

Course Code	Course Title	L	T	P	C
1152EC225	WIRELESS ADHOC AND SENSOR NETWORKS	2	0	2	3

a. Course Category

Program Elective

b. Preamble

This course will provide students with an understanding of wireless adhoc and sensor networks enable them to recognize the wide range of applicability of these networks and provide them with an understanding of the major design issues including topics such as protocol mechanisms and resource constraints

c. Prerequisite

Nil.

d. Related Courses

Data Communication Networks, Internet of Things

e. Course Outcomes

Upon the successful completion of the course, student will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on Revised Bloom's Taxonomy)
CO1	Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks	K2
CO2	Describe the MAC protocol issues of ad hoc networks	K2
CO3	Describe routing protocols for ad hoc wireless networks with respect to TCP design issues	K2
CO4	Explain the concepts of network architecture and MAC layer protocol for WSN	K2

CO5	Discuss the WSN routing issues by considering QoS measurements	K2
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f. Correlation of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	L	L	M	-	-	L	-	--	-	-	-	-	-
CO2	L	-	-	M	-	-	-	L	-	-	-	-	-	-
CO3	H	L	L	M	-	-	-	L	-	-	-	-	L	L
CO4	M	-	-	L	-	-	-	-	-	-	-	-	-	-
CO5	M	-	-	-	-	L	-	-	-	-	-	-	-	-

g. Course Content

UNIT I INTRODUCTION 9

Fundamentals of Wireless Communication Technology -The Electromagnetic Spectrum - Radio propagation Mechanisms - Characteristics of the Wireless channel mobile ad hoc networks (MANETs) - Wireless Sensor Networks (WSNs): concepts and architectures - Applications of Ad Hoc and Sensor Networks - Design Challenges in Ad hoc and Sensor Networks.

UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS 9

Issues in designing a MAC Protocol - Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks - Design Goals of a MAC Protocol for Ad Hoc Wireless Networks - Classification of MAC Protocols -Contention based protocols - Contention based protocols with Reservation Mechanisms - Contention based protocols with Scheduling Mechanisms - Multi channel MAC - IEEE 802.11.

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS9

Routing Protocol: Issues in designing a routing protocol for Ad hoc networks - Classification- proactive routing - reactive routing (on-demand) - hybrid routing - Transport Layer protocol for Ad hoc networks - Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks -Classification of Transport Layer solutions-TCP over Ad hoc wireless - Network Security - Security in Ad Hoc Wireless Networks - Network Security Requirements.

UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS 6

Single node architecture: hardware and software components of a sensor node -WSN Network architecture: typical network architectures -data relaying and aggregation strategies -MAC layer protocols: self-organizing - Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

Issues in WSN routing –OLSR - Localization –Indoor and Sensor Network Localization - absolute and relative localization - triangulation - QOS in WSN - Energy Efficient Design – Synchronization.

List of experiments:(Using MATLAB/NS3)

S.No.	List of experiment	Co's	Skill level
1	Node creation and deployment	CO4	SO3
2	Cluster formation	CO4	SO3
3	Cluster head selection using LEACH protocol	CO4	SO3
4	Routing in wireless sensor network using AODV protocol	CO5	SO3
5	Localization using TOA	CO5	SO3
6	Security in WSN using RSA algorithm	CO5	SO3
7	Creating attacks in WSN	CO5	SO3

Total hours: 60

h) Learning Resources

Text Books

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Pearson Education, 2008.
2. Labiod. H, "Wireless Adhoc and Sensor Networks", Wiley, 2008.
3. Li, X, "Wireless ad -hoc and sensor Networks: theory and applications", Cambridge University Press, 2008.

Reference Books

1. Carlos De MoraesCordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2nd edition, 2011.
2. Feng Zhao and LeonidesGuibas, "Wireless Sensor Networks", Elsevier Publication
3. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005 (soft copy available)
4. KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley, 2007. (soft copy available)
5. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.(soft copy available)

Online Resources

1. www.wirelessnetworksonline.com
2. www.securityinwireless.com
3. www.ida.liu.se/~petel71/SN/lecture-notes/sn.pdf

Practice Aspects

1. NS2 Simulator tool