33044 TRANSDUCERS AND SIGNAL CONDITIONERS

DETAILED SYLLABUS

UNT I CLASSIFICATION AND SENSING ELEMENTS

General – Definition - Necessity - Types - classification based on the principle of operation - Active and passive - Primary and Secondary - Examples in each - Advantages - Primary sensing elements - Bourdon tubes. Bellows – Load cells – Thermistors –Types – construction and operation of Metal Resistance thermometer – Digital encoding transducer

UNIT II PASSIVE TRANSDUCERS

Resistive Transducer - Strain Gauge - construction and working of Strain gauge - Strain gauge in measurement of displacement - Capacitive transducer and its applications – Liquid level measurement using capacitive transducers – Inductive transducer - Basic structure - proximity sensor - Measurement of pressure using inductive transducer - Construction and operation of LVDT, RVDT.

UNIT III ACTIVE TRANSDUCERS

Thermocouple - construction and principle - Measurement of angular velocity using Tachogenerator - Piezoelectric transducers - principle - measurement of pressure and vibrations - Hall effect Transducer - photo voltaic transducers (solar cell) - photo conductive transducer Measurement of radiation using Geiger Muller tube.

UNIT IV OPERATIONAL AMPLIFIERS

Block diagram - DC, AC signal conditioning – operational amplifiers IC 741 – Pin details – Important terms – characteristics of Ideal op amp - inverting and Non inverting mode –Gain – Applications of op. amps - Adders, Subtractor, Scale charger, integrator, Differentiator, Voltage to current converter - current to voltage converters - Differential amplifiers - Comparators (inverting and non- inverting).

UNIT V SIGNAL CONDITIONERS IN INDUSTRIAL INSTRUMENTATION

Operational amplifier with capacitive transducer – Operational amplifier as Instrumentation amplifiers – Bridge amplifier – active filters using op.amp - LPF, HPF – LPF as integrator - HPF as differentiator - Clipper, Clamper using op.amp. Successive approximation ADC - R - 2R ladder network DAC - wein bridge oscillator using op.amp - op. amp as Zero crossing Detector

TEXT BOOK

1. Transducers and Instrumentation DVS Murty PHI 2009

REFERENCE BOOK

1. Sensor and Transducers D. Patranabis PHI 2011

2. A Course in Electrical and Electronics Measurements and Instrumentation. , A.K. Sawhney ,Puneet Sawhney Dhanpat Rai & Co (P) Ltd., New Delhi 1993

3. Measurement and Instrumentation Arun. K PHI 2010

4. Operational Amplifiers and Linear Integrated Circuits, Robert F. Coughlin, Frederick F. Driscoll PHI 1992

5. Op. amp & Linear Integrated Circuits Ramakant. A. Gayakwad PHI 1992.