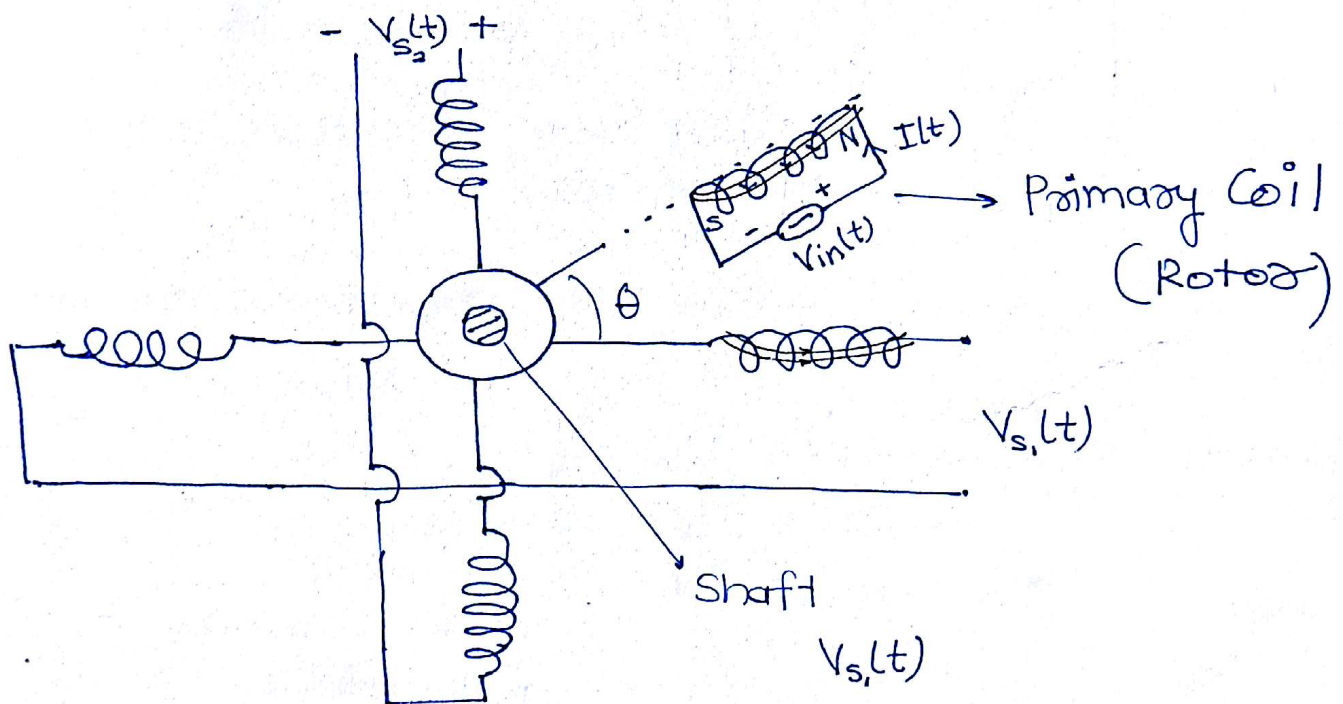


Resolver:- Resolver is an electrical instrument which is used to measure angular position (θ) of the shaft.

Resolver works on the principle of electromagnetic induction.

The resolution of the resolver is much better than optical encoder, but the only problem is we will get analog output.

Resolver consists of primary coil (Rotor), two secondary coils (Stator) as shown below.

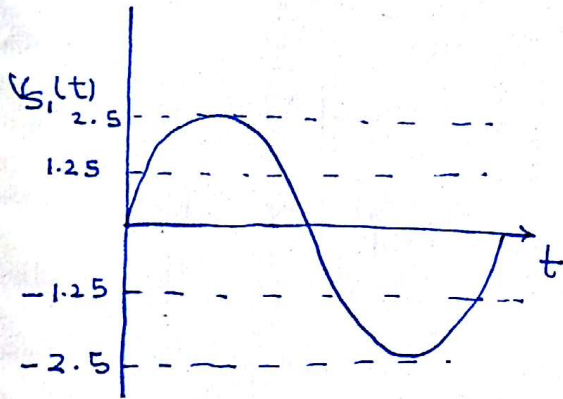


Resolver resolves the input voltage applied to primary coil into two components based on the angular position of shaft

$$V_{s1}(t) = K V_{in}(t) \cos \theta$$

$$V_{s2}(t) = K V_{in}(t) \sin \theta$$

Ques A resolver which has a primary coil as rotor generates induced voltages in the stator bindings based on the angular position of shaft. the ~~can~~ cosine output of the resolver is displayed on C.R.O as shown in fig. If transformation Ratio $k = 0.5$ and input voltage applied to the primary coil is $V_{in}(t) = 10 \sin 2t$ then the angular position (θ) of shaft is $\theta = ?$



$$k = 0.5$$

$$V_{in}(t) = 10 \sin 2t$$

$$V_{s_i}(t) = k V_{in}(t) \cos \theta$$

$$V_{s_i}(t) = 0.5 \times 10 \sin 2t \cos \theta$$

$$V_{s_i}(t) = 5 \sin 2t \cos \theta$$

$$V_{s_i}(t) = \underbrace{5 \cos \theta}_{\text{Amplitude}} \cdot \sin 2t$$

$$\text{Amplitude Give} = 2.5 = 5 \cos \theta$$

$$\cos \theta = \frac{1}{2}$$

$$\theta = 60^\circ$$

Que IF the cosine wave amplitude becomes 2.5 volt, 5 times in 1 sec. then the shaft speed in rpm is ?

