Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - APR 2023

Semester : Semester VI -2020

Course Code : EEE3046

Course Name : Sem VI - EEE3046 - Discipline Elective-V: Sensors and Transducers

Program : EEE

Date : 15-APR-202

Time : 9:30AM - 11AM

Max Marks : 60

Weightage : 30%

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.

PART A

ANSWER ALL THE QUESTIONS **(5 X 2 = 10M)**

1. An optical fiber is a cylindrical dielectric waveguide that transmits light along its axis through the process of total internal reflection. To confine the optical signal in the core of the fibre, the refractive index of the core must be,

a) Less than that of the cladding. (CO1) [Knowledge]

b) Greater than that of the cladding.

c) Equal that of the cladding.

d) Double than that of the cladding

2. The piezoelectric effect is the appearance of an electrical potential across the sides of a crystal when it is subjected to mechanical stress. The Electric Potential appearing across the Piezo Electric material depends on

a) Voltage sensitivity of the material (CO1) [Knowledge]

b) Thickness of the material

c) Stress applied

d) All the above

3. A photodiode is a PN-junction diode that consumes light energy to produce an electric current. These diodes are particularly designed to work in

a) reverse bias conditions (CO2) [Knowledge]

b) Forward bias conditions

c) All the above

d) None of the above

4. Distributed Temperature Sensing (DTS) is a powerful tool for measuring temperature changes in tunnels and pipe lines. ---------- technology is the unique technology for DTS

a) Piezo electric (CO2) [Knowledge]

b) Fiber optic

c) Photovoltaic

d) Photo sensing

5. Photomultipliers, or photomultiplier tubes (PMTs), belong to a class of vacuum tubes that convert photons into electric signal. They have a very high sensitivity due to

a) An avalanche multiplication process (CO2) [Knowledge]

b) Recombination of electrons and holes

c) Photo detection

d) All the above

PART B

ANSWER ALL THE QUESTIONS (2 X 15 = 30M)

6. A noncontact sensor is required to use in a metal detector. The device should be suitable to use in outdoor and non-hygienic conditions and it should be compact. Identify the suitable sensor and with neat sketch explain its construction and working principle.

(CO1) [Comprehension]

7. Identify a photodetector that can be used in consumer electronics devices like smoke detectors, compact disc players, and television remote controls. It should be a fast detector and use low voltage for its operation. With neat sketches explain its construction and working principle

(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION (1 X 20 = 20M)

8. A piezoelectric crystal having dimensions of 5mm X 5mm X 1.5mm and a voltage sensitivity of 0.055 VN/m is used for force measurement.

a) Calculate the force if the voltage developed is 100V.

b) If the dimension of the crystal is changed to 2mm X 2mm X 1mm, estimate the voltage developed when the same force is acting on the crystal

(CO1) [Application]