

Reg. No. \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2017

Course Code: **AE 204**Course Name: **SENSORS AND TRANSDUCERS (AE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any two questions. Each question carries 15 marks.*

1. a. Distinguish between sensor and transducer with suitable examples. (5)  
b. List the criteria for selection of transducers for a particular application. (5)  
c. With schematic explain a bonded foil strain gauge. (5)
2. a. Illustrate the classification of transducers based on transduction principle, with example for each transduction. (7)  
b. With schematic diagram explain a capacitive transducer for
  - (i) measurement of angular displacement.
  - (ii) measurement of distance. (8)
3. a. What is the difference between primary transducer and secondary transducer? Explain how the same transducer can be used as primary and secondary transducer in measurements. (5)  
b. Derive expression for gauge factor. (5)  
c. A capacitive transducer uses two quartz diaphragms of area  $800 \text{ mm}^2$  separated by a distance of 4mm. A pressure of  $950 \text{ kN/m}^2$  when applied to top diaphragm produces a deflection of 0.5 mm. The capacitance is 350 pF when no pressure is applied to the diaphragm. Find the value of capacitance after the application of pressure. (5)

**PART B**

*Answer any two questions. Each question carries 15 marks.*

4. a. Describe the working of a hydraulic load cell. (5)  
b. With schematic explain any two methods of level measurement. (10)
5. a. Explain the working of a U-tube manometer. (5)  
b. Differentiate between sound pressure level and sound power level. (4)  
c. With block diagram, explain a typical sound level meter. (6)
6. a. With schematic explain measurement of torque using
  - (i) strain gauge torque transducer
  - (ii) torsion bar (8)

- b. What is the function of dead weight calibrator? Explain its working with the help of a diagram. (7)

**PART C**

*Answer any two questions. Each question carries 20 marks.*

7. a. State Bernouli's principle. (5)  
b. With schematic explain turbine flow meter. (5)  
c. Explain the principle of operation of  
(i) fiber optic sensor (ii) accelerometer (10)
8. a. Explain the working of rotameter for flow measurement and derive expression for fluid flow rate. (10)  
b. What are digital transducers? With schematic explain a digital displacement transducer. (10)
9. a. With schematic diagram explain hot wire anemometer. (10)  
b. Define piezoelectric effect. Explain the working of a piezoelectric transducer for pressure measurement. (10)

\*\*\*