

Branch Name:	Information and Communication Technology
Program Code:	ET107
Semester/Year:	Semester VII/ Fourth Year
Course Title:	Professional Elective –IV: Wireless Sensor Network
Course Code:	2ET1070704T
Pre-requisite Course:	Introductory knowledge of data communication, Electronic measurements, measuring instruments & transducers, Digital and Analog Communication, Signals & Systems.

Course Objective:

- 1.The course will provide fundamental about many theoretical & practical concepts that form the basis for Wireless Sensor Networks (WSN).
- 2.The students will learn starting from the fundamentals of WSN to the various protocols i.e. routing protocols, MAC protocols, includes S-MAC, B-MAC as well as the real-time traffic & security protocols for WSN.
- 3.Students will also get an exposure to design principles for WSN with single-node architecture and its prototypes for various applications of WSN.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction to Sensor Networks: Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks.	9	20
2	Fundamentals and Enabling Technologies: Mobile Ad-hoc Networks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks. Issues and challenges in wireless sensor networks	9	20
3	Communication Protocols for WSN: Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and ZigBee	7	15
4	Data Management and Quality in WSN: Dissemination protocol for large sensor network, Data dissemination, data gathering and data fusion; Quality of a sensor network; Real-time traffic support and security protocols.	9	20
5	Design Principles and Gateway Concepts: Design Principles for WSNs, Gateway Concepts, Need for gateway, WSN to Internet Communication and Internet to WSN Communication.	5	12

6	Sensor Node Architecture and Hardware Components: Single-node architecture and prototypes i.e. The IMote Node Architecture, The XYZ Node Architecture, The Hogthrob Node Architecture. Hardware components i.e. Temperature sensors, Pressure sensors, Displacement sensors, MEMS sensors etc. & design constraints.	6	13
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List of References:

1. Waltenegus Dargie, Christian Poellabauer, “Fundamentals of Wireless Sensor Networks Theory and Practice”, By John Wiley & Sons Publications, 2011
2. Sabrie Soloman, “Sensors Handbook” by McGraw Hill publication. 2009
3. Feng Zhao, Leonidas Guibas, “Wireless Sensor Networks”, Elsevier Publications, 2004
4. Kazem Sohrby, Daniel Minoli, “Wireless Sensor Networks”: Technology, Protocols and Applications, Wiley-Inter science
5. Philip Levis, And David Gay "TinyOS Programming" by Cambridge University Press 2009
6. Kazem Sohrby, Daniel Minoli, Taieb Znati “Wireless Sensor Networks”: Technology, Protocols and Applications, Wiley-India Edition

E-Resources:

1. <https://archive.nptel.ac.in/courses/106/105/106105160/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand emerging research areas in the field of sensor networks.	2 Understanding
CLO2	Understand MAC protocols used for different communication standards used in WSN.	2 Understanding 4 Analyze
CLO3	Explore new protocols for WSN resource management.	3 Applying 4 Analyze
CLO4	Design of WSN for different applications.	5 Synthesis

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes(POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H	M	M	L	L	L					H	H	H	L	M	
CLO2	M	M	M	M	L	L					M	M	M	L	M	L
CLO3	M	M	H	M	H	M					M	M	M	H		H
CLO4	H	M	H	M	M	M					L	L	M	H		

H:High, M:Medium, L:Low