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**Presidency University**

**Bengaluru**

**SCHOOL OF ENGINEERING**

**MAKE-UP EXAMINATION JULY-2024**

**Course Code**: EEE1006

**Course Name**: Smart Sensors for Engineering Applications

**Program** : B.Tech

**Date**: 22-07-2024

**Time**: 9:30 AM to 12:30 PM

**Max Marks**: 100

**Weightage**: 50 %

**Instructions:**

1. *Read the all questions carefully and answer accordingly.*
2. *All of you should bring your calculator*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries TWO marks. (10Qx 2M= 20M)**

Q.NO.1 Gyroscopes are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Inertial Motion sensors  
b) Pressure sensors  
c) Voltage sensors  
d) Humidity sensors

(C.O.No.1) [Knowledge]

Q.NO.2 Which of the following is not a piezo electric sensor?  
a) PZT  
b) Roscelle salt  
c) Quartz  
d) None of the mentioned

(C.O.No.1) [Knowledge]

Q.NO.3 Which of the following is not a configuration of a smart sensor?  
a) Transducer  
b) Network interface  
c) Processor  
d) None of the mentioned

(C.O.No.1) [Knowledge]

Q.NO.4 Input signal to smart sensor is fed from \_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Power supply  
b) Transducer  
c) Voltmeter  
d) All of the mentioned

(C.O.No.1) [Knowledge]

Q.NO.5 Output of smart sensors will of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Analog  
b) Digital  
c) Analog and digital  
d) None of the mentioned

(C.O.No.1) [Knowledge]

Q.NO.6 Which of the following defines smartness of sensor?  
a) Quality of data  
b) Circuit size  
c) Circuit components  
d) All of the mentioned

(C.O.No.1) [Knowledge]

Q.NO.7 Input data of smart sensor will be \_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Analog  
b) Digital  
c) Analog and digital  
d) None of the mentioned

(C.O.No.1) [Knowledge]

Q.NO.8 Smart Sensor performs

a) Logic function

b) Make decision

c) Two-way communication

d) All of the above

(C.O.No.1) [Knowledge]

Q.NO.9 Transducer Interface Module (TIM) contains

a) A/D Converter

b) Signal Conditioning

c) Both (a) and (b)

d) None of these

(C.O.No.1) [Knowledge]

Q.NO.10 A\_\_\_\_\_\_ is thermally sensitive resistor that exhibits a large change in resistance.

a) Thermistor

b) Resistance Thermometer

c) Thermocouple

d) Semiconductor based sensor

(C.O.No.1) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the questions. Each question carries TEN marks (5Qx10M=50M)**

Q.NO.11 Mr. Joseph is planning to construct 5-star hotel and he wants to conserve the power in each of the rooms. The key power consumption equipment in the hotel is air conditioner and lights. Kindly suggest any two sensors with their working which would help him to conserve power.

(C.O.No.3) [Comprehension]

Q.NO.12 An Electric Vehicle Industry wants to increase the Global NCAP safety rating in their vehicle. For this, their main intention is to protect the safety of passenger while the car meet with an accident. Kindly suggest any two sensor which would help them to tackle this condition.

(C.O.No.3) [Comprehension]

Q.NO.13 The water wasted in agriculture is a key concern for Govt. of India. They are planning to adopt some mechanism to maintain the moisture of the soil and at the same time, the water should be used at optimum level. Please suggest any sensor which would perform this task to maintain the moisture at the optimum level.

(C.O.No.4) [Comprehension]

Q.NO.14 Mr. Jignesh purchased a brand-new smartphone for his regular activities. As his eyesight is very weak, he turned on the automatic balancing of brightness in his phone to tune the brightness of screen’s smartphone with the outside environment. Which sensor would perform this task in his smartphone? Explain the working of the sensor with neat and clean diagram.

(C.O.No.3) [Comprehension]

Q.NO.15 Mrs. Geeta stays in rural area, and she is suffering from diabetes and blood pressure. She needs to regularly visit the doctor for physical examination but due to long distance between her home and hospital, she is unable to visit the doctor. Please suggest the convenient mode of data collection technique which would help Mrs. Geeta to send the data to the Doctor.

(C.O.No.4) [Comprehension]

**Part C [Problem Solving Questions]**

**Answer the Question. Each question carries FIFTEEN marks. (2Qx15M=30M)**

Q.NO.16 A barium titanate pickup has the dimension of 5mmx5mmx1.25mm. The force acting on it is 5N. The charge sensitivity of barium titanate is 150 pC/N and its permittivity is 12.5x10-9 F/m. If the modulus of Elasticity of barium titanate is 12x106 N/m2. Calculate the strain. Also calculate the charge and the capacitance. (C.O.No.3) [Comprehension]

Q.NO.17 A capacitive transducer uses two quartz diaphragms of area 750mm2 separated by a distance of 3.5mm. A pressure of 900 kN/m2 when applied to the top diaphragms produces a deflection of 0.6mm. The capacitance is 370 pF when no pressure is applied to the diaphragms. Find the value of capacitor after application of a pressure of 900 kN/m2.

(C.O.No.3) [Comprehension]