Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Make-up Examinations – December 2025

Date: 27 – 12- 2025 **Time:** 01:00pm – 04:00pm

School: SOE	**Program:** B.Tech. (ECE)	
Course Code: ECE3045	**Course Name:** Sensor Technology	
Semester: MK	**Max Marks:** 100	**Weightage:** 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	24	24	26	26	-

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1	List the any two differences between sensor and transducer	2 Marks	L1	CO1
2	With neat diagram, label cut-off and saturation.	2 Marks	L1	CO1
3	For capacitance-based sensor, identify the material property and geometric property.	2 Marks	L1	CO2
4	Define piezoelectric effect.	2 Marks	L1	CO2
5	Write the current-voltage relationship for a photodiode	2 Marks	L1	CO3
6	What are the various switching types?	2 Marks	L1	CO3
7	Describe “ice-bath” technique used to maintain reference junction in a thermocouple.	2Marks	L1	CO3
8	What is the output voltage for a non-inverting amplifier?	2 Marks	L1	CO4
9	Draw the transfer characteristics (I-V) for an open-loop op-amp	2 Marks	L1	CO4
10	How to find the cut-off frequency for a Notch filter?	2Marks	L1	CO4

Part B

Answer the Questions. **Total Marks 80M**

11.	a.	Draw the schematic for a measurement system and explain each component of the system	10 Marks	L2	CO1
	b.	With necessary graphs, describe zero drift and sensitivity drift	10 Marks	L2	CO1
Or					
12.	a.	Describe in detail the model used to understand reliability analysis	10 Marks	L2	CO1
	b.	Compare the following: (i) Response time, (ii) Delay time, (iii) Rise time, (iv) Settling time and (v) Peak time.	10 Marks	L2	CO1

13.	a.	Explain the parameters that could be modified to develop a resistance-based sensor. Describe the dependance of temperature on resistance.	10 Marks	L2	CO1
	b.	Compare the following principles of light sensors: photo-emissive, photo-voltaic and photo-conductive	10 Marks	L2	CO1
Or					
14.	a.	For a piezoelectric sensor, illustrate the relationship between applied pressure and output voltage.	10 Marks	L2	CO1
	b.	Explain all four effects responsible for developing a sensor using thermoelectric effect.	10 Marks	L2	CO1

15.	a.	With the help of neat figures, show that the Linear Variable Differential Transformer (LVDT) can be used to detect both direction and magnitude.	10 Marks	L2	CO1
	b.	Explain all the three principles by which an object can be detected using photoelectric- based proximity sensor.	10 Marks	L2	CO1
Or					
16.	a.	Explain the construction of a photo-diode and its working when the diode is forward-biased and reverse-biased.	10 Marks	L2	CO1
	b.	Illustrate various techniques by which one of the junctions in a thermocouple is maintained as a reference (cold-junction).	10 Marks	L2	CO1

17.	a.	The output of a sensor is 0.2mV which is provided to an amplifier. The amplifier is designed using an op-amp with an input resistance of 12kΩ and feedback resistance of 60kΩ. Estimate the output produced by (i) non-inverting amplifier, (ii) inverting amplifier and (iii) buffer amplifier	10 Marks	L3	CO1
	b.	An instrumentation amplifier is developed such that the gain of the first stage is 10 and the gain of the second stage is 100. If the differential input is 25mV, determine the output voltage. If the feedback resistor of the first stage is 2kΩ, calculate the range of the gain resistor, if the gain varies from 5 to 50.	10 Marks	L3	CO1
Or					
18.	a.	Construct a differential amplifier, such that the gain of the amplifier is 100.	10 Marks	L3	CO1
	b.	A sensor produces an output signal with a frequency greater than 40Hz. An electrical interference noise of 60Hz might be incorporated in the output signal. Construct the necessary high-pass filter and notch filter. Assume the value of the resistors to be 1kΩ.	10 Marks	L3	CO1