ,PH.D (PHYSICS)

GOVT ARTS COLLEGE SALEM -7

THIRUPHYSICS1994@GMAIL.COM

8610560810,,,