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PRESIDENCY UNIVERSITY

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Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 02:00 PM - 03:30 PM

Course Code: EEE3506 **Course Name:** Sensors and Transducers

Semester: Fifth Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	46	44

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	**What is an ionization gauge? Give one application of an ionization gauge.**	2	CO1	BT1
2	A linear potentiometer has a total resistance of 100 kΩ and a total travel length of 100 mm. If the slider is moved by 40 mm, find the resistance at that position.	2	CO1	BT3
3	**A piezoelectric crystal is used in an industrial vibration sensor to monitor the vibration of rotating machinery. The crystal has a charge sensitivity of *d=6* pC/N . If a dynamic force of *300* N is applied to the crystal, calculate the charge generated by the piezoelectric sensor.**	2	CO1	BT3
4	**How does an LDR act as a light sensor? And How photodiode detect light**	2	CO2	BT1
5	**Why is a photodiode operated in reverse bias? Why is a photodiode preferred over an LDR in some light-sensing applications?**	2	CO2	BT1

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	*A linear resistance potentiometer is 50 mm long and is uniformly wound with a wire having a resistance of 10kilo Ohm .Find the linear displacement when the resistance of the potentiometer as measure by a Wheatstone bridge for two cases is: 3000 Ohm* & 7000 Ohm *If it is possible to measure a minimum of* 10 Ohm *using the arrangement, find the resolution*	10	CO1	BT3
7	A potentiometer is made of wires of two materials as shown. Green is copper and red is aluminium. Length of both wires are 50 cm. What will be the output voltage if the wiper is 70 cm from the ground? Given resistivity of Copper is 1.68×10^{-8} Ohm-metre. Resistivity of Aluminium is 2.65×10^{-8} Ohm metre Area of cross section is the same at $1\ mm^2$	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT

PTO (Please Turn Over)

8	**For a certain thermistor** $B = 3100$ Kelvin **and its resistance at 20°C is known to be 1050 Ω. The thermistor is used for temperature measurement and the resistance measured is 2300 Ω. Find the measured temperature**	10	CO1	BT3
9	A Pt thermomoter has a resistance of $100\ \text{Ohm at } 25^{o}\ C$ The resistance temperature coefficient of Pt is $0.00392/^{o}C$ 1. Find its resistance at $65^{0}\ C$ 2. If the thermometer has a resistance of $200\ \text{Ohm}$ calculate the temperature	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
10	An automated production line must detect very small changes in light intensity. The system should amplify weak optical signals and produce a reliable electrical output even when the incoming light is very low. **a)** Identify the most suitable photosensitive device for detecting extremely weak light signals and justify your selection. **(2 marks)** **b)** Explain the construction and working principle of the selected device. **(4 marks)** **c)** Compare its operation with a photodiode and phototransistor in terms of sensitivity and amplification. **(4 marks)**	10	CO2	BT2
11	A smart lighting system must automatically switch ON when the surrounding light level becomes low. In another section of the same system, a sensor must detect the presence of an object without physical contact. **a)** Select suitable photoresistive/photoconductive devices for these two applications and justify your choices. **(2 marks)** **b)** Explain how the resistance of a photoresistor changes with incident light and describe its working principle. **(4 marks)** **c)** Explain how a photodiode or phototransistor can be used for object detection and compare its operation with a photoresistor. **(4 marks)**	10	CO2	BT2

PART E: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
12	A remote monitoring station is located several kilometres away from a control room. Electrical cables are undesirable because of electromagnetic interference and signal losses. The station also requires a small electrical power source from sunlight. **a)** Identify the two sensor/device technologies that can satisfy the communication and power requirements. **(2 marks)** **b)** Explain the construction and working principle of a photovoltaic device used for generating electrical power from light. **(4 marks)** **c)** Explain how a fibre-optic system can transmit information between the remote station and control room. Draw a suitable block diagram. **(4 marks)**	10	CO2	BT2
13	A smart instrument panel must sense light, convert the optical information into an electrical signal, and display the measured information electronically. The system should have compact, reliable and low-power components. **a)** Identify suitable **solid-state light transducers** for sensing the incident light and justify your choice. **(2 marks)** **b)** Explain the working principle of a photodiode and photovoltaic device, highlighting how light is converted into an electrical response in each case. **(4 marks)** **c)** Explain the role of **liquid crystal devices** in an electronic display and describe how they differ from conventional light-emitting devices. **(4 marks)**	10	CO2	BT2