INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

WIRELESS ADHOC AND SENSOR NETWORKS								
VI Semester: CSE (CS)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACCD12	Elective	3	0	0	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Prerequisites: Network Security								

I. COURSE OVERVIEW:

Ad hoc networks are created between two or more wireless PCs together, without the use of a wireless router or an access point. The basic knowledge of the MAC protocols, routing protocols, transport layer protocols, sensor network networks, and wireless LANs and PANs. It focuses on disaster relief, conference, hospital, campus, and battlefield environments, with laptops, palmtops, cellular phones, or other devices serving as nodes.

II. COURSE OBJECTIVES:

The students will try to learn:

- **I** The basic concepts of wireless LANs and comparison of wired and wireless LANs.
- **II** The operation and performance of various Ad-hoc wireless network protocols.
- **III** The function of security practices and protocols of Ad-hoc and Sensor Networks.
- **IV** The performance and characteristics of basic protocols involved in wired/wireless communication process

III. COURSE OUTCOMES:

At the end of the course, students should be able to:

- CO1 **Understand** and recognize the importance of Wireless LANs (WLANs) and Personal Area Networks (PANs). Identify the IEEE 802.11 standards and their significance in wireless networking
- CO2 **Define** the objectives and requirements for designing effective MAC protocols. Explore other variations and advancements in MAC protocols.
- CO3 **Find out** the challenges and considerations in designing routing protocols for Ad Hoc networks and investigate hybrid and power-aware routing protocols.
- CO4 **Define** the objectives and requirements for designing effective transport layer protocols.
- CO5 **Understand** how data dissemination and gathering work in sensor networks
- CO6 **Learn** about location discovery techniques in sensor network.

IV. COURSE CONTENT:

MODULE – I: WIRELESS LANs AND PANs (09)

Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF. ADHOC Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks.

MODULE – II: MAC PROTOCOLS (10)

Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention – Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

MODULE – III: ROUTING PROTOCOLS (09)

Introduction, Issues in Designing a Routing Protocol for ADHOC Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols.

Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols.

MODULE - IV: TRANSPORT LAYER PROTOCOLS (10)

Introduction, Issues in Designing a Transport Layer Protocol for ADHOC Wireless Networks, Design Goals of a Transport Layer Protocol for ADHOC Wireless Networks, Classification of Transport Layer Solutions, TCP Over ADHOC Wireless Networks, Other Transport Layer Protocol for ADHOC Wireless Networks.

MODULE – V: SENSOR NETWORK SECURITY (10)

Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks.

V. TEXTBOOKS:

1. C. Siva Ram Murthy and B.S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols”, Prentice Hall (PHI), 1st edition, 2004.
2. Jagannathan Sarangapani, “Wireless Ad- Hoc and Sensor Networks: Protocols, Performance and Control”, CRC Press.1st Edition, 2007.

VI. REFERENCE BOOKS:

1. C.K. Toh, “Ad- Hoc Mobile Wireless Networks: Protocols & Systems”, Pearson Education, 1 st Edition, 2004.
2. C. S. Raghavendra, Krishna M. Sivalingam, “Wireless Sensor Networks”, Springer, 2004.William Stallings, “Computer Organization and Architecture”, Pearson Edition, 8th edition, 2010.

VII. ELECTRONIC RESOURCES:

1. https://www.worldscientific.com/worldscibooks/10.1142/8066
2. https://onlinelibrary.wiley.com/doi/book/10.1002/9780470610893
3. http://www.oldcitypublishing.com/journals/ahswn-home/

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Open-ended experiments
5. Definitions and terminology

6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. PowerPoint presentation
11. E-Learning Readiness Videos (ELRV)