Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17EI2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SENSORS AND TRANSDUCERS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Classify transducers based on the principle of transduction. Give examples for each type. | CO1 | 12 |
| b. | Distinguish between the following with relevant examples   1. Accuracy and Precision 2. Active and Passive Transducers 3. Direct and Inverse Transducers 4. Primary and Secondary Transducers | CO1 | 8 |
| **(OR)** | | | | |
| 2. | a. | What are the functional blocks of a generalized measurement system? Explain the function of each block with an example. | CO1 | 12 |
| b. | Discuss about the role of instrumentation in automation. | CO1 | 8 |
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| 3. | a. | List the static characteristics of an instrument. Explain each one and mention the significance of each. | CO4 | 10 |
|  | b. | Determine the step response of a typical first order system and hence define the dynamic characteristics of the system. | CO4 | 10 |
| **(OR)** | | | | |
| 4. | a. | Bring out the importance of error analysis in measurement systems. Classify the errors in measurement and explain with suitable example. | CO2 | 12 |
|  | b. | For the following given data x1=79.3; x2=80.2; x3=79.7; x4=79.5; x5=80.3,  Calculate (i) Arithmetic Mean, (ii) Deviation of each value, (iii)Algebraic sum of deviation, (iv) Average deviation, (v) Standard Deviation | CO2 | 8 |
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| 5. | a. | With neat sketches, show how a resistive potentiometer is used as a displacement transducer. Also analyze the factors affecting its resolution and loading effect. | CO3 | 10 |
|  | b. | Define Strain. Explain the principle of working of a Strain Gage. Derive the expression for Gage Factor. | CO3 | 10 |
| **(OR)** | | | | |
| 6. | a. | Give a brief account of the construction, working principle, characteristics and applications of Resistance Temperature Detector.(RTD) | CO3 | 10 |
|  | b. | Explain the principle of operation of hot wire anemometer. Give its applications. | CO3 | 10 |
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| 7. | a. | Illustrate with relevant diagrams and explanations the construction, principle and working of LVDT. | CO4 | 10 |
|  | b. | Define magnetostrictive effect.  Name the materials used in magnetostrictive transducers.  Describe any one application of magnetostrictive transducer. | CO6 | 10 |
| **(OR)** | | | | |
| 8. | a. | What is Hall Effect? Write the expression for Hall Voltage. Mention a few applications of Hall Effect transducers. | CO5 | 10 |
|  | b. | Give the expression for capacitance. Show how the capacitance principle can be used as a pressure transducer. | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | What is piezoelectric effect? Derive the equivalent circuit of a piezoelectric crystal and thereby obtain the transfer function. | CO6 | 10 |
|  | b. | Discuss about MEMS sensors and Nano sensors. | CO6 | 10 |