BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : VII**
BRANCH: ALL **SESSION : MO/19**

SUBJECT: MEC1047 SENSORS AND TRANSDUCER

TIME: 3.00Hrs. **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)	Differentiate between Transducer, Sensor, Actuator and Detector.	[2]
Q.1(b)	Explain the classifications of sensor by giving suitable examples in each class.	[4]
Q.1(c)	Explain Electrical characteristics of transducer and the different characteristics of sensor observed in laboratory testing.	[6]
Q.2(a)	What is strain guage and their different types?	[2]
Q.2(b)	A linear resistance POT is 50mm long and is uniformly wound with a wire having a resistance of 10000Ω. Under normal conditions, the slider is at the centre of the potentiometer. Find the linear displacement when the resistance of the POT as measured by a Wheatstone bridge for two cases is (i) 3850Ω (ii) 7560Ω. Are the two displacement in the same direction? If it is possible to measure a minimum value of 10Ω resistance with the above arrangement. Find the resolution of the POT in mm.	[4]
Q.2(c)	Explain principle of Hall effect sensor and its application for measurement of displacement.	[6]
Q.3(a)	Explain temperature sensor classification on the basis of primary and secondary sensors.	[2]
Q.3(b)	Explain Noise thermometry with its disadvantage and TC-NT sensor.	[4]
Q.3(c)	What is fibre optic sensor and their classification? Explain temperature sensor using FSO technique.	[6]
Q.4(a)	What is Electrochemical cell?	[2]
Q.4(b)	Explain working principle of Standard Hydrogen Electrode with suitable diagram.	[4]
Q.4(c)	Discuss membrane electrodes with its different types and explain working of Gas sensing electrode.	[6]
Q.5(a)	What is smart sensor? Explain with its simplified diagram.	[2]
Q.5(b)	Explain the properties of an intelligent field device.	[4]
Q.5(c)	Explain the types of compensation attempted for sensor defects and also explain HART protocol with suitable figure.	[6]
Q.6(a)	Define digital transducer with suitable example.	[2]
Q.6(b)	Explain Barrier and Isolator with suitable diagram.	[4]
Q.6(c)	Describe Proximity switch with its type and Thermistor based Temperature switch.	[6]
Q.7(a)	Explain the technologies used in today's sensors development.	[2]
Q.7(b)	Define basic processes of MEMS and its application.	[4]
Q.7(c)	Describe the typical gaseous pollutants present in Air pollution and working of Gas Chromatography.	[6]

:::::09/12/2019E:::::