

## **OIC751 TRANSDUCER ENGINEERING**

### DETAILED SYLLABUS

#### **OBJECTIVES:**

- To understand how physical quantities are measured and how they are converted to electrical or other forms.
- To have an adequate knowledge in resistance, transducers.
- To develop the knowledge of inductance and capacitance transducers.
- To study the characteristics of Transducers.
- To impart knowledge on various types of transducers

#### **UNIT I SCIENCE OF MEASUREMENTS AND CLASSIFICATION OF TRANSDUCERS**

Units and standards – Calibration methods – Static calibration – Classification of errors - Limiting error and probable error – Error analysis: – Statistical methods – Odds and uncertainty – Classification of transducers – Selection of transducers.

#### **UNIT II CHARACTERISTICS OF TRANSDUCERS**

Static characteristics: – Accuracy, precision, resolution, sensitivity, linearity, span and range - Dynamic characteristics: – Mathematical model of transducer – Zero, I and II order transducers - Response to impulse, step, ramp and sinusoidal inputs.

#### **UNIT III VARIABLE RESISTANCE TRANSDUCERS**

Principle of operation, construction details, characteristics and applications of potentiometer, strain gauge, resistance thermometer, Thermistor, hot-wire anemometer, piezoresistive sensor and humidity sensor.

#### **UNIT IV VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS**

Induction potentiometer – Variable reluctance transducers – EI pick up – Principle of operation, construction details, characteristics and applications of LVDT –Capacitive transducer and types – Capacitor microphone – Frequency response.

SSLC, HSE, DIPLOMA, B.E/B.TECH, M.E/M.TECH, MBA, MCA

*Notes*

*Syllabus*

*Question Papers*

*Results and Many more...*

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## **UNIT V OTHER TRANSDUCERS**

Piezoelectric transducer - Hall Effect transducer – Magneto elastic sensor- Digital transducers – Smart sensors - Fibre optic sensors- Film Sensors-Introduction to MEMS and Nano sensors.

### **OUTCOMES:**

- Ability to model and analyze transducers.

### **TEXT BOOKS:**

1. Neubert H.K.P., Instrument Transducers – An Introduction to their Performance and Design, Oxford University Press, Cambridge, 2003.
2. Doebelin E.O. and Manik D.N., Measurement Systems – Applications and Design, Special Indian Edition, Tata McGraw Hill Education Pvt. Ltd., 2007.
3. D. Patranabis, Sensors and Transducers, 2nd edition, Prentice Hall of India, 2010. E.A.

### **REFERENCES:**

1. John P. Bentley, Principles of Measurement Systems, III Edition, Pearson Education, 2000.
2. Murthy, D.V.S., Transducers and Instrumentation, 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. W. Bolton, Engineering Science, Elsevier Newnes, Fifth edition, 2006.
4. Ramón Pallás-Areny, John G. Webster, Sensors and Signal Conditioning, Wiley-Interscience 2nd Edition, 1991.
5. Bela G.Liptak, Instrument Engineers' Handbook, Process Measurement and Analysis, 4th Edition, Vol. 1, ISA/CRC Press, 2003.
6. Ian Sinclair, Sensors and Transducers, 3rd Edition, Elsevier, 2012.