

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7E2 WIRELESS ADHOC AND SENSOR NETWORKS	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1. To understand the basics of Ad-hoc & Sensor Networks.
2. To learn various fundamental and emerging protocols of all layers.
3. To study about the issues pertaining to major obstacles in establishment and efficient management of Ad-hoc and sensor networks.
4. To understand the nature and applications of Ad-hoc and sensor networks.
5. To understand various security practices and protocols of Ad-hoc and Sensor Networks.

Prerequisite: Computer networking concepts

COURSE CONTENTS

UNIT I -MAC & TCP IN AD HOC NETWORKS

Fundamentals of WLANs, IEEE 802.11 Architecture, Self-configuration and Auto configuration, Issues in Ad-Hoc Wireless Networks, MAC Protocols for Ad-Hoc Wireless Networks, Contention Based Protocols-TCP over Ad-Hoc networks, TCP protocol overview-TCP and MANETs, solutions for TCP over Ad-Hoc Networks.

UNIT II-ROUTING IN AD HOC NETWORKS

Routing in Ad-Hoc Networks, Introduction, Topology based versus Position based Approaches, Proactive, Reactive, Hybrid Routing Approach, Principles and issues ,Location services ,DREAM ,Quorums based location service, Grid-Forwarding strategies, Greedy packet forwarding ,Restricted directional flooding, Hierarchical Routing, Issues and Challenges in providing QoS.

UNIT III-MAC, ROUTING & QOS IN WIRELESS SENSOR NETWORKS

Introduction, Architecture, Single node architecture, Sensor network design considerations ,Energy Efficient Design principles for WSNs, Protocols for WSN, Physical Layer : Transceiver Design considerations, MAC Layer Protocols ,IEEE802.15.4 Zigbee, Link Layer and Error Control issues-Routing Protocols, Mobile Nodes and Mobile Robots, Data Centric & Contention

Based Networking ,Transport Protocols & QOS, Congestion Control issues ,Application Layer support.

UNIT IV -SENSOR MANAGEMENT

Sensor Management, Topology Control Protocols and Sensing Mode Selection Protocols, Time synchronization, Localization and positioning, Operating systems and Sensor Network programming, Sensor Network Simulators.

UNIT V -SECURITY IN AD HOC AND SENSOR NETWORKS

Security in Ad-Hoc and Sensor networks, Key Distribution and Management, Software based Anti-tamper techniques, water marking techniques, Defence against routing attacks, Secure Ad-hoc routing protocols, Broadcast authentication WSN protocols, TESLA, Biba, Sensor Network Security Protocols, SPINS.

Learning Outcomes:

At the end of this course, students will be able to:

1. Identify different issues in wireless ad hoc and sensor networks.
2. To analyze protocols developed for ad hoc and sensor networks.
3. To identify and address the security threats in ad hoc and sensor networks.
4. Establish a Sensor network environment for different type of applications.

BOOKS RECOMMENDED:

- [1].Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.
- [2].Carlos De Moraes Cordeiro, Dharma Prakash Agrawal "Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing, 2011.
- [3].C.Siva Ram,Murthy and B.S.Manoj, "Ad Hoc Wireless Networks–Architectures and Protocols", Pearson Education, 2004.
- [4].C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
- [5].Erdal Çayırıcı , Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009.

List of Practical Assignments:

Practical based on open source Sensor network Simulator.