MAGNETISM

10.	Draw a schematic sketch of a cyclotron. [Delhi 2008, 2011C, 2012, All India 2013,2014]
11.	Draw a labelled diagram of a moving coil galvanometer. [Foreign 2012, All India 2014]
12.	Sketch the magnetic field lines for a finite solenoid.
	[Foreign 2010]
13.	Draw magnetic field lines when a (i) diamagnetic, (ii) paramagnetic substance is placed in an external magnetic field.
14.	Draw the magnetic field lines due to a current carrying loop. [Foreign 2010, Delhi 2013C]
15.	The current flowing through an inductor of self inductance L is continuously increasing. Plot a graph showing the variation of (i) Magnetic flux versus the current (ii) Induced emf versus dI/dt (iii)Magnetic potential energy stored versus the current. [Delhi 2014]
16.	Draw the magnetic field lines due to a circular wire carrying current <i>I</i> . [All India 2016]

SOLUTIONS

10. Schematic sketch of a Cyclotron.



11. Moving coil Galvanometer.



12. Magnetic field lines due to a finite solenoid has been shown below.



13. (i) Behavior of magnetic field lines when diamagnetic substance is placed in an external field.



(ii) Behavior of magnetic field lines when paramagnetic substance is placed in a external field.



14. Magnetic lines of force due to current carrying coil have been shown in the diagram given below.



15. (i) Since ϕ =LI

where, *I* = Strength of current through the coil at any time

 φ = Amount of magnetic flux linked with all turns of the coil at the time

and, L= Constant of proportionality called coefficient of self induction



(ii) Induced emf,

$$e = -\frac{d\phi}{dt} = -\frac{d}{dt} (LI)$$

i.e.,
$$e = -L \frac{dI}{dt}$$

[drawn considering only magnitude of *e*]



(iii) Since magnetic potential energy is given by,



16.

