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## B. E. (Fourth Semester) Examination, April-May, 2008

(ECE & T Engg. Branch)

## INDUSTRIAL TRANSDUCERS & SENSORS

*Time Allowed : Three hours*

*Maximum Marks : 80*

*Minimum Pass Marks : 28*

*Note : 2 marks questions are compulsory & attempt any two questions from remaining part.*

### Unit-I

1. (a) Define 'passive' and 'active' transducer & give an example of each. 2

(b) Describe the different criteria for selection of transducers for a particular applications. 7

(c) Describe the construction and working of Dry type Anemometer. Give their advantages and limitations also. 7

(d) A strain gauge with gauge factor of 2 is fastened to a metallic member, subjected to a stress of 1,000 kg/cm². The modulus of elasticity of the metal is $2 \times 10^6$ kg/cm². Calculate the percentage change in resistance of the strain gauge. What is the value of poisson ratio (η). 7

## Unit-II

2. (a) Explain how does an RVDT different from an LVDT? 2

(b) Draw neat sketch & describe the construction of a capacitive transducer for measurement of liquid level. 7

(c) Describe an inductive transducer suitable for the measurement of linear displacement. 7

(d) A capacitive transducer uses two quartz diaphragms of area 600 mm² separated by distance of 2·5 mm. A pressure of $8 \times 10^5$ N/m², When applied to the top diaphragm, causes a deflection of 0·5 mm. The capacitance is $400 \times 10^{-12}$ F when no pressure is





applied to the diaphragms. Determine the value of capacitance after the application of a pressure of $8 \times 10^5$ N/m². 7

## Unit-III

3. (a) Explain magnetostrictive phenomenon. 2

(b) Describe the properties of material used for piezoelectric transducer. Derive expression for voltage and charge sensitivities. 7

(c) Describe the construction, principle of working & applications of Hall-effect transducer. 7

(d) Describe the constructional features of a magnetostrictive transducer and explain how force can be measured by applying magnetostriction phenomenon. 7

## Unit-IV

4. (a) Explain Photoelectric effect. 2

(b) Explain the principle of operation of a electromagnetic flow meter & suggest the nature of fluids that can be used with the system. 7

(c) Explain the principle of working & constructional details of photoemissive cell. 7

(d) Show how variable reluctance transducer can be used to measure :

(i) linear & (ii) angular velocity over short ranges of motion. 7

## Unit-V

5. (a) Explain why are digital transducer preferred over angular transducer. 2

(b) What is pH value? Describe the working of pH meter. 7

(c) Define digital transducer and explain its application for measurement of angular displacement. 7

(d) Describe the ionization vaccume gauge. 7