



19. Two coaxial solenoids of different radii carry current I in the same direction. Let \vec{F}_1 be the magnetic force on the inner solenoid due to the outer one and \vec{F}_2 be the magnetic force on the outer solenoid due to the inner one. Then:

- (1) $\vec{F}_1 = \vec{F}_2 = 0$ (2) \vec{F}_1 is radially inwards and \vec{F}_2 is radially outwards
 (3) \vec{F}_1 is radially inwards and $\vec{F}_2 = 0$ (4) \vec{F}_1 is radially outwards and $\vec{F}_2 = 0$

Answer:

Current flowing through the solenoids will create magnetic field along its axis, the force on the inner coil carrying current is cross product of current through it (for understanding let's take one turn) and magnetic field produced due to outer solenoid, hence it is ZERO also for inner solenoid outer solenoid is outside the magnetic field hence force is also zero. [Note: refer selfstudy.in \rightarrow Solenoidal conductor, here magnetic field due to solenoid carrying current derived. A current carrying solenoid is equivalent to a bar magnet which can be pictorially presented by drawing lines of force around it.]

Correct option is (1) $\vec{F}_1 = \vec{F}_2 = 0$