

APJ Abdul Kalam Technological University  
Ernakulam II Cluster  
Second Semester M. Tech Degree Examination May 2017  
**05EC 6004-SENSOR TECHNOLOGIES AND MEMS**

Time: 3 hrs

Max. Marks: 60

1. a) What are the criteria for the selection of transducers for the measurement of temperature greater than 2000<sup>0</sup>C. (6 Marks)
- b) Design a temperature measurement system to measure the temperature of room and control the fan using thermistor. (6 Marks)
2. a) With the basic principle of operation and applications, explain the following transducers.
  - i. Capacitive Transducers
  - ii. Inductive Transducers (4 marks)
- b) Design a fully automated embedded system to measure the thickness of a glass sheet. Define the features of the system. Design the block schematic, circuit diagram and other design aspects. (8 Marks)
3. a) What is the basic principle of Hall effect sensors. Give a typical application. (6 Marks)
- b) Expound the Piezoelectric phenomena and design a system to measure the force developed in a cantilever (12 Marks)

**OR**

4. a) Based on the principle of operation, construction, theory, advantages and disadvantages and applications, explain the following transducers.
  - i. Optical encoder
  - ii. Magneto-strictive transducer (6 Marks)
- b) What are smart sensors? Draw the block schematics of a smart sensor. How is it different from an ordinary sensors? (12 Marks)

5. a) Evaluate the method of R-2R digital to analog conversion. (6 Marks)

b) By what method shielding and grounding will affect the signal acquisition and explain the different methods of shielding. (12 Marks)

**OR**

6. a) Design an ac bridge signal processing circuit to measure the variations produced in an inductive transducer. What are the design conditions? (9 Marks)

b) With merits and demerits of the instrumentation amplifier, design an amplifier to amplify the signal from an active transducer. (9 Marks)