INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ADHOC WIRELESS NETWORKS								
VII Semester: ECE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AECD51	**Elective**	3	-	-	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Prerequisite: Wireless Communication Networks								

I. COURSE OVERVIEW:
The aim of this course is to give an up-to-date overview of modern wireless access technologies. This course covers major aspects of adhoc networks, from design through performance issues to application requirements. It starts with characteristics features, applications of adhoc networks, Modulation techniques and voice coding. Various aspects of wireless networking will be covered including: fundamentals of cellular communication, mobile radio propagation, multiple access techniques, mobility support, channel allocation, Wireless PAN/LAN/MAN standards, mobile ad-hoc networks, wireless sensor networks, and routing in wireless and mobile networks. It also covers the IEEE 802.11 Wireless LAN and Bluetooth standards

II. COURSES OBJECTIVES:
The students will try to

I. Classify routing protocols for adhoc wireless networks.
II. Discuss the Pros and Cons of a routing Protocol that uses GPS Information for an Ad hoc wireless Network for search and rescue operation.
III. List the characteristics of ideal routing protocol for adhoc wireless network.
IV. Identify the working mechanism of Ad-hoc Wireless Networks using multicast routing protocols.
V. Analyze the various design issues and challenges in the layered architecture of Adhoc wireless networks
VI. Analyze energy management in ad-hoc wireless networks

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO1: Compare the differences between cellular and adhoc networks and analyze the challenges at various layers and applications.
CO2: Summarize the protocols used at the MAC layer and scheduling mechanisms.
CO3: Implement different type of applications for smart phones and mobile devices with latest network routing strategies.
CO4: Describe the issues and challenges faced in designing a security protocol for adhoc wireless networks.
CO5: Examine security measures present at different levels and identify the possible improvements for the latest version of the ad hoc network.
CO6: Evaluate the energy management schemes and quality of service solution in adhoc networks

IV. COURSE CONTENT:

MODULE - I: AD-HOC WIRELESS NETWORKS (09)

Ad-hoc Wireless Networks Introduction, Issues in Ad-hoc Wireless Networks, Ad-hoc Wireless Internet; MAC Protocols for Ad-hoc Wireless Networks: Introduction, Issues in Designing a MAC Protocol, Design Goals of MAC Protocols, Classification of MAC protocols, Contention-Based Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based Protocols with Scheduling Mechanisms, MAC Protocols that Use Directional Antennas.

MODULE –II: ROUTING PROTOCOLS FOR AD-HOC WIRELESS NETWORKS (09)

Routing Protocols for Ad-hoc Wireless Networks Introduction, Issues in Designing a Routing Protocol for Ad-hoc Wireless Networks; Classification of Routing Protocols; Table Driven Routing Protocols; On-Demand Routing Protocols, Hybrid Routing Protocols, Hierarchical Routing Protocols and Power-Aware Routing Protocols.

MODULE –III: MULTICAST ROUTING IN AD-HOC WIRELESS NETWORKS (10)

Multicast Routing in Ad-hoc Wireless Networks Introduction, Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols.

Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols and Mesh-Based Multicast Routing Protocols

MODULE –IV: TRANSPORT LAYER AND SECURITY PROTOCOLS FOR AD-HOC NETWORKS (10)

Transport Layer and Security Protocols for Ad-hoc Networks: Introduction, Issues in Designing a Transport Layer Protocol; Design Goals of a Transport Layer Protocol; Classification of Transport Layer Solutions; TCP over Transport Layer Solutions; Other Transport Layer Protocols for Ad-hoc Networks; Security in Ad-hoc Wireless Networks, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management and Secure Touting Ad-hoc Wireless Networks.

MODULE –V: QUALITY OF SERVICE IN AD-HOC WIRELESS NETWORKS (10)

Quality of Service and Energy Management in Ad-hoc Wireless Networks: Introduction, Issues and Challenges in Providing QoS in Ad-hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions; Energy Management in Ad-hoc Wireless Networks: Introduction, Need for Energy Management in Ad-hoc Wireless Networks, Classification of Energy Management Schemes, Battery Management Schemes, Transmission Management Schemes, System Power Management Schemes.

V. TEXT BOOKS:

1. C. Siva Ram Murthy & B. S. Manoj: Ad-hoc Wireless Networks, 2nd Edition, Pearson Education, 2011.
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000.

VI. REFERENCE BOOKS:

1. Ozan K. Tonguz and Gianguigi Ferrari: Ad-hoc Wireless Networks, John Wiley, 2007.
2. Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du: Ad-hoc Wireless Networking, Kluwer Academic Publishers, 2004.
3. C.K. Toh: Ad-hoc Mobile Wireless Networks- Protocols and Systems, Pearson Education, 2002.
4. Adleshein & Gupta, "Fundamentals of Mobile and Pervasive Computing, TMH, 2005
5. Handbook of Ad Hoc wireless network, By Mohamed Illayas, CRC press.

VII. ELECTRONICS RESOURCES:

1. https://wam.ece.ufl.edu/courses/eel6588/
2. https://www.nitt.edu/home/academics/departments/ece/programmes/mtech/commsys/Electives/ec708/
3. https://cse.iitkgp.ac.in/~smisra/course/wasn.html
4. https://archive.nptel.ac.in/courses/106/105/106105160/
5. https://nptel.ac.in/courses/106105160

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Definition and terminology
4. Tech-talk topics
5. Assignments
6. Model question paper - I
7. Model question paper - II
8. Lecture notes
9. Early learning readiness videos (ELRV)
10. Power point presentations