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

COURSE CONTENT

ADVANCED MOBILE AND WIRELESS NETWORKS								
II Semester: ES								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BESE19	**Elective**	3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Computer Networks, Wireless communications and Networks.								

I. COURSE OVERVIEW:
This course introduces fundamental aspects of wireless networks, with emphasis on current and next-generation wireless networks. This course will cover 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. The goal of this course is to introduce the students to state-of-the-art wireless network protocols and architectures in various communication networks.

II. COURSES OBJECTIVES:
The students will try to learn

I. The propagation mechanisms and radio wave propagation to know the behavior of radio waves.
II. The types of wireless local area networks and networking standards for implementing the network of computing devices.
III. The platforms and protocols used in mobile environment.

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

CO1 Understand the fundamentals of mobile communication systems.
CO2 Learn about Carrier Sense Multiple Access with Collision Detection (CSMA/CD).
CO3 Understand the difference between tree-based, mesh-based, and hybrid multicasting protocols.
CO4 Identify the limitations of 2G and 2.5G wireless mobile communication.
CO5 Understand the fading and shadowing concept in wireless communication systems.
CO6 Design 3G and beyond mobile communication systems.

IV. COURSE CONTENT:

MODULE – I: FUNDAMENTALS OF WIRELESS COMMUNICATION TECHNOLOGY (9)
Overview and applications, types of wireless and mobile networks; evolution and challenges of wireless networks; the electromagnetic spectrum; spread spectrum; frequency reuse; radio propagation mechanisms, signals, antennas; characteristics of wireless channels; modulation techniques and multiple access techniques for wireless systems.

MODULE – II: WIRELESS LANS AND PANS (9)
Wireless LANs & PANs: Use and design goals for WLANs; IEEE802.11 standard: architecture, infrastructure vs.

Ad- hoc modes, physical & MAC layer, CSMA/CA mechanism; HIPERLAN 1/2 standards; technical features of HOMERF; BLUETOOTH specifications and architecture; introduction to other PAN technologies and their applications.

MODULE – III: WIRELESS WANS & MANS (9)

The cellular concept; call set-up; frequency reuse channel allocation algorithms; handoffs; mobility management.

Telecommunication Systems: GSM and IS-95 architecture, channels and Call Establishment; Wireless Data Service; Generations in Wireless; DECT, TETRA, UMTS; Satellite Systems.

WiMAX: physical layer, media access control, mobility and networking, overview of IEEE 802.22, Wireless, regional area networks. Wireless internet: address mobility; mobile IP; IP and TCP for wireless domains; WAP.

MODULE –IV: ADHOC WIRELESS NETWORKS: (9)

Introduction; applications & design issues. MAC Protocols for Ad Hoc Wireless Networks: Issues, design goals and classification; Contention based protocols; Contention based mac protocols with reservation and scheduling mechanism; Other MAC Protocols. Cellular Networks and their features.

Intelligent and Internetworking: Introduction, fundamentals of call processing, intelligence in the networks, SS#7 signaling, IN Conceptual Model (INCM), Soft switch, programmable networks, technologies and interfaces for IN.

MODULE – V: MULTICAST ROUTING IN AD HOC NETWORKS (9)

Energy Management in Ad Hoc Wireless Networks: Need and classification of energy management schemes. Transport layer for Ad Hoc Wireless Networks: Introduction and design issues; TCP over Ad Hoc wirelessnetworks. Introduction; Issues; Operation of Multicast Routing Protocols; Classification; Tree-Based Multicast Routing Protocols; Mesh-Based Multicast Routing Protocols; Energy Efficient Multicasting.

V. TEXT BOOKS:

1. Dharma Prakash Agrawal and Qing, a Zeng, introduction to Wireless and Mobile Systems, Tomson, 2006, 2nd Edition, (ISBN: 0-534-49303-3).
2. Jochen Schiller: Mobile Communication.

VI. REFERENCE BOOKS:

1. David Tso & Pramod Viswanath: Fundamentals of Wireless Communication, Cambridge University Press.
2. Ezio Bigler: MIMO Wireless Communications, Cambridge University Press ARM Assembly Language, William Hohl, CRC Press, ISBN:978-81-89643-04-1.

VII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Assignments
4. Model question paper - I
5. Model question paper - II
6. Lecture notes
7. Power point presentations
8. Early Lecture Readiness Videos