

# neway challenge academy no.1

2019/20 Academic Year

Second Semester

Worksheet - II



Name: \_\_\_\_\_ Grade **12** Section: \_ \_ R.No: \_ \_  
Date: \_\_\_\_\_ Value % Subject: **Physics**

## **I. Answer the following questions.**

1. A proton enters a magnetic field of 4T intensity with a velocity of  $2.5 \times 10^6 \text{ m/s}$  at an angle of  $30^\circ$  with the field find the magnitude of the force on the proton.
2. A 5MeV proton moves vertically downward through a magnetic field of  $1.5 \text{ weber/m}^2$  pointing horizontally from south to north. Calculate the direction of force acting on the proton.
3. Find the flux density of the magnetic field to cause 62.5eV electron to move in a circular path of radius 5cm.
4. An electron beam is deflected by 1.76mm in travelling a distance of 10cm through an electric field of 1800V/m acting perpendicular to its path. Find the electron charge to mass ratio, if average velocity of the electrons is  $3 \times 10^7 \text{ m/s}$ .
5. An electron is moving at  $10^6 \text{ m/s}$  in a direction parallel to a current of 5A, flowing through an infinitely long straight wire, separated by a perpendicular distance of 10cm in air. Calculate the magnitude of the force experienced by the electron.
6. The wires which connect the battery of an automobile to its starting motor carry a current of 300A (for a short time). What is the force per unit length between the wires, if they are 70cm long and 1.5cm apart? Is the force attractive or repulsive?
7. Given a uniform magnetic field at 100G in an east to west direction and a 44cm long wire with a current carrying capacity of at most 10A. what is the shape and orientation of the loop made of this wire, which yields maximum turning effect on the loop? What is the magnitude of the maximum torque?
8. Two long straight conductors are placed parallel at a distance of 2cm from each other. When one of them carries a current of 60A, the force on 1m length of the other is 1200N. Calculate current in the other.
9. Two straight wires A and B of lengths 10m and 12m carrying current of 4A and 6A respectively in opposite directions lie parallel to each other at a distance of 4cm. Estimate the force on a 10cm section of the wire B near its centre.
10. What torque acts on a 40 turn coil of  $100 \text{ cm}^2$  area carrying a current of 10 ampere held with its axis at right angle to magnetic field of flux density 0.2tesla and plane of the coil parallel to the field?
11. The magnetic flux through a coil perpendicular to its plane is varying according to the relation  $\Phi = (4t^3 + 5t^2 + 8t + 5)$  weber. Calculate the induced current through the coil at  $t = 2 \text{ sec}$ , if the resistance of the coil is  $3.1\Omega$ .

12. Find the magnitude of emf induced in a 200 turn coil with cross-sectional area of  $0.16\text{m}^2$ , if the magnetic field through the coil changes from  $0.1\text{Wb/m}^2$  to  $0.3\text{Wb/m}^2$  at a uniform rate over a period of  $0.05\text{sec}$ .
13. Magnetic flux of  $5\mu\text{Wb}$  is linked with a coil, when a current of  $1\text{mA}$  flows through it. What is the self inductance of the coil?
14. A coil has an inductance of  $1.5 \times 10^{-2}\text{H}$ . calculate the emf induced, when current in the coil changes at the rate 200 ampere per second.
15. A coil has a self inductance of  $10\text{mH}$ . What is the maximum magnitude of the induced emf in the inductor, when a current  $I = 0.1\sin 200t$  ampere is sent through it?
16. A coil has inductance of 5 Henry and resistance  $20\Omega$ . An emf of  $100\text{Volt}$  is applied to it. What is the energy stored in the magnetic field, when the current has reached its final steady value?
17. What is the mutual inductance of a pair of coils, if a current of 3 ampere in one coil causes the flux in the second coil of 1000 turns to change by  $10^{-4}\text{Wb}$  in each turn?
18. A coil of wire of certain radius has 600 turns and a self inductance of  $108\text{mH}$ . What will be the self inductance of a similar coil, which has 500 turns?
19. A capacitor, a  $5\Omega$  resistor and  $101.5\text{mH}$  inductor are placed in series with a  $50\text{HZ}$  a.c source. Calculate the capacitance of the capacitor, if the current is observed in phase with the voltage.
20. A circuit consists of a non-inductive resistance of  $50\Omega$ , an inductance of  $0.3\text{Henry}$  and a capacitor of  $40\text{microfarad}$  in series and supplied with a current of  $200\text{Volt}$   
50 hertz. Find the impedance and power in the circuit.