142103005 Sensors and Automation Pallavi Gaikwad
DIV: 2 (S.Y)

Assignment No: 3

Q1. Design Capactive type level sensor for water measurement with detailing of size of electrodes and size of tank and explain factors that affect capacitive value. Elaborate level to current converter for the same.

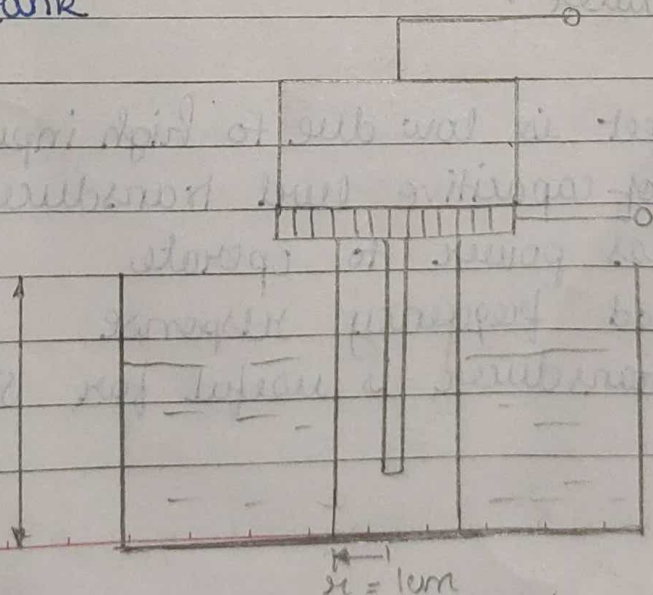
Answer State of rank = 500
Radius = 1cm

$$C = \frac{AE_0K}{d}$$

Capacitance value depends on dielectric used and of plate & distance between them.

- Level to current converted:

1. Level in rank change, capacitance of dielectric formal below electrode & tank wall changes.
2. Values of capacitance depends on temperature of other factors → material of a) wall b) electrode
3. Output current gives measure of level of water in the tank



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Q2. Explain various transducers used for direct measurement of level. Explain one transducer in detail.

Answer Ultrasonic level technology / transducer
Float element hyle-level transducer
Capacitive level transducer
Pressure level transducer
resistive level transducer

- **Ultrasonic level Transducer**

1. Works by the time of flight presume its a method for measuring the distance between liquid & object.
2. It emits ultrasonic pulse beam towards the liquid. Pulse is neglected back to ultrasonic receiver pulse by the liquid pulse
3. The time difference between transmission & received pulse is measured and calibrated to distance.

Q3. State advantages and disadvantages of Capacitive level Transducer.

Answer: **Advantages:**

1. Loading effect is low due to high input impedence.
2. Resistivity of capacitive level transducer is high
3. Requries less power to operate
4. It has good frequency response
5. Capacitive transducer is useful for small system

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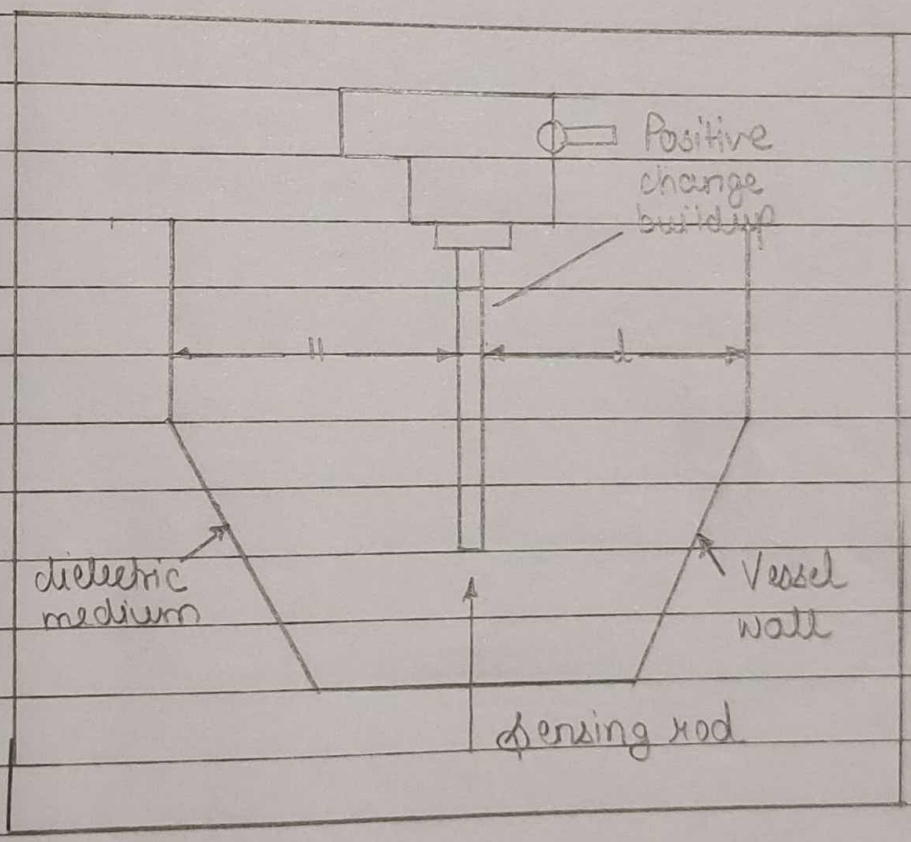
- **Disadvantages:**

1. Prone to errors due to dust particles
2. Output impedance depends upon frequency used
3. Temperature dependent capacitive level transducer
4. Non linear Behaviour.

Q4. RF source is used with capacitive level transducer. why?

Answer Capacitance is formed between the level receiving probe & metallic wall of the level which as 2 electrodes & application media acts as acts dielectric when sensor is introduced into the verve these electrodes are seperated by insulator by suitable mestra. Dielectric is main factor in capacitance principle.

- **Diagram:**



$$C = \frac{\varepsilon dA}{d}$$