Wireless Technology

(Code : ITC603)

Semester VI – Information Technology
(Mumbai University)

Strictly as per New Choice Based Credit and Grading System Syllabus
(Revise 2019 'C' Scheme) of Mumbai University with effective from Academic Year 2021-2022

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(Semester VI – Information Technology, Mumbai University)

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We dedicate this Publication soulfully and wholeheartedly,

in loving memory of our beloved founder director,

Late Shri. Pradeepji Lalchandji Lunawat,

who will always be an inspiration, a positive force and strong support behind us.

"My work is my prayer to God"

- Lt. Shri. Pradeepji L. Lunawat

Soulful Tribute and Gratitude for all Your Sacrifices, Hardwork and 40 years of Strong Vision…

(Book Code : ME183A)

Syllabus…

Wireless Technology : Sem. VI (Information Technology, (MU))

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tut.	Total
ITC603	Wireless Technology	03	–	–	03	–	–	03

Course Code	Course Name	Examination Scheme							
		Theory				Exam Duration (Hrs.)	Term Work	Practical and Oral	Total
		Internal Assessment			End Sem. Exam.				
		Test 1	Test 2	Avg.					
ITC603	Wireless Technology	20	20	20	80	03	—	—	100

Course Objectives :

The course aims :

1. Discuss the Fundamentals of Wireless Communication.
2. Comprehend the Fundamental Principles of Wide Area Wireless Networking Technologies and their Applications.
3. Explain Wireless Metropolitan and Local Area Networks.
4. Describe Wireless Personal Area Networks and Ad hoc Networks
5. Learn and Analyze Wireless Network Security Standards.
6. Study the Design Considerations for Wireless Networks.

Course Outcomes :

On successful completion, of course, learner/student will be able to :

1. Describe the basic concepts of Wireless Network and Wireless Generations.
2. Demonstrate and Evaluate the various Wide Area Wireless Technologies.
3. Analyze the prevalent IEEE standards used for implementation of WLAN and WMAN Technologies
4. Appraise the importance of WPAN, WSN and Ad-hoc Networks.
5. Analyze various Wireless Network Security Standards.
6. Review the design considerations for deploying the Wireless Network Infrastructure.

Prerequisite : Principle of Communication, Computer Network and Network Design, Computer Network Security.

(Book Code : ME183A)

Module 0

Prerequisite :

Digital Modulation Techniques : ASK, FSK, BPSK, QPSK, Electromagnetic Spectrum. **Multiplexing Techniques :** FDM, TDM, OFDM. OSI and TCP / IP Model. Need for Security, Types of Security Threats and Attacks. **(Refer Article-A)**

Module I

Fundamentals of Wireless Communication :

Introduction to Wireless Communication : Advantages, Disadvantages and Applications, **Multiple Access Techniques :** FDMA, TDMA, CDMA, OFDMA ; **Spread Spectrum Techniques :** DSSS, FHSS : **Evolution of Wireless Generations :** 1G to 5G (Based on technological differences and advancements) ; **5G :** Key requirements and drivers of 5G systems, Use cases, Massive MIMO. **(Refer Chapter 1)**

Self-learning Topics : Modulation Techniques - QAM, MSK, GMSK.

Module II

Wide Area Wireless Networks :

Principle of Cellular Communication : Frequency reuse concept, Cluster size and System capacity, Cochannel interference and Signal quality ; **GSM :** System architecture, GSM radio subsystem, Frame structure ; **GPRS and EDGE :** System architecture ; **UMTS :** Network architecture ; **CDMA 2000 :** Network architecture ; **LTE :** Network architecture ; Overview of LoRa and LoRaWAN. **(Refer Chapter 2)**

Self-learning Topics : IS-95.

Module III

Wireless Metropolitan and Local Area Networks :

IEEE 802.16 (WiMax) : Mesh mode, Physical and MAC layer ; **IEEE 802.11(Wi-Fi) :** Architecture, Protocol stack, Enhancements and Applications. **(Refer Chapter 3)**

Self-learning Topics : WLL(Wireless Local Loop).

Module IV

Wireless Personal Area Networks and Ad hoc Networks :

IEEE 802.15.1 (Bluetooth) : Piconet, Scatter net, Protocol Stack ; **IEEE 802.15.4 (ZigBee) :** LR- WPAN Device Architecture, Protocol Stack ; **Wireless Sensor Network :** Design Considerations, Issues and Challenges, WSN Architecture, Applications ; **Introduction of Ad hoc Networks : MANET and VANET :** Characteristics, Applications, Advantages and Limitations ; Overview of E-VANET (Electrical Vehicular AdHoc Networks). **(Refer Chapters 4 and 5)**

Self-learning Topics : HR–WPAN (UWB)

Module V

Wireless Network Security :

Security in GSM ; UMTS Security; Bluetooth Security ; WEP ; WPA2. **(Refer Chapter 6)**

Self-learning Topics : Study of Wireless Security Tools.

Module VI

Wireless Network Design Considerations :

Cisco Unified Wireless Network ; Designing Wireless Networks with Lightweight Access Points and Wireless LAN Controllers. **(Refer Chapter 7)**

Self-learning Topics : Cisco Unified Wireless Network Mobility Services.

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Module 0

Syllabus : Digital Modulation Techniques : ASK, FSK, BPSK, QPSK, Electromagnetic spectrum. **Multiplexing Techniques :** FDM,TDM,OFDM. OSI and TCP/IP model. Need of security, Types of security threats and attacks.

Module I

Syllabus : Introduction to Wireless Communication : Advantages, Disadvantages and Applications, **Multiple Access techniques :** FDMA, TDMA, CDMA, OFDMA ; **Spread Spectrum Techniques :** DSSS, FHSS : **Evolution of Wireless Generations :** 1G to 5G (Based on technological differences and advancements); **5G :** Key requirements and drivers of 5G systems, Use cases, Massive MIMO.

Syllabus : Wireless sensor Network : Design considerations, Issues and Challenges, WSN architecture, Applications. **Introduction to Ad-hoc Networks : MANET and VANET :** Characteristics and Application, Advantage and Limitations ; Overview of E-VANET (Electrical Vehicular Ad-hoc Networks).

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