Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

THIRD SEMESTER B. TECH. (INSTRUMENTATION AND CONTROL ENGG.)

END SEMESTER DEGREE EXAMINATIONS, DECEMBER – 2018

SUBJECT: SENSORS AND TRANSDUCERS [ICE 2105]

TIME: 3 HOURS **MAX. MARKS:50**

Instructions to Candidates:

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

1A. Explain the generalized input-output configuration of measurement systems. **(5)**

1B. Explain the following with respect to a typical instrumentation system. **(3)**
(i) Output range (ii) Transfer function

1C. Define the terms (i) International Standards. (ii) Gross Errors **(2)**

2A. With the help of a graph, explain the maximum input hysteresis & maximum output hysteresis. **(3)**

2B. A quartz piezoelectric crystal having a thickness of 2 mm and a voltage sensitivity of 0.055V-m/N is subjected to a pressure of 1.5MN/m^2. Calculate the voltage output if the permittivity of quartz is 40.6 x10^{-12} F/m. Calculate the charge sensitivity. **(4)**

2C. Explain the working principle of capacitive transducer for angular displacement measurement. **(3)**

3A. Derive the expression for gauge factor of strain gauge. **(5)**

3B. Briefly explain the Thomson effect. **(2)**

3C. A strain gauge has a gauge factor of 3.5.If the strain gauge is attached to a metal bar that shrinks from 0.358 m to 0.35m when strained, what is the percentage change in resistance? If the unstrained value of gauge is 120Ω.What is the resistance valve of the gauge after the application of strain? **(3)**

4A. Differentiate between Photodiode and Light Emitting Diode. **(4)**

4B. Describe construction and working of flowing type of sensors for pH determination. **(3)**

4C. Explain the constructional features of Synchro-pair system. **(3)**

5A. Explain the construction and principle of rotational type potentiometer **(4)**

5B. Write any three applications of biosensors. **(3)**

5C. With a neat sketch explain working of LVDT, by considering core position at $ES_1 > ES_2$. **(3)**

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