Ans:

Most of the velocity transducers work on the principle of electromagnetic induction to measure the velocity. Based upon this principle, the velocity transducers for measuring the linear velocity can be classified as follows,

1. Electromagnetic velocity transducer
2. Seismic type velocity transducer.

1. Electromagnetic Velocity Transducer

The electromagnetic transducers can be classified into the following, based upon the way of applying the principle of electromagnetic induction.

(a) Moving coil type/Electrodynamic transducer

(b) Moving magnet type

(c) Proximity type velocity transducer.

Electromagnetic transducer works on the principle that a voltage is produced in the coil due to change of flux linkages resulting from change in reluctance. As the rate of change of flux is directly proportional to the rate of change of reluctance, the voltage generated is directly proportional to the rate of change of reluctance i.e., as

$$\frac{d\phi}{dt} \propto \frac{dR}{dt} \Rightarrow e_o \propto \frac{dR}{dt}$$

Where, ϕ = Flux

R = Reluctance

e_o = Output voltage

As reluctance is a function of length of air-gap, the voltage e_o is directly proportional to the rate of change of air gap (i.e., velocity).

(a) Electrodynamic "Moving Coil Type" Velocity Transducer

In this type of transducer, the magnet is fixed and the coil moves in the magnetic field, thereby resulting in the generation of voltage in the coil according to electromagnetic induction principle.

The electrodynamic transducer consists of a fixed permanent magnet having an annular space between the poles. The coil is wound on a hollow cylinder. The hollow cylinder made up of a nonmagnetic material, is attached to the object whose velocity is to be measured. When the object moves the coil cylinder moves in the annular space of the fixed magnet and a voltage is generated in the coil due to the change of flux. Therefore, the voltage generated is proportional to the velocity of the object.

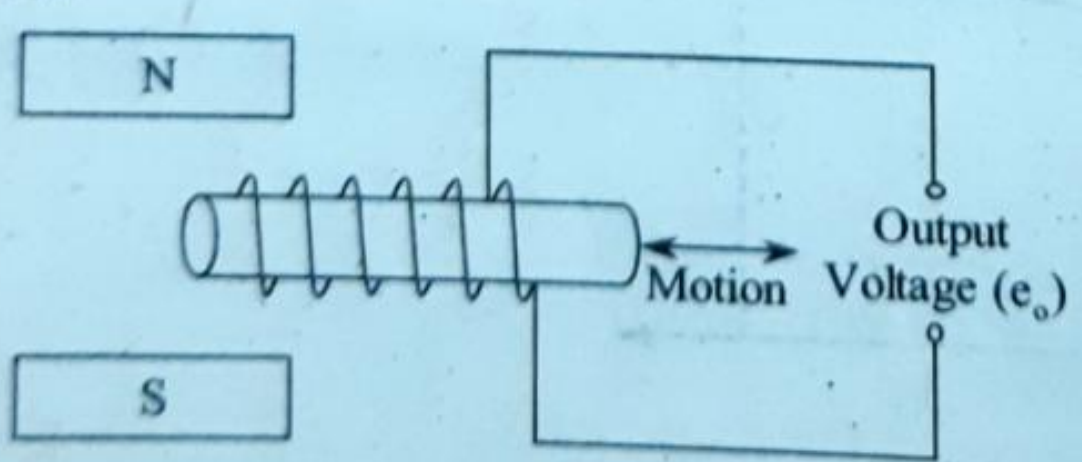

Figure: Electrodynamic Velocity Transducer