BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2EC17: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
CREDITS - 3 (LTP:3,0,0)

Course Objective:
The students will be familiar with the basics of Electronics measurements and Instruments. The fundamentals of signal conditioning circuits for the use of the various sensors are also to be understood.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
3	0	0	3	60	40	00	00	100

Course Contents:

Unit No.	Topics	Teaching Hours
1.	**Introduction :** Definitions, Accuracy and Precision, Significant Figures, Types of Error, Statistical Analysis, Probability of Errors, Limiting Errors,	05
2	**Measurements and Instrumentations :** Analog Data Representation, Definitions, Sensor Time Response: first order, second order, Analog and Digital Processing.	05
3.	**Analog Signal Conditioning :** Introduction, Principles of Analog Signal Conditioning, Passive Circuits, Op Amp Circuits in Instrumentation, Active Filter design using Op-Amp.	10
4.	**Digital Signal Conditioning :** Review of Digital Fundamentals, Converters, Data-Acquisition Systems, Characteristics of Digital Data.	08
5.	**Transducers and Sensors :** Definition of Temperature. Metal Resistance versus Temperature Devices, Thermistors, Thermocouples, Other Thermal Sensors, Displacement, and location or position sensor: Potentiometric sensor, capacitive & Inductive sensor, level sensor; Strain Sensor: metal strain gauges, semiconductor strain gauges, load cells. Fundamentals of EM Radiation, Photo detectors, Optical Sources,.	12
6	**Isolation Techniques :** Transformer Isolation, Optical Isolation, Digital Techniques, For Optical Isolation.	05
	Total	**45**

List of References:

1. Johnson, Curtis D. "*Process control instrumentation technology"*. Prentice Hall PTR, 1999.
2. Ramakant Gayakwad. "*Op-amps and linear integrated circuits"*. Prentice-Hall, Inc., 1993.
3. Kalsi H. S. "*Electronic Instrumentation*", Tata McGraw-Hill Education, 2nd Ed., 2004.
4. Rangan C. S., Sarma G. R. and Mani V. S. V., "*Instrumentation devices and systems*", Tata

McGraw-Hill, 2nd Ed., 2004.

Course Outcomes (COs):

By learning this course students will be able to …

1. Recollect the basic knowledge of measurement units, standards and definitions.
2. Study and Measure the characteristics of the various control systems and sensor responses.
3. Understand & Analyze important of analog signal conditioning using Op-amp.
4. Understand & analyze important of Digital signal conditioning and data acquisition systems.
5. Categorize the different sensors and transducers its characteristics.
6. Study and measure parameters of various Isolation techniques.