GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering
Level: PG
Subject Code: ME02027011
Subject Name : Wireless Sensor Network

WEF Academic Year :	2024-25
Semester :	2
Category of the Course :	PCC

Prerequisite :	Wireless Communication, Data Communication and Networking
Rationale :	Now a day, wireless sensor networks are used in many applications like habitat monitoring or in areas where human interventions is hazardous. Wireless sensor network is an emerging area which utilizes network of sensor nodes which are tiny in size and battery operated. They required to be used very power efficiently so that network lifetime is optimized and provide reliable communication to the base station. By learning this subject the students will appreciate the recent trends of wireless sensor networks, their design constraints and challenges.

Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Teaching and Examination Scheme:

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks .	UN
02	Analyse the sensor network platform and tools state-centric programming.	AN
03	Select the appropriate infrastructure, topology, joint routing and information aggregation for wireless sensor networks	EL

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*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	Unit 1: Introduction and overview of sensor network architecture and its applications, sensor network comparison with Ad Hoc Networks, Sensor node architecture with hardware and software details.	**07**	**20**
2	Unit 2: Hardware: Examples like mica2, micaZ, telosB, cricket, Imote2, tmote, btnode, and Sun SPOT, Software (Operating Systems): tinyOS, MANTIS, Contiki, and RetOS.	**08**	**20**
3	Unit 3: Programming tools: C, nesC. Performance comparison of wireless sensor networks simulation and experimental platforms like open source (ns-2) and commercial (QualNet, Opnet)	**07**	**10**
4	Unit 4:Overview of sensor network protocols (details of atleast 2 important protocol per layer): Physical, MAC and routing/ Network layer protocols, node discovery protocols, multi-hop and cluster based protocols, Fundamentals of 802.15.4, Bluetooth, BLE (Bluetooth low energy), UWB.	**08**	**20**
5	Unit 5: Data dissemination and processing; differences compared with other database management systems, data storage; query processing.	**07**	**15**
6	Unit 6: Specialized features: Energy preservation and efficiency; security challenges; fault- tolerance, Issues related to Localization, connectivity and topology, Sensor deployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research, and Enabling technologies in wireless sensor network.	**08**	**15**
	Total	**45**	**100**

Reference Book :

- Karl and A. Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley & Sons, India, 2012.
- C. S. Raghavendra, K. M. Sivalingam, and T. Znati, Editors, “Wireless Sensor Networks”, Springer Verlag, 1 st Indian reprint,2010.
- F. Zhao and L. Guibas, “Wireless Sensor Networks: An Information Processing Approach”, Morgan Kaufmann, 1 st Indian reprint,2013.

- YingshuLi, MyT. Thai, Weili Wu, “Wireless sensor Network and Applications”, Springer series on signals and communication technology, 2008.

Suggested Course Practical List :

List of Open Source Software/learnng website: sensors.cs.umass.edu/

List of Laboratory/Learning Resources Required :

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