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, NOVEMBER - 2018

SUBJECT: SENSORS AND TRANSDUCERS [ICE- 2105]

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to candidates: (i) Answer ALL questions. (ii) Missing data may be suitably assumed.			
1A.	Explain the schematic diagram of input filtering in a measurement system.		(5)
1 B .	Explain the following with respect to a typical instrumentation system.(i) Loading effects (ii) Hysteresis (iii) Gross Errors		(3)
1C.	Define the terms (i) Working Standards (ii) Derived unit		(2)
2A.	Describe the output characteristics of transducers.		(3)
2B. 2C.	A barium titanate pickup has the dimensions of $5\text{mm} \times 5\text{mm} \times 1.25$ mm. The force acting on it is 5N. The charge sensitivity of barium titanate is 150pC/N and its permittivity is 12.5×10^{-9} F/m. If the modulus of elasticity of barium titanate is 12×10^{6} N/m ² , calculate the strain. Also calculate the charge and the capacitance. Explain the working principle of four bit encoder with its truth table.		(4) (3)
3A.	Derive the expression of output voltage in a quarter bridge type strain gauge circuit.		(5)
3B.	Define the piezo-electric effect.		(2)
3C. 4A.	A strain gauge bridge comprises of two fixed resistors each of value 120Ω . One active gauge and an unstained temperature compensation gauge. The two gauges are connected in adjacent arms of the bridge have a unstrained resistance of 120 Ω and gauge factor of 2.2. Find the bridge output voltage for a supply voltage of 3V, when the active gauge is subjected to 600 microstrain. Differentiate between Photodiode and Phototransistor		(3)
4B.	Describe the working and construction of Calomel-electrode.		(3)
4C.	Explain the constructional features of Synchro-control transformer.		(3)
5A.	Explain the construction and principle of translational type potentiometer.		(4)
5B.	Write any three basic characteristics of Biosensors.		(3)
5C.	Explain with neat sketch of LVDT	with core position is at $ES_1 = ES_2 = 0$.	(3)
