BASIC INSTRUMENTATION II
Code S-4216

Teaching Scheme:
Lectures: 4 hrs per week
Practicals: 2 hrs per week

Examination scheme:

Test marks	25
Term Work	25
End of term	
Theory paper	75 (3 hrs duration)
Practical exam	50
Total Marks	175

		Hours	Marks
I	**Special types of transducers**	16	20

1. Piezoelectric types
   - Equivalent circuit of Piezoelectric crystal
   - Modes of operation of Piezoelectric crystal
   - Measurement of force using Piezoelectric transducer
2. Magneto Electric types
   - Working principle, Construction and comparison of Mo coil type and Moving magnet type transducers
   - Working principle and comparison of electrical tachometers
3. Digital Encoding transducers
   Working Principle, construction and comparison of
   - tachometer encoder
   - incremental encoder
   - absolute encoder.
4. Fiber optic Transducer
   Working principle construction and application of Fiber opt transducers in temperature and level measurement.

II.	**Signal Conditioning Elements**	16

1. Classification of signal conditioning elements
   - Amplification
   - signal-modification
   - Data transmission
   - filters

III.

2. Basic concepts, i/p- o/p relationships & typical specifications of the following:

Mechanical Amplifiers
- Lever & gear types
- Hydraulic type
- Pneumatic type
- Optical type.

Electronic Amplifiers
- AC amplifier
- DC amplifier
- Differential amplifier
- Buffer amplifier
- Operational amplifier
- Integrator/ Differentiator

Signal Modifiers
- Charge amplifier
- Rack & pinion gear
- Amplitude modulation
- Frequency modulation

Converters
- V to F and F to V
- V to I and I to V
- Analog to digital & Digital to Analog.

Bridge Circuits(Wheatstone bridge)
- Balance equation
- Comparison of null & deflection
- Comparison of AC / DC excitation.

Filters
- Purpose of filters
- Frequency response
- RC circuits of low pass , high pass, band pass , band stop
- filters.

III.	**Data Presentation Elements**	14	15

1. Classification of the data presentation elements
   Visual Display/ Recorder
   Analog/ Digital
2. Construction, working , typical specifications & Block diagram (Wherever applicable) of the following
   Mechanical pointers
   Moving coil Mechanism
   Pen recorders
   Ultra violet recorders
   Servo recorder

Magnetic tape recorder
Cathode ray oscilloscope
X – Y plotter

16 20

IV **System Performance**

Definition & Significance of the following in a measurement system for Static performance

- Sensitivity
- Accuracy
- Precision
- Linearity
- Resolution
- Drift
- Hysteresis
- Threshold
- Dead band
- Impedance loading & impedance matching

Dynamic performance

- Response of step input & sinusoidal input to zero order, first order & second order systems
- Step response specifications & frequency respon specifications such as gain & band width of A DC devices

Types of errors & remedial actions

- Shielding
- Grounding
- Coupling techniques.

02

V. **Complete Measuring systems**

Typical application for displacement and temperature

Total 64

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