



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

Semester: II	Credits:2	Subject Code:BS22007	Lectures: 40
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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

Unit 1: Operational Amplifier	16
<ul style="list-style-type: none"> • 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 • concept of negative feedback, Concept of virtual ground , , Op amp as inverting and non-inverting amplifier • Applications of Op amp as voltage follower, adder, subtractor, and comparator. 	

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

Unit 3: Instrumentation System	15
<ul style="list-style-type: none"> • Block diagram of smart instrumentation systems. Definition of sensors and transducers. Classification of sensors: Active and passive sensors. • Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution, reproducibility. • 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 	

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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=vf2lW4LkmMQ>

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	
Subject Expert (Outside SPPU)	Dr. R.K.Kamat		<i>R. Kamat</i> 22/7/20
Subject Expert (Outside SPPU)	Dr. Sangeeta Kale	<i>S. Kale</i> 22/7/20	
Industry Expert	Amber Mukherjee		<i>Amber Mukherjee</i> 22/7/20
Alumni	Supriya Palande	<i>S. Palande</i> 22/7/20	<i>S. Palande</i>

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