

L	T	P	Cr
2	1	2	3.5

**erequisite(s):** None

**SORS/TRANSDUCERS:TRANSDUCERS PRINCIPLES:** Classification, static and dynamic characteristic of transducers, classification of transducers, resistive strain gauges, capacitive transducer, inductive, Piezoelectric transducer, Temperature transducers: RTD, Thermocouple, Encoders, Absolute and incremental encoders, Tacho meters, Torque measurement, MEMS (torque, speed etc.), accelerometers, proximity sensors.

**SIGNAL CONDITIONING:** Nature of signal and noise, frequency domain analysis of signals, types of noise, interfering and modifying signals, Operational Amplifiers and signal conditioning circuits, instrumentation amplifier and their transfer characteristics, Wheatstone bridge circuit, Transducers, analog to digital and digital to analog circuits, Voltage to frequency and frequency to voltage converters, PWM based firing circuits

**BRIDGE CIRCUITS:** Null type bridge, Voltage sensitive deflection type bridge, Current sensitive deflection type bridge, bridge circuit transducers.

**FILTERS AND CIRCUITS:** Introduction, Frequency and time domain analysis of low pass, high pass, band pass, and band stop filters. Filter types - Butterworth, Chebyshev, Bessel, Elliptic. Design of active high-pass, low pass, band-stop, and all-pass filters. Frequency discriminators, linear voltage regulator, First order, Second order and higher order filters, introduction to Digital filters.

**APPLICATIONS OF SIGNAL CONDITIONING TO ELECTRIC DRIVES:** Selection of sensors, Wheatstone bridge circuits, Active filters using standard approaches, GUI design for condition monitoring of drive systems

**LABORATORY :**Measurement of electrical parameters, Speed and torque measurement, design of firing and control circuits for converter applications.

**Recommended Books**

1. Doebelin, E.O. and Manic, D.N., *Measurement Systems: Applications and Design*, McGraw-Hill (2004) 5<sup>th</sup> ed.
2. Nakra, B.C. and Chaudhry, K.K., *Instrumentation, Measurement and Analysis*, Tata McGraw Hill (2003).
3. Murthy, D.V.S., *Transducers and Instrumentation*, Prentice Hall of India (2003).
4. Sawhney, A.K. and Sawhney, Puneet, *A Course in Electrical and Electronic Measurements and Instrumentation*, Dhanpat Rai (2008) ed.
5. Mohan, N et al., *Power Electronics: Converters, Applications and Design*, John Wiley and Sons, Newyork, Third Edition, 2002.

**Evaluation Scheme:**

S. No.	Evaluation Elements	Weightage (%)	
1.	MST	25	
2.	EST	35	
3.	Sessionals (May include Assignments/Projects/Tutorials/Quizes etc.)	40	