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

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **14EI2001** | **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. | Draw the functional block diagram of a generalized measurement system and explain the function of each block. | CO1 | 10 |
| b. | Differentiate the following with examples.   1. Direct and Inverse Transducers. 2. Active and Passive Transducer. 3. Primary and Secondary Transducer. | CO1 | 6 |
| c. | A displacement measuring instrument is calibrated from 0 mm to 200 mm. The accuracy is specified within ±0.1% of instrument span. What is the maximum static error? | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | List the types of errors in measurement system. Mention the source of the errors and the methods to handle the errors. | CO2 | 10 |
| b. | Differentiate static and dynamic characteristics of an instrument. | CO1 | 5 |
| c. | Give the significance of static calibration. | CO1 | 5 |
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| 3. | a. | Illustrate with a neat diagram the construction, principle of operation and characteristics of a resistive potentiometer used for angular displacement transducer | CO2 | 10 |
| b. | Compare the constructional details, working and characteristics of RTD and Thermistor. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Classify strain gages based on their construction and derive the expression for gage factor. | CO2 | 10 |
| b. | State Seebeck Effect. Demonstrate how it is used for temperature measurement with relevant diagrams and explanations. | CO2 | 10 |
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| 5. | a. | Expand LVDT. With neat diagrams and explanations, elaborate on the working principle and characteristics of an LVDT. | CO2 | 10 |
| b. | Give the expression of Capacitance C. What are the factors that affect Capacitance? Explain how the capacitance variation can be used to measure displacement. | CO2 | 10 |
|  |  | (OR |  |  |
| 6. | a. | Describe the construction and working of a variable reluctance accelerometer. | CO3 | 10 |
| b. | Elaborate on the principle of differential pressure measurement using a capacitance transducer. | CO3 | 10 |
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| 7. |  | What is piezoelectric effect? How can it be used as a pressure transducer? Derive the expression for charge sensitivity and voltage sensitivity. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | What is Villari Effect? Describe with necessary diagrams the application of villari effect for displacement measurement using a magnetostrictive transducer. | CO3 | 20 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | State Hall Effect? Elaborate on the applications of Hall Effect Transducers for displacement measurement. | CO3 | 10 |
| b. | Write a short note on smart sensors and their advantages. | CO3 | 10 |