APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code : IRA0819341-I   (Pages: 2)   Name: ....

Reg. No : ....

FIRST SEMESTER M.TECH. DEGREE EXAMINATION December 2019

Branch: Mechanical Engineering   **Specialization: Industrial Automation and Robotics**

08ME6341 MEASUREMENTS AND SENSORS FOR AUTOMATION

Time: 3 Hours   Max. Marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks

1. a What are the desirable characteristics of a transducer element?   **3**

Answer b or c

b Explain the functional elements of a generalized measurement system with a neat sketch.   **6**

c How are standards of measurements classified? Briefly explain them.   **6**

Q. No.	Module 2	Marks

2. a What do you mean by calibration? State the various types of calibration procedures.   **3**

Answer b or c

b Obtain the dynamic response of a first order measuring instrument for a harmonic input. What is break-point frequency?   **6**

c Deduce system equation from first principles for seismic motion transducer.   **6**

Q. No.	Module 3	Marks

3. a What is the advantage of using Gray codes over binary code in Code disks? How are these related?   **3**

Answer b or c

b With a neat sketch, explain the working principle and measuring arrangement of eddy current prioximity sensor.   **6**

c Explain the principle of ultrasonic displacement measurement with a neat sketch. What are the limiting factors in the measurements?   **6**

Q. No.	Module 4	Marks

4. a With a neat sketch, explain the working principle of piezoelectric accelerometer.   **3**

Answer b or c

b   Explain the construction, working and signal conditioning circuits of resistance thermometers with temperature compensation.   **6**

c   Explain the principle of working of NMR thermometer.   **6**

Q. No.	Module 5	Marks
5. a	What are electroceramics? State its application for sensors.	**4**

Answer b or c

b   Explain the working principle of magnetostrictive sensors with neat sketches.   **8**

c   Discuss the working principle of inductive proximity sensors.   **8**

Q. No.	Module 6	Marks
6. a	What is an optocoupler? Explain its function with a neat sketch.	**4**

Answer b or c

b   Discuss how Maxwell bridge is used to measure unknown inductance   **8**

c   What are smart sensors? What are the basic requirements for a smart sensor and state its advantages.   **8**