



**Electronics-I**  
**Instrumentation System**  
**[CORE COURSE]**

<b>Semester: II</b>	<b>Credits:2</b>	<b>Subject Code:BS22007</b>	<b>Lectures: 40</b>
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**Course Outcomes:**

**At the end of this course, the learner will be able to:**

Define different OPAMP parameters, comparison of ideal and practical parameters. Identify and discuss OPAMP Applications

- To classify different types of ADC and DAC, apply the knowledge of conversion of digital to analog and vice-versa
- Explain working principle of sensors and transducers and their classification, Identify and apply the knowledge of sensors in smart instrumentation system

<b>Unit 1: Operational Amplifier</b>	<b>16</b>
<ul style="list-style-type: none"> <li>• Symbol, block diagram of op amp , Op amp characteristics, basic parameters(ideal and practical) such as input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, Specification of IC741</li> <li>• concept of negative feedback, Concept of virtual ground , , Op amp as inverting and non-inverting amplifier</li> <li>• Applications of Op amp as voltage follower, adder, subtractor, and comparator.</li> </ul>	

<b>Unit 2 : Data Converters</b>	<b>9</b>
<ul style="list-style-type: none"> <li>• Digital to Analog converters, Need of DAC and its parameters,</li> <li>• weighted resistor network,</li> <li>• R-2R ladder network,</li> <li>• Analog to Digital converters, need of ADC and its parameters</li> <li>• Flash ADC, successive approximation ADC</li> </ul>	

<b>Unit 3: Instrumentation System</b>	<b>15</b>
<ul style="list-style-type: none"> <li>• Block diagram of smart instrumentation systems. Definition of sensors and transducers. Classification of sensors: Active and passive sensors.</li> <li>• Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution, reproducibility.</li> <li>• Working principle and application of -Temperature sensors (LM-35,Thermistor), optical sensor (LDR), Passive Infrared sensor (PIR), Accelerometer sensor, tilt sensor, touch screen sensor(Capacitive type), ultrasonic sensor, Motion Sensor and Image sensor</li> </ul>	

Board Of Studies	Name	Signature
Chairman (HoD)	Swatee Sarwate	<i>Swatee Sarwate</i>



### Reference Books:

- Prof A.D. Shaligram, *Sensors and Transducers*, PHI publication, 2nd Edition
- A. Motorshed , *Electronic Devices and circuits*., Prentice Hall of India.
- Bolyestad, *Electronic Devices and Circuits*., Tata McGraw Hill.
- Ramakant Gaykwad *Op Amp and Linear Integrated Circuits*:

### Websites:

- <https://electronicsforu.com/>
- <https://www.howstuffworks.com/>
- <https://www.instructables.com/>

### E-Resources:

- <https://nptel.ac.in/courses/117/103/117103063/>
- <https://www.youtube.com/watch?v=ZJwCPU7RfQ>
- <https://nptel.ac.in/courses/117/106/117106034/>
- <https://nptel.ac.in/courses/108/108/108108147/>
- <https://www.youtube.com/watch?v=nSeW3R2hr1A>
- <https://www.youtube.com/watch?v=W8dA6npX3pk>
- <https://www.youtube.com/watch?v=vf2IW4LkmMQ>

**Contact Hours: 12 hours for Library work, practical or field work or research purposes**

Board Of Studies	Name	Signature (in white cell)
Chairman (HoD)	Swatee Sarwate	<i>Swatee Sarwate</i> 22/7/20
Faculty	Anitha Menon	<i>A. Menon</i> 22/7/20
VC Nominee (SPPU)	Dr. Neha Deshpande	<i>N. Deshpande</i> 22/7/20
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Alumni	Supriya Palande	<i>S. Palande</i> 22/7/20

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