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# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

*A Constituent Institution of Manipal University*

**FOURTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.)**

**END SEMESTER EXAMINATIONS, JUNE 2017**

SUBJECT: INTRODUCTION TO INDUSTRIAL INSTRUMENTATION [ICE 3281]

Time: 3 Hours MAX. MARKS: 50

**Instructions to Candidates:**

- Answer **ALL** questions.
- Missing data may be suitably assumed.

**1A.** Write the differences between **5**

i. Active and passive transducers

ii. Primary and Secondary transducers

**1B.** What is gauge factor? Derive a relation for gauge factor for a strain gauge. **3**

**1C.** A resistance wire strain gauge with a gauge factor of 2 is bonded to a steel structural member subjected to a stress of 10 MN/ Sq.m. The modulus of elasticity of steel is 200GN/Sq.m. Calculate the percentage change in the value of the gauge resistance due to applied stress. **2**

**2A.** Discuss in detail on resistance temperature characteristics of a thermistor. **4**

**2B.** Describe the phenomenon of linear approximation of RTD's **3**

**2C.** A platinum thermistor has a resistance of 100Ω at 25°C **3**

a) Find its resistance at 65°C if the platinum has a resistance temperature coefficient of 0.00392/°$_C$

b) If the thermometer has a resistance of 150Ω, calculate the temperature.

**3A.** Explain the working of U tube manometer **3**

**3B.** Describe the working of Dead weight tester **4**

**3C.** A U tube manometer uses tubes of 5mm and 25mm diameter for the legs. The difference in height of two fluid columns is 250mm of Hg when subjected to a certain pressure. What would have been the difference in height if both legs were of same diameter? **3**

**4A.** Describe the working of Rota meter used for flow measurement **5**

**4B.** Describe the principle of measurement of level with Capacitive methods **3**

**4C.** The effective area of a photodiode is $0.2 \times 10^{-6} m^2$ and the irradiance is 250W/$m^2$. Calculate the incident power. If the load resistance is 10kΩ and the capacitance of the diode is 2pF, find the cut off frequency. **2**

**5A.** Describe the working of optical displacement transducers. **3**

**5B.** Explain the working of rotor torque mass flow meter **4**

**5C.** Discuss the method of measurement of thickness using inductive methods **3**