$$V_s(t) = k V_{in}(t) \cos \theta$$

$$V_s(t) = 0.5 \times 10 \cos 60 \sin 2t$$

$$V_s(t) = 2.5 \sin 2t$$

$$\theta = 60^\circ$$

$$1 \text{ sec} \rightarrow 5 \text{ Rev}$$

$$60 \text{ sec.} \rightarrow 300 \text{ rev}$$

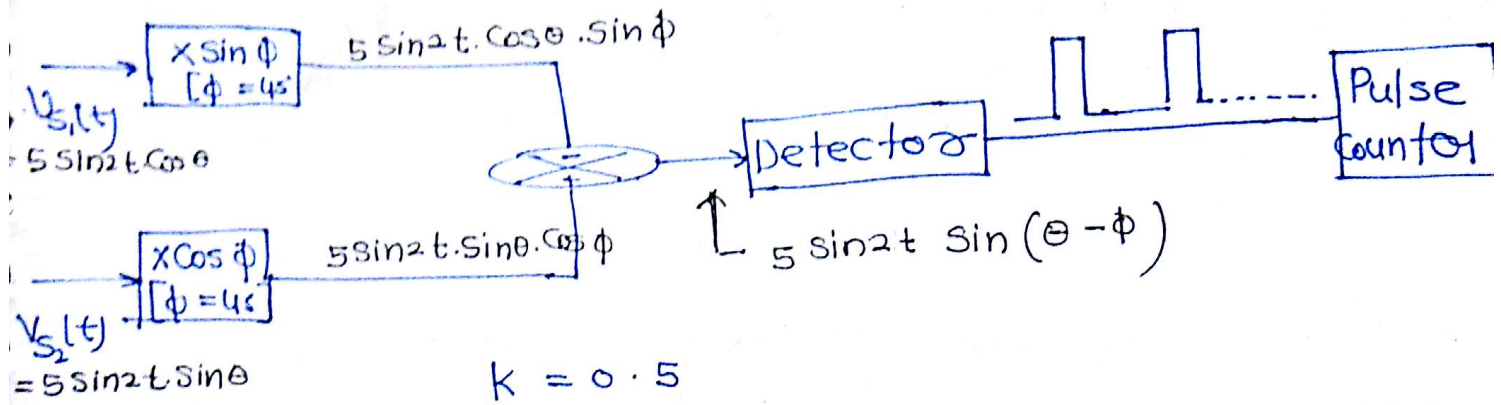
(1 min)

$$\text{shaft speed} = 300 \text{ rpm}$$

5 times in 1 sec. means it getting 60° , in 5 times in 1 sec.

Que:- A Resolver, which is used to measure the angular position θ and shaft speed generates two components of output which are processed as shown below. Given that the transformation ratio $k = 0.5$ and supply voltage to primary coil is $V_{in}(t) = 10 \sin 2t$ detector is a electronic device which generates a pulse when the input to detector becomes zero

(1) Find the angular position of shaft if the Detector Generates a pulse.

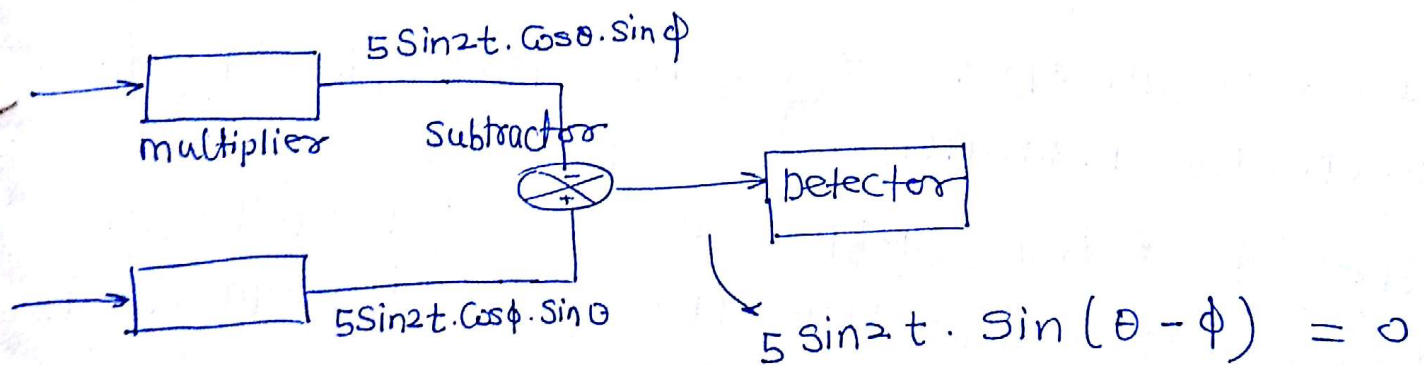


Solⁿ

$$V_{s1}(t) = k V_{in}(t) \cos \theta$$

$$V_{s1}(t) = 5 \sin 2t \cdot \cos \theta$$

$$V_{s2}(t) = 5 \sin 2t \cdot \sin \theta$$



$$\sin(\theta - \phi) = 0$$

$$\theta = \phi$$

$$\theta = 45^\circ$$

(ii) If pulse Counter shows a display of 10 _{pulse} in 1 sec.
then the shaft speed is

$$10 \text{ pulse} \rightarrow 1 \text{ sec.}$$

$$10 \text{ Rev} \rightarrow 10 \text{ pulse} \rightarrow 1 \text{ sec.}$$

$$10 \text{ rev} \leftarrow 1 \text{ sec.}$$

$$600 \text{ rev} \leftarrow 60 \text{ sec.}$$

shaft speed is 600rpm.