Course: Minor
Computer Instrumentation

| Semester: II | Credits: 2 | Subject Code: BSMINELE22302 | Lectures: 30 |

Course Outcomes:

Course Outcomes:
At the end of this course, the learner will be able to:
- CO1- Recall the basic knowledge of semiconductor devices and their working
- and use of signal conditioning circuits in a system.
- CO2 - Explain the working principle of sensors and transducers and their classification, Identify and apply the knowledge of sensors in smart instrumentation system
- CO3 - Classify different types of ADC and DAC, apply the knowledge of conversion of digital to analog and vice-versa
- CO4- Apply the knowledge above to understand an instrumentation system.

| Unit 1: Basic semiconductor devices and Signal conditioners | 15 |

- Introduction to semiconductor: Intrinsic and extrinsic semiconductor P and N-type semiconductor, the study of PN junction diode and its characteristics, LED, Photodiode and optocoupler.
- Introduction to signal conditioning - Transistor and its types, concept of amplifier Introduction to MOSFET, Operational amplifier - basic parameters differential and common mode gain, CMRR, the concept of negative feedback, Op-amp as an inverting amplifier, Applications of the Op-amp as an adder, subtractor, and comparator

| Unit 2: Introduction to Sensors and Data Converters | 15 |

- Definition of sensors and transducers. Classification of sensors: Active and passive sensors. Working principle and application of -Temperature sensors (LM-35, ThermistorAD590), optical sensor (LDR), Passive Infrared sensors (PIR), Accelerometer sensors, tilt sensors, touch screen sensors (Capacitive type), ultrasonic sensors, Motion Sensors.
- Data Converters - Need of DAC and ADC and its parameters, R-2R ladder network DAC, Flash ADC
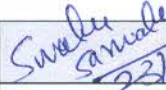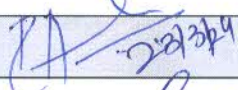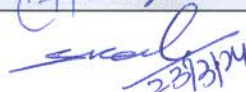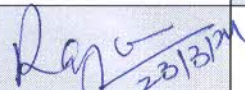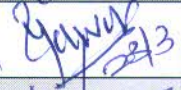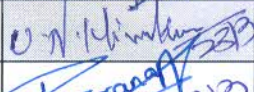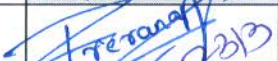- Block diagram of smart instrumentation systems

Reference Books:

- Prof A.D.Shaligram *Sensors and Transducers*
- Bernard Grob, *Basic Electronics*,McGraw Hill Publication, 8thRevised Edition,2010
- D. Patranabis *Sensors and Transducers* ,PHI publication, 2nd Edition
- Ramakant Gaykwad, *Op Amp and Linear Integrated Circuits*
- V.K. Mehta, *Principles of Electronics*, Chand and Co.

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Websites:

- http://www.electronicsforu.com/newelectronics/default.asp
- https://www.instructables.com/id/Basic-Electronics/
- https://www.instructables.com/id/Basic-Electronics/
- https://electronicsforu.com/
- https://www.howstuffworks.com/
- https://www.instructables.com
- https://nptel.ac.in/courses/122/106/122106025/
- https://nptel.ac.in/courses/117/103/117103063/

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