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Expt. No. \_\_\_\_\_

B.Sc. Part II

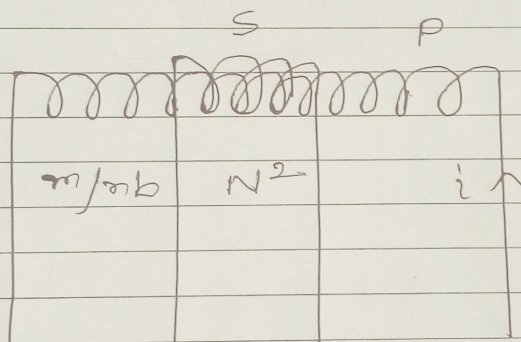
Physics Hours

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Dr. Shiva Kant Mishra  
Dept of Physics HDJL  
Course of Electricity.

### Mutual Inductance Between two Co-axial Solenoids :-

Let a long air Cored Solenoid as Primary coil of area of cross-section  $A \text{ m}^2$  and having  $n_1$  turns per metre length of the solenoid. A short 2nd solenoid. As secondary coil  $S$  of  $N_2$  turns is wound closely over the central portion of the primary  $P$  as shown in figure.



Let a current of  $i$  ampere be flowing in the primary.

Then the magnetic field inside the primary is

$$B = \mu_0 n_1 i \text{ (A/m)}$$

Teacher's Signature \_\_\_\_\_

$\therefore$  Magnetic flux Through each turn of the primary  
 $\phi_B = BA = \mu_0 n P i A$  Weber

Since the secondary is wound closely over the central portion of the primary, the same flux is also linked with each turn of the secondary.

$$N_s \phi_B = \mu_0 n P N_s^2 A \text{ Weber turns.}$$

By definition the Mutual inductance of the two coils is given by

$$M = \frac{N_s \phi_B}{i} = \mu_0 n P N_s A.$$

henry.