142103012

SA Assignment - 2

1] Explain construction, working principle with waveform of LVDT and application

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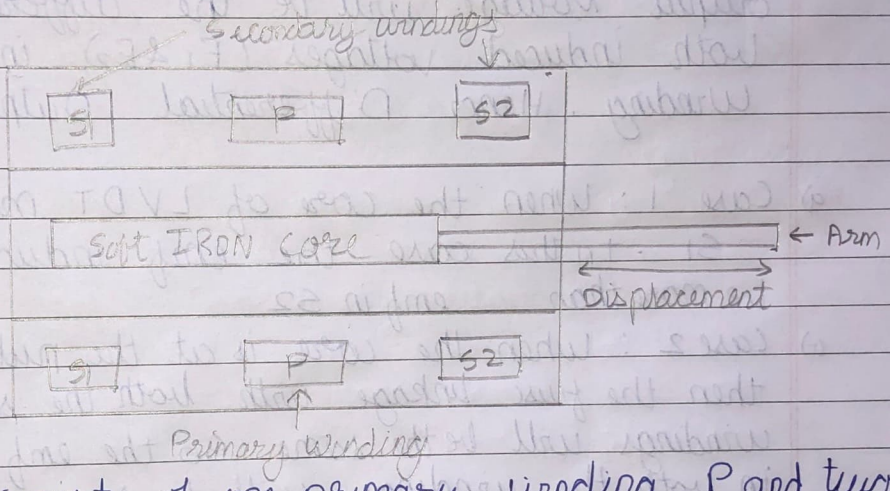

LVDT consist of one primary winding P and two secondary winding S1 & S2 mounted on a cylindrical former. Both the secondary windings (S1 & S2) has an equal number of turns and is placed identically on either side of the primary windings in such a way that the net output will be the difference of the voltage of both secondary windings. There is a movable soft iron core placed inside the former

- Working principle

The working principle is based on mutual induction principle. When AC excitation of 5-15V at a freq of 50 - 400 Hz is applied to the primary winding, then a magnetic field is produced. This magnetic field induces a mutual current in secondary windings

Due to this, the induced voltages in secondary windings (S1 & S2) are E1 & E2 respectively. Since, Both the secondary windings are connected in series opposition, so the net output voltage will be the difference of both induced voltages (E_1 & E_2) in secondary Winding. Hence Differential Output of LVDT

a) Case 1: When the core of LVDT moves towards S1. In this case the emf induced in S1 will be more than emf in S2
b) Case 2: When the core is at the null position then the flux linkage with both the secondary windings will be the same. So the emf induced in both the windings will be same.
c) Case 3: When the core of LVDT moves towards S2. In this case the emf induced in S2 will be more than the induced emf in S1.

Application of LVDT

1) Used to measure the physical quantities such as force, Tension, Pressure, weight etc.
2) Mostly used in industries as well as a servomechanism.
3) It is also used in Industrial Automation Aircraft, Turbine, Satellite, hydraulics etc.

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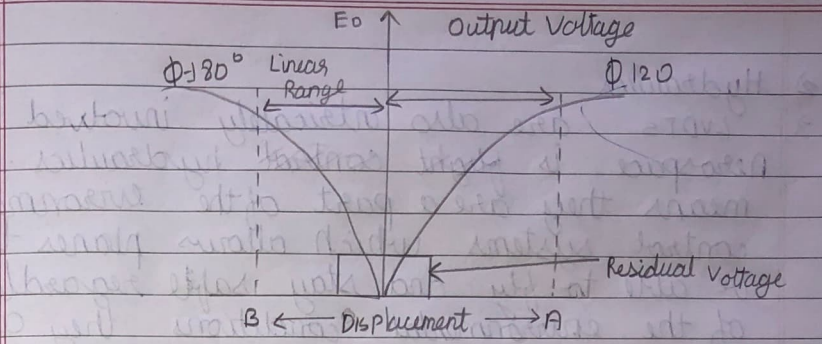

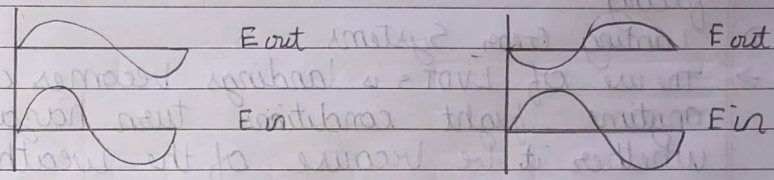

when closer to S1 | when closer to S2

Q2) How LVDT is used in Aerospace explain in details with selection criteria of LVDT?

⇒ Linear Variable Differential Transformers have a wide variety of uses and application. This is because they are versatile, reliable, rugged and robust, among other reasons. LVDT are also highly preffered because they are cost-effective and low maintenance

1) Flight control

⇒ One of the top applications of LVDTs in Aerospace is flight control. In particular, they are used on ailerons, elevators, rudders spoilers, landing gear, and flappers. Flight control actuators are also a part of engine.

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2) Hydraulics

→ LVDTs are also intricately involved in Aerospace is flight control hydraulics. This means they are a part of the environmental control systems which allows planes to be able to fly and stay safe regardless of the environmental conditions they are facing

3) Landing Gear Systems

→ The use of LVDTs in landings becomes critical anytime flight conditions turn hazardous whether it be because of the weather or something going wrong with the aircraft.

- LVDT are reliable. Once installed rest maintenance and downtown will be reduced

The factors to consider are

Nominal Linear Range
Linearity error
Full Scale output
Resolution
Repeatability

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Q3) Design LVDT as secondary transducer with any application

→ To design and test a new, simple, and reusable linear variable differential transformer based in situ bolt preload monitoring system (L-PMS) during fastening of a truck wheel assembly