

**Reg. No:**

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**M.Tech I Year I Semester Regular Examinations Jan 2020**

**SENSORS AND ACTUATORS**

(Embedded Systems)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a Explain briefly about the dynamic characteristics of sensors. **6M**  
 b Write about precision and resolution of a sensor. **4M**  
 c Write a short note on strain gauge. **2M**

**OR**

- 2 Define potentiometer. Explain about the resistive potentiometers in detail **12M**

**UNIT-II**

- 3 a Describe about the two relations used in the development of dielectric constant and refractive index thermo-sensors. **6M**  
 b Define noise thermometer. Explain various schemes of noise thermometry. **6M**

**OR**

- 4 a How quartz crystal sensors are used temperature sensors? Describe how resonant frequency is related to temperature. **8M**  
 b Explain the working principle of Nuclear quadrupole resonance thermometer. **4M**

**UNIT-III**

- 5 a Explain about the Phototransistors and Photo FETs. **6M**  
 b Why is a reference electrode needed in a sample analysis? Explain about the commonly used reference electrodes. **6M**

**OR**

- 6 Describe the characteristics of electro-ceramics such as  $ZrO_2$ ,  $TiO_2$ , and  $(SiO_2, ZrCr_2O_4)$  and explain how they use their ionic conductivity, semi-conductivity, and surface ionic conductivity respectively for measuring oxygen content and humidity. **12M**

**UNIT-IV**

- 7 a Describe with the help of diagram, how the primary sensors are being integrated with signal processing ensembles. **10M**  
 b With some examples, explain how instrumentation has improved the studies of ecology. **2M**

**OR**

- 8 a Explain the signal communication standards in modern control systems. **6M**  
 b Write a short note on excitation, amplification and filters. **6M**

**UNIT-V**

- 9 a With help of neat diagrams explain the symbols of directional control valves. **6M**  
 b Define Actuators. Mention the different types of Actuation systems. **6M**

**OR**

- 10 a Draw and explain various types of motion involved in mechanical actuation systems. **6M**  
 b Mention the importance of links and joints in kinematic chains. **6M**

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