SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
Narsapur, West Godavari District, A.P. 534280
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

TEACHING PLAN

Course Code	Course Title	Semester	Branch	Contact Period/Week	Academic Year	Course Commencement Date
23EC6E03	Smart and Wireless Instrumentation	VI	ECE	5	2025-26	10-12-2025

COURSE OUTCOMES:	
At the end of the Smart and Wireless Instrumentation Course student can able to	
CO1.	Analyze Smart and Wireless Instrumentation with respect to various performance parameters. [K4]
CO2.	Demonstration of various Node Architectures and Applications of WSN. [K3]
CO3.	Demonstration of Fundamentals of Wireless Digital Communication [K3]
CO4.	Analyze the power sources, Demonstrate an ability to design strategies as per needs and specifications [K4]

Unit No.	Out Comes/ Bloom's Level	Topics No	Topics/Activity	Number of periods	Text Book/ Reference	Delivery Method
1	**CO1:** Analyze Smart and Wireless Instrumentation with respect to various performance parameters	**UNIT-I: INTRODUCTION**			T1,T2	Chalk & Talk, PPT, Active Learning & Tutorial.
		1.1	Smart Instrumentation Materials	1		
		1.2	Automation systems	1		
		1.3	Ensign and Sensors	1		
		1.4	Sensor Classifications	1		
		1.5	Wireless Sensor Networks	1		
		1.6	History of Wireless Sensor networks	1		
		1.7	Communication in a WSN	1		
		1.8	Important design constraints of a WSN like Energy	1		
		1.9	Self Management	1		
		1.10	Wireless Networking	1		
		1.11	Decentralized Management	1		
		1.12	Design Constraints and Security etc.	1		
			Class Test	1		
				13		

2	**CO2:** Demonstration of various Node Architectures and Applications of WSN.	**UNIT-II :NODE ARCHITECTURE**			T1, T2	Chalk & Talk, PPT, Active Learning & Tutorial.
		2.1	The sensing subsystem	1		
		2.2	Analog to Digital converter	1		
		2.3	The processor subsystem	1		
		2.4	Architectural overview	1		
		2.5	Microcontroller	1		
		2.6	Digital signal processor	1		
		2.7	Application specific integrated circuit	1		
		2.8	Field programmable gate array (FPGA)	1		
		2.9	Communication interfaces	1		
		2.10	Serial peripheral interface	1		
		2.11	Inter integrated circuit	1		
		2.12	The IMote node architecture	1		
		2.13	The XYZ node architecture	1		
		2.14	The Hog throb node architecture	1		
			Class Test	1		
				15		
3	**CO2:** Demonstration of various Node Architectures and Applications of WSN.	**UNIT-III: FUNDAMENTALS OF WIRELESS DIGITAL COMMUNICATION**			T1, T2	Chalk and Talk, PPT and Tutorial
		3.1	Basic components	2		
		3.2	Source encoding	1		
		3.3	The efficiency of a source encoder	1		
		3.4	Pulse code modulation and delta modulation	1		
		3.5	Channel encoding	1		
		3.6	Types of channels	1		
		3.7	Information transmission over a channel	1		
		3.8	Error recognition and correction	1		
		3.9	Modulation and modulation types	1		
		3.10	Quadratic amplitude modulation	1		
		3.11	Signal propagation.	1		
			Class Test	1		
				13		
4	**CO3:** Demonstration of Fundamentals of Wireless Digital Communication	**UNIT- IV: FREQUENCY OF WIRELESS COMMUNICATION**			T1, T2,T3	Chalk & Talk, Smart Class, PPT Tutorial, & Case Study
		4.1	Development of Wireless Sensor Network based on Microcontroller and communication device- Zigbee Communication device	2		
		4.2	Power sources	1		
		4.3	Energy Harvesting Solar and Lead acid batteries	1		
		4.4	RF Energy /Harvesting-Energy	1		
		4.5	Harvesting from vibration	1		
		4.6	Thermal Energy Harvesting-Energy.	1		
		4.7	Management Techniques	1		
		4.8	Calculation for Battery Selection	1		
			Class Test	1		
				10		
5	**CO4:** Analyze the power sources, Demonstrate an ability to design strategies as per needs and specifications	**UNIT- V : APPLICATIONS**			T2, T3	Chalk & Talk, Smart Class, PPT Tutorial, & Case Study
		5.1	Structural health monitoring	1		
		5.2	Sensing seismic events	1		
		5.3	Single damage detection using natural frequencies	1		
		5.4	Multiple damage detection using natural frequencies	1		
		5.5	Multiple damage detection using mode shapes	1		
		5.6	Coherence	1		
		5.7	Piezoelectric effect	1		

		5.8	Traffic control	1		
		5.9	Health care - available sensors	1		
		5.10	Pipeline monitoring	1		
		5.11	Precision agriculture	1		
		5.12	Active volcano	1		
		5.13	Underground mining	1		
			Class Test	1		
				14		
			TOTAL	65		

Text Books:	
S.No	
1	Waltenegus Dargie, Christian Poellabauer, Fundamentals of wireless sensor networks theory and practice , A John Wiley and Sons, Ltd., Publication.
2	Subhas Chandra Mukhopadhyay, Smart Sensors, Measurement and Instrumentation, Springer Heidelberg, New York, Dordrecht London, 2013.
3	HalitEren: Wireless Sensors and Instruments Networks, Design and Applications, CRC Press, Taylor and Francis Group, 2006.
Reference Books:	
1	Chapman & Hall, Uvais Qidwai, Smart Instrumentation: A data flow approach to Interfacing", 1st Edn, December 2013.
2	Edgar H. Callaway Jr. and Ed gar H. Callaway. Wireless Sensor Networks: Architectures and Protocols, CRC Press and Auerbach Publications.
Web Details:	
1	www.nptel.ac.in
2	www.slideshare.net
3	https://youtu.be/Z-Hw3CpPVj0
4	https://www.youtube.com/channel/UCSk8Ys0LqZF8sjcOUCnFN3Q

		Name	Signature with Date
i.	Faculty	Mr.Ch.K.L.Rao.	9/12/25
ii.	Course Coordinator	Mr.Ch.K.L.Rao.	9/12/25
iii.	Module Coordinator	Dr.B.V.Ramana	9/12/25
iv.	Programme Coordinator	Dr.B.Subrahmanyeswara Rao.	

Principal
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