

GUJARAT TECHNOLOGICAL UNIVERSITY**ME- SEMESTER II- EXAMINATION – SUMMER 2015****Subject Code: 2724114****Date: 30/05/2015****Subject Name: Sensor Signal Processing****Time: 2:30 PM – 5:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is a proximity sensor ? How does it work ? Draw its characteristics. **07**
(b) List three semiconductor integrated temperature sensors. Which sensor exhibit the nonlinear behavior? How can this nonlinear behavior be linearized ? Give one application of such sensor. **07**

- Q.2** (a) How does touch based sensor operates? What is the sensitivity of such sensor ? What are typical applications for such sensors ? **07**
(b) There is need to measure the vibration of a small handy device. Which sensor can be used for the same ? What kind of signal conditioning circuit is needed for the same ? Draw the circuit. **07**

OR

- (b) What is an accelerometer? How does it work ? Show its signal processing circuit with one application for positional information system. **07**
- Q.3** (a) Why do one need to have filter for interfacing with sensor signals ? Explain one illustrative example of high pass filter and low pass filter which can be connected at the output of the sensor. **07**
(b) There is a need to count number of time a touch sense screen is checked using touch sensor. What kind of the output is expected from the sensor ? How can it be counted using any of the controller ? Write the sample code for the same. **07**

OR

- Q.3** (a) What is a mixed mode controller ? How can it be used for the processing of signal from the temperature sensor like thermistor and shaft encoder ? **07**
(b) What is a moisture content sensor and humidity sensor? How can it be embedded on the device ? **07**
- Q.4** (a) In case of requirement of using integrator and differentiator for signal processing, how would you realize them using analog circuits ? It should be perfect integrator and differentiator. **07**
(b) Show the digital realization of integrator and differentiator using controller that you know. **07**

OR

- Q.4** (a) Show the design of PWM circuits. How can it be used to process the sensor signal obtained from the output of the shaft ? **07**
(b) What is the need of the schmitt trigger circuit ? Show the circuit with one application. **07**
- Q.5** (a) What is a level shifter circuit ? Which kind of sensors output needs level shifter ? Give one application of such circuit. **07**
(b) What is microphone based array system ? How can it be used for sensing speech signal ? **07**

OR

- Q.5** (a) How can motion sensor be useful for detecting motion of a mobile device or an object ? Draw the circuit diagram for the same. **07**

- (b)** What is the difference between displacement sensor and positional sensor ? **07**
How can they be configured for processing using analog and digital domain?