



Department of Electronics and Communication Engineering		LP: EC22603
B.E/ <del>B.Tech</del> /M.E/ <del>M.Tech</del> : ECE	Regulation: R2022	Rev. No: 00
PG Specialisation : NA		Date: 20/01/2025
Sub. Code / Sub. Name : EC22603 / Wireless Communication		
Unit : I		

**Unit Syllabus:** Spectrum - Large scale path loss – Path loss models: Free Space and Two-Ray models - Link Budget design – Small scale fading - Parameters of mobile multipath channels – Time dispersion parameters - Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

**Objective:** To know the characteristics of the wireless channel

Session No *	Topics to be covered	Ref	Teaching Aids
1	Spectrum, Large scale path loss	1,2,4	PPT
2	Path loss models- Free Space Propagation Model	1,4	PPT
3	Free Space Propagation Model-Problems, Path loss model-Two-Ray Propagation model	1,4	PPT
4	Two-Ray Propagation model-Problems, Link Budget design	1,4	PPT
5	Small scale fading, parameters of mobile multipath channels	1,4	PPT
6	Time dispersion parameters - Coherence bandwidth	1,4	PPT
7	Fading due to Multipath time delay spread - flat fading & frequency selective fading	1,4	PPT
8	Frequency dispersion parameters - Doppler spread & Coherence Time	1,4	PPT
9	Fading due to Multipath Doppler spread - fast fading & slow fading	1,4	PPT
<b>Content beyond syllabus covered (if any):</b> Local propagation effects with mobile radio-Rayleigh Fading & Rician Fading			

\* Session duration: 50 minutes



Sub. Code / Sub. Name: EC22603 / Wireless Communication

Unit : II

**Unit Syllabus:** Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations – Cellular concept Frequency reuse - channel assignment - hand-off - interference & system capacity - trunking & grade of service – Coverage and capacity improvement

**Objective:** To learn the various cellular architectures

Session No *	Topics to be covered	Ref	Teaching Aids
10	Multiple Access techniques-Introduction to Multiple Access-FDMA	1,4	PPT
11	Multiple Access-TDMA, CDMA	1,4	PPT
12	Cellular concept- Capacity calculations	1,4	PPT
13	Capacity of cellular CDMA with multiple cells, Capacity of Space Division Multiple Access	1,4	PPT
	FAT-I		
14	Frequency reuse, Channel Assignment, Illustration of cellular frequency reuse concept	1,6	PPT
15	Hand off strategies-Proper and Improper Hand off Strategies-Prioritizing Handoffs	1	PPT
16	Interference & System Capacity - Co-channel Interference -Average Received power Derivation	1	PPT
17	Trunking & grade of service - Power control for reducing Interference	1	PPT
18	Coverage and capacity improvement - Cell Splitting, Sectoring, Repeaters for Range Extension, Microcell Zone Concept	1,6	PPT
<b>Content beyond syllabus covered (if any):</b> FHMA, Hybrid Spread Spectrum Techniques			

\* Session duration: 50 mins



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Unit : III

**Unit Syllabus:** Structure of a wireless communication link, Principles of Offset-QPSK,  $\pi/4$ -DQPSK, QAM, Minimum Shift Keying, Gaussian Minimum Shift Keying, OFDM principle – Cyclic prefix, Windowing, PAPR

**Objective:** To understand the concepts behind various digital signaling schemes for fading channels

Session No *	Topics to be covered	Ref	Teaching Aids
19	Structure of a Wireless Communication Link, Introduction to Digital Modulation Techniques	1,4	PPT
20	Principles of Offset QPSK — Transmitter & Receiver	1,4	PPT
21	Principles of $\pi/4$ -DQPSK — Transmitter & Receiver	1,4	PPT
22	Principles of QAM — Transmitter & Receiver	1,4	PPT
23	Principles of Minimum Shift Keying— Transmitter & Receiver	1,4	PPT
24	Principles of Gaussian Minimum Shift Keying — Transmitter & Receiver	1,4	PPT
25	OFDM principle	4,5	PPT
26	OFDM - Cyclic prefix, Windowing	4,5	PPT
27	OFDM — PAPR	4,5	PPT

