JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

M .Tech. -I Semester (CSE/IT/ECE/CE/BT/BI)

COURSE CODE (CREDITS): 21M11EC111 (3) MAX. MARKS: 35

COURSE NAME: SENSOR AND SMART INSTRUMENTATION

COURSE INSTRUCTORS: Dr. HARSH SOHAL MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required

for solving problems

Q.No.	Question	CO	Marks
Q1	A platinum themometer has a resistance of 100 Ω at 25°C. (a) Find its resistance at 65 °C (a) if the platinum has a resistance temperature co-efficient of 0.00392/°C. (b) If the thermomneter has a resistance of 150 Ω, calculate the temperature.	CO2	5
Q2	A capacitive transducer uses two quartz diaphragms of area 750 mm^2 separated by a distance of 3.5 mm. A pressure of 900 kN/m^2 when applied to the top diaphragm produces a deflection of 0.6 mm. The capacitance is 370 pF when no pressure is applied to the diaphragms. Find the value of capacitance after the application of a pressure of 900 kN/m^2.	CO3	5
Q3	(a)What is an LVDT? Explain the working and construction of an LVDT. Also discuss the range of applications in which an LVDT may be employed. [4] (b). The output of an LVDT is connected to a 5 V voltmeter through an amplifier whose amplification factor is 250. An output of 2 mV appears across the terminals of LVDT when the core moves through a distance of 0.5 mm. Calculate the sensitivity of the LVDT and that of the whole set up. The milli-voltmeter scale has 100 divisions. The scale can be read to 1/5 of a division. Calculate the resolution of the instrument in mm. [5].	CO4	9

Q4	(a) Are there any similarities and/or differences between the use of mercury in glass tube as a manometer and as a thermometer? Discuss. [2] (b) What is the principle of operation of Piezo-electric Transducers? [1] (c) What is Gauge pressure? How is it related to Atmospheric pressure? [1] (d) What are the factors to be considered while selecting a manometric liquid for U tube manometer in industrial measurements? [2]	CO1	6
Q5	(a) What is Piezoresistive effect? Explain. How does it form the basis of working of a strain gauge? (b) A compressive force is applied to a structural member. The strain is 5 micro-strain. Two separate strain gauges are attached to the structural member, one is a nickel wire strain gauge one is a nickel wire strain gauge with a gauge factor of -12.1 and the other is nichrome wire strain gauge having a gauge factor of 2. Calculate the value of resistance of the gauges after they are strained. The resistance of strain gauges before being sprained is 120 Ω.	CO5	2+4=6
Q6	A modified form of Wheatstone bridge is shown in Fig below. Calculate the value of unknown resistance, Rx, if Ra = 1200 Ω, Ra = 1600 Rb, R1 = 800 Rb, R1 = 1.25 ,R2 and R3 = 0.5 Rb, are the resistance values under balanced conditions. [3] 	CO5	4