Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

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

END SEMESTER EXAMINATIONS, NOVEMBER - 2017

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 with block diagram the functional elements of instrument system.	**5**
1B.	Define the following with respect to a typical instrumentation system. (i) sensitivity (ii) Repeatability (iii) Accuracy	**3**
1C.	Define the terms (i) Primary Standards. (ii) International standards	**2**
2A.	What are the factors influencing the choice of transducer? Explain.	**3**
2B.	Two strain gauges attached to the surface of a cylindrical pressure vessel, one in axial and one is circumferential direction, given the strain values as 0.00018 and 0.00072 respectively. Calculate the hoop and longitudinal stress values if the cylinder is of steel having a modulus of elasticity of 200 GN/m^2 and Poisson's ratio =0.29.	**4**
2C.	Explain the construction and principle of shaft encoder.	**3**
3A.	Derive the expression of output voltage from the full bridge type strain gauge circuit.	**5**
3B.	What is the Thomson Effect in a Thermocouple?	**2**
3C.	A piezo electric crystal having dimensions of 5mm x 5mm x 1.5mm and a voltage sensitivity of 0.055V-m/N is used for force measurement. Calculate the force if the voltage developed is 100V.	**3**
4A.	Differentiate between Capacitive transducers and Piezoelectric transducers?	**4**
4B.	Describe the working and construction of Reference electrode type.	**3**
4C.	Explain the constructional features of Synchro -pairs.	**3**
5A.	Explain the equivalent circuit diagram of a Piezo electric transducer.	**4**
5B.	Write any three basic components of a Biosensors	**3**
5C.	With neat sketch explain LVDT with core position at $ES_1 > ES_2$	**3**