**Content beyond syllabus covered (if any):** Practical applications of OFDM.

\* Session duration: 50 mins



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Unit : IV

**Unit Syllabus:** Fundamentals of Equalization – Adaptive equalization, Linear and Non-Linear equalization, Algorithms for Adaptive Equalization - Zero Forcing and LMS - Principle of Diversity - Micro Diversity and Macro Diversity – Space Diversity - Polarization Diversity - Frequency Diversity - Time Diversity - Diversity combining techniques - Selection Diversity - Switched Diversity - Maximal Ratio Combining - Equal Gain Combining - Rake receiver

**Objective:** To be familiar with various multipath mitigation techniques

Session No *	Topics to be covered	Ref	Teaching Aids
28	Equalization —Introduction, Fundamentals of Equalization,	1,6	PPT
29	Adaptive Equalization	1	PPT
30	Linear and Non-Linear equalization	1	PPT
31	Equalization Algorithms -Zero forcing Algorithms	1.6	PPT
32	Equalization Algorithms - LMS Algorithms	1	PPT
	FAT-II	1,6	PPT
33	Diversity — Principles, Micro & Macro Diversity Techniques	1,2,6	PPT
34	Space Diversity, Polarization Diversity, Frequency Diversity , Time Diversity	1,2,6	PPT
35	Diversity combining techniques- Selection Diversity - Switched Diversity - Maximal Ratio Combining - Equal Gain Combining	1,2,4,5	PPT
36	Rake receiver and its functions	1,2	PPT

**Content beyond syllabus covered (if any):** Equalizers in a Communications Receiver

\* Session duration: 50 mins



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Unit : V

**Unit Syllabus:** GSM - Services and Features - System Architecture - Radio Subsystem - Channel Types - evolution of 2.5 G mobile radio networks - IS-95 - Frequency and Channel Specification - CDMA Channel Modulation Process - key features of IS-95 - 3G WCDMA - UMTS, LTE physical layer - UMTS network architecture - CDMA 2000 physical layer – Introduction to 5G Wireless Technology

**Objective:** To acquire knowledge of a few cellular standards

Session No *	Topics to be covered	Ref	Teaching Aids
37	GSM standardization - architecture and function partitioning	1	PPT
38	GSM radio aspects, Channel types, Frequency and Channel Specification	1,4,5	PPT
39	GSM standardization- Protocol Model, Call Flow Sequences	1,4,5	PPT
40	Evolution to 2.5G Mobile Radio Networks, CDMA Channel Modulation Process	1,4	PPT
41	IS-95 service and Radio Aspects	1,4	PPT
42	Key features of IS-95 CDMA systems, 3G WCDMA	1,4	PPT
43	UMTS, LTE physical layer	1,5	PPT
44	UMTS network architecture, Introduction to 4G and 5G Communication Networks	1,4,5	PPT
45	CDMA 2000 physical layer, 4G WiMax — Introduction to 5G Wireless Technology	1,4,5	PPT
	FAT-III		

**Content beyond syllabus covered (if any):** New aspects that are involved in ongoing 6G research

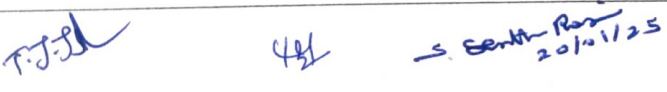

\* Session duration: 50 mins



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**REFERENCES:**

1. Rappaport. T.S., "Wireless communications", Pearson Education, Second edition updated, 3rd impression, 2024.
2. Haykin & Moher, "Modern Wireless Communications" Pearson 2011 (Indian Edition)
3. Vijay K Garg, —Wireless Communications and networking, First Edition, Elsevier 2007
4. Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2006.
5. Andreas Goldsmith, "Wireless Communication Cambridge University Press, Aug-2005.
6. D. Tse and P. Viswanath, "Fundamentals of Wireless Communications," Cambridge University Press, 2005.

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Designation	ASP/ASP/AP	HOD/ECE
Date	20-01-2025	20-01-2025
Remarks *		
Remarks *		

\* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD