



SWARNANDHRA

COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited by NBA, AICTE, NEW DELHI • Accredited by NAAC with "A" Grade

Recognized by UGC Under Sections 2(f) & 12 (B) of UGC Act 1956

Approved by AICTE, New Delhi, Permanent Affiliated to JNTU K, Kakinada

Seetharampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh

Department of Mechanical Engineering

TEACHING PLAN

Course Code	Course Title	Semester	Branch	Contact Periods/ Week	Academic Year	Date of Commencement of Semester
23RB4T02	SENSORS & INSTRUMENTATION	B.Tech / IV	ROBOTICS	5	2025-2026	15/12/2025

Course Outcomes: After successful completion of this course, students should be able to:

1	Recognize with various calibration techniques and signal types for sensors.(K1)
2	Describe the working principle and characteristics of force, magnetic, heading, pressure and temperature, smart and other sensors and transducers.(K2)
3	Apply the various sensors and transducers in various applications(K3)
4	Select the appropriate sensor for different applications.(K4)
5	Determine the application for MEMS & Nano Sensors.(K2)
6	Discuss about the signals from different sensors using Data acquisition systems.(K2)

Unit	Outcome/ Bloom's Level	Topics No.	Topics/ Activity	TextBook/ Reference	Contact Hour	Delivery Method/ LMS
I	CO1: Recognize with various calibration techniques and signal types for sensors.(K1)	1.1	Introduction to Measurements	T1,R1	1	Chalk & Talk, PPT, NPTEL video
		1.2	Basics of Measurement	T1,R1	1	
		1.3	Classification of errors	T1,R1	1	
		1.4	Error analysis	T1,R1	1	
		1.5	Static and dynamic characteristics of Transducers	T1,R1	1	
		1.6	Classification of sensors	T1,R1	1	
		1.7	Performance measures of sensors	T1,R1	1	
		1.8	Sensor calibration techniques	T1,R1	1	
		1.9	Sensor Output Signal Types.	T1,R1	1	
	Content beyond syllabus (if need)		Methods Of Measurements	T1,R1	1	
		Total			10	



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II	CO2: Describe the working principle and characteristics of force, magnetic, heading, pressure and temperature, smart and other sensors and transducers. (K2)	2. MOTION, PROXIMITY AND RANGING SENSORS				
		2.1 Motion Sensors	T1,R2	1	Chalk & Talk, PPT, PBL, NPTEL video.	
		2.2 Potentiometers.	T1,R2	1		
		2.3 Resolver.	T1,R2	1		
		2.4 OpticalEncoders	T1,R2	1		
		2.5 Magnetic Encoders	T1,R2	1		
		2.6 Inductive Encoders&Capacitive Encoders	T1,R2	1		
		2.7 LVDT	T1,R2	1		
		2.8 RVDT	T1,R2	1		
		2.9 Synchro.	T1,R2	1		
		2.10 Microsyn	T1,R2	1		
		2.11 Accelerometer – GPS, Bluetooth	T1,R2	1		
		2.12 Range Sensors – RFbeacons	T1,R2	1		
		2.13 Ultrasonic Ranging,	T1,R2	1		
		2.14 Reflective beacons.	T1,R2	1		
		2.15 Laser Range Sensor (LIDAR)..	T1,R2	1		
Content beyond syllabus (if need)						
Total				15		
III	CO3: Apply the various sensors and transducers in various applications(K3)	3.FORCE, MAGNETIC AND HEADING SENSORS				
		3.1 Strain Gage	T1,R2	1	Chalk & Talk, PPT, NPTEL video	
		3.2 Load Cell	T1,R2	1		
		3.3 Magnetic Sensors –types, principle, requirement and advantages	T1,R2	2		
		3.4 Magneto resistive	T1,R2	1		
		3.5 Hall Effect – Current sensor	T1,R2	1		
		3.6 Heading Sensors	T1,R2	1		
		3.7 Compass	T1,R2	1		
		3.8 Gyroscope	T1,R2	1		
		3.8 Inclinometers	T3,R1	1		
Content beyond syllabus (if need)						
			Total	10		
IV	CO4 & CO5: Select the appropriate sensor for different applications.K4 & Determine the application for MEMS & Nano Sensors.(K2)	4. OPTICAL, PRESSURE AND TEMPERATURE SENSORS.				
		4.1 Photo conductive cell	T2,R1, R2	1	Chalk & Talk, PPT, NPTEL video	
		4.2 photo voltaic Cell	T2,R1, R2	1		
		4.3 Photo resistive	T2,R1, R2	1		
		4.4 LDR	T2,R1, R2	1		
		4.5 PressureFiber optic sensors	T2,R1, R2	1		



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		4.6	Diaphragm&Bellows	T2,R1, R2	1	
		4.7	Piezoelectric-Tactile sensors	T2,R1, R2	1	
		4.8	Temperature – IC, Thermistor	T2,R1,	1	
		4.9	RTD, Thermocouple	R2	1	
		4.10	Acoustic Sensors – flow and level measurement	T2,R1,	1	
		4.11	Radiation Sensors – SmartSensors	T1, R2	1	
		4.12	Radiation Sensors- Film sensor	T2,R1,	1	
		4.13	MEMS & Nano Sensors	R2	1	
		4.14	LASER sensors	T2,R1,	1	
Content beyond syllabus (if need)						
				Total	13	

V	CO6: Discuss about the signals from different sensors using Data acquisition systems. (K2).	5. SIGNAL CONDITIONING AND DAQ SYSTEMS			
		5.1	Amplification	T1,T2, R1	1
		5.2	Filtering – Sample and Hold circuits	T1,T2, R1	2
		5.3	Data Acquisition	T1,T2, R1	1
		5.4	Single channel data acquisition	T1,T2, R1	1
		5.5	Multichannel data acquisition	T1,T2, R1	1
		5.6	Data logging.	T1,T2, R1	1
		5.7	AutomobileData logging.	T1,T2, R1	1
		5.8	Aerospace Data logging.	T1,T2,	1
		5.9	Home appliances Data logging.	T2, R1	1
		5.10	ManufacturingData logging.	T1,T2,	1
		5.11	Environmental monitoring Data logging.	T1, R1	1
Content beyond syllabus (if need)					
				Total	12

		Cumulative Proposed Periods	60

Text Books:

S. No.	Author, Book Title, Edition, Publisher, Year of Publication
1	Ernest O Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill, 2009.
2	Sawney A K and Puneet Sawney, "A Course in Mechanical Measurements and Instrumentation and Control", Dhanpat Rai & Co, 12th edition New Delhi, 2013.

Chalk & Talk,
PPT,
NPTEL video



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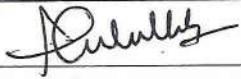
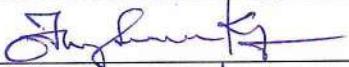
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Reference Books:

S. No	Authors, Book Title, Edition, Publisher, Year of Publication
1	C. Sujatha ... Dyer, S.A., Survey of Instrumentation and Measurement, John Wiley & Sons, Canada, 2001.
2	Kurt Tönshoff (Editor), Ichiro, "Sensors in Manufacturing" Volume 1, Wiley-VCH April2001.
3	John Turner and Martyn Hill, "Instrumentation for Engineers and Scientists", Oxford Science Publications, 1999.
4	Patranabis D, "Sensors and Transducers", 2nd Edition, PHI, New Delhi, 2011.
5	Richard Zurawski, "Industrial Communication Technology Handbook" 2nd edition, CRC Press, 2015.

Web Details:

1	https://onlinecourses.nptel.ac.in/noc23_ee105/preview
2	https://onlinecourses.nptel.ac.in/noc24_ee83/preview
3	https://onlinecourses.nptel.ac.in/noc21_ee32/preview
4	https://nptel.ac.in/courses/117108107

		Name	Signature with Date
i.	Faculty	Mr. Abdul Azeez	
ii.	Course Coordinator	Mr. B. Mahesh Krishna	
iii.	Module Coordinator	Dr. Francis Luther King	
iv.	Programme Coordinator	Dr. Francis Luther King	




Principal