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**PRESIDENCY UNIVERSITY
BENGALURU**

SET A

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester V - 2021

Course Code : EEE3016

Course Name : Sensors Actuators and Controls

Program : B.Tech.

Date : 09-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts.
 - (iii) Scientific and non-programmable calculator are permitted.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE QUESTIONS

5 X 2M = 10M

1. List the difference between Sensor, Transducer and Transmitter
(CO1) [Knowledge]
2. List the advantages of LVDT
(CO2) [Knowledge]
3. List different types of actuators used in robotic applications
(CO3) [Knowledge]
4. Describe the features of micro sensors
(CO4) [Knowledge]
5. List any 2 advantages and 2 disadvantages of chemical sensors
(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

6. A manufacturing industry need a sensor for the remote monitoring of its plant temperature. The temperature has to be monitored continuously and is to be used for temperature control. Identify a sensor which is having a linear characteristic for this industry. With neat circuit diagram explain its working.
(CO1) [Comprehension]

7. Due to the rise of e-commerce, material handling industry has been experiencing significant changes. The demand for Autonomous Mobile Robot (AMR) for material handling is rapidly increasing. One of the main challenges in autonomous operation in an unstructured environment is gapless perception. Identify a sensor that can be mounted on the robots to avoid collisions and ensure safe operation. With neat sketch explain the construction and working principle of the same
(CO2) [Comprehension]
8. Solid state switches are essential part of electrical actuating systems. Identify and explain with neat diagram any 3 types of Solid state switches that are used for smooth control of electrical actuators.
(CO3) [Comprehension]
9. Identify a micro sensor that can be used as a trigger to activate airbags in automobiles in an event of collision. The Sensor should also sense the excessive vibration of the vehicle. With neat sketch explain the principle and working of the sensor
(CO4) [Comprehension]
10. An automobile industry required a linear electric actuator for its robotic control system to perform a forward and backward movement. Suggest a suitable actuator for the same. The actuator should be capable of creating short and quick motion. With neat sketch explain the principle and working of the sensor
(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 20M = 40M

11. The thermistor is a solid state temperature sensing device which acts a bit like an electrical resistor but is temperature sensitive. The working principle of a thermistor is that its resistance is dependent on its temperature. A $10\text{k}\Omega$ NTC thermistor has a " β " value of 3455 between the temperature range of 25 degree Celcius and 100degree Celcius. Calculate its resistive value at 25degree Celcius and again at 100degree Celcius.
with neat graphs explain the characteristics of NTC and PTC thermisters
(CO1) [Application]
12. 1. Capacitive pressure sensor can be used for measuring gas or liquid pressures in jet engines, car tyres, the human body and many other places. It can also be used as tactile sensors in robotic applications. With neat sketch explain the principle and working of capacitive pressure sensor
2. A resistance thermometer which measures temperature by measuring the change in the resistance of the conductor has a resistance of 40Ω at 20°C . When the device is immersed in a vessel containing melting Indium, it's resistance increases to 86.8Ω . Find the melting point of Indium. Use $\alpha = 3.92 \times 10^{-3} \text{ }^\circ\text{C}^{-1}$
(CO2) [Application]