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COURSE PLAN

Subject code: EC 8652	**Branch/Year/Sem/Section: B.E ECE/III/VI**
Subject Name: WIRELESS COMMUNICATION	**Batch:2017-2021**
Staff Name: R.KUTTIMANI	**Academic year:2019-2020**

COURSE OBJECTIVE

- Characterize a wireless channel and evolve the system design specifications
- Design a cellular system based on resource availability and traffic demands
- Identify suitable signaling and multipath mitigation techniques for the wireless channel and system under consideration

TEXT BOOK:

T1. Rappaport,T.S., ―Wireless communications‖, Pearson Education, Second Edition, 2010.

T2. Andreas.F. Molisch, ―Wireless Communications‖, John Wiley – India, 2006.

REFERENCES:

R1. Wireless Communication –Andrea Goldsmith, Cambridge University Press, 2011

R2. Van Nee, R. and Ramji Prasad, ―OFDM for wireless multimedia communications, Artech House, 2000

R3. David Tse and Pramod Viswanath, ―Fundamentals of Wireless Communication, Cambridge University Press, 2005.

R4. Upena Dalal, ―Wireless Communication‖, Oxford University Press, 2009.

WEB RESOURCES

W1: https://www.google.com/explained.html

W2: http://nptel.ac.in/courses/10810505/pdf/lesson-2.pdf

W3: http://nptel.ac.in/courses/web courses-contents/IIT%20kharagpur/Embedded%20systems/Pdf/Lesson-13.pdf

TEACHING METHODOLOGIES:

- BB - BLACK BOARD
- PPT - POWER POINT PRESENTATION

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC8652	**WIRELESS COMMUNICATION**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

UNIT I WIRELESS CHANNELS **9**

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.

UNIT II CELLULAR ARCHITECTURE **9**

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.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS **9**

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES **9**

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.

UNIT V MULTIPLE ANTENNA TECHNIQUES **9**

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TOTAL: 45 PERIODS

Topic No	Topic Name	Books For reference	Page No	Teaching Methodology	No of periods required	Cumulative periods
UNIT I	**WIRELESS CHANNELS**					**(9)**
1.	Large scale path loss – Path loss models	T1	105	BB	1	1
2.	Free Space and Two-Ray models- Link Budget design	T1	107-119	BB	1	2
3.	Small scale fading- Parameters of mobile multipath channels	T1	120-125	BB	1	3
4.	Time dispersion parameters- Coherence bandwidth	T1	178-180	BB	1	4
5	Doppler spread & Coherence time	T1	197	BB	1	5
6	fading due to Multipath time delay spread	T1	198-200	BB	1	6
7	flat fading – frequency selective fading	T1	202	BB	1	7
8	Fading due to Doppler spread	T1	203-204	BB	1	8
9	fast fading – slow fading	T1	206-207	BB	1	9
LEARNING OUTCOME: **At the end of unit , the students will be able to** • Know the fundamentals of Free space and two ray models • Understand the concept of Path loss • Define the types of fadings						
UNIT –I I	**CELLULAR ARCHITECTURE**					**(9)**
10	Multiple Access techniques	T1	449-458	BB	1	10
11	FDMA, TDMA, CDMA	T1	480-481	BB	1	11
12	Capacity calculations	T1	471-475	BB	1	12
13	Frequency reuse	T1	57	BB	1	13
14	channel assignment	T1	58-61	BB	1	14
15	hand off- interference & system capacity	T1	62	BB	1	15

16	trunking & grade of service	T1	62-67	BB	1	16
17	Coverage and capacity improvement	T1	67-74	BB	1	17
18	Cellular concept	T1	77-86	BB	1	18

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept of Hand off
- Define Multiple Access techniques

UNIT – III	**DIGITAL SIGNALING FOR FADING CHANNELS**					**(9)**
19.	Structure of a wireless communication link	T1	181-186	BB	1	19
20.	Principles of Offset-QPSK,	T1	301-303	BB	1	20
21.	p/4-DQPSK,	T1	199-201	BB	1	21
22.	Minimum Shift Keying	T1	201-204	BB	1	22
23	Gaussian Minimum Shift Keying	T1	314-318	BB	1	23
24.	Error performance in fading channels	T1	316-321	BB	1	24
25.	OFDM principle	T1	250	BB	1	25
26	Cyclic prefix,	T1	417-418	BB	1	26
27	Windowing, PAPR	T1	318-320	BB	1	27

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept of OFDM
- Understand the concept of Digital

UNIT IV	MULTIPATH MITIGATION TECHNIQUES					(9)
28	Equalization	T1	355-364	BB	1	28
29	Adaptive equalization	T1	366-371	BB	1	29
30	Linear and Non-Linear equalization	T1	374-376	BB	1	30
31	Zero forcing and LMS Algorithms	T1	259-268	BB	1	31
32	Diversity	T1	387	BB	1	32
33	Micro and Macro diversity	T1	343-346	BB	1	33
34	Diversity combining techniques	T1	391-393	BB	1	34
35	Error probability in fading channels with diversity reception	T1	393-395	BB	1	35
36	Rake receiver.	T1	395-398	BB	1	36

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept of Zero forcing and LMS Algorithms.
- Known about Equalization
- Get the knowledge about Micro and Macro diversity

UNIT V	MULTIPLE ANTENNA TECHNIQUES					(9)
37	MIMO systems	T1	464-480	BB	1	37
38	spatial multiplexing	T1	351-355	BB	1	38
39	System model	T1	486	BB	1	39
40	Pre-coding	T1	484	BB	1	40
41	Beam forming	T1	273-274	BB	1	41
42	transmitter diversity	T1	274-276	BB	1	42

43	Channel state information	T1	276-278	BB	1	43
44	capacity in fading	T1	467	BB	1	44
45	non-fading channels	T1	468-500	BB	1	45

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept MIMO system
- Know about the concept of Diversity

COURSE OUTCOME

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

- Ability to understand and analyze Fading.
- Ability to suggest an Digital Signal modulation for a given application.
- Ability to operate various Multiple access system
- Ability to study about the bus Communication
- Ability to acquire knowledge on various wireless communications.
- Ability to understand basics of Diversity

CONTENT BEYOND THE SYLLABUS

Hand off technology

CONTINUES INTERNAL ASSESSMENT DETAILS

ASSESMENT NUMBER	I	II	MODEL
TOPIC NO.(UNIT)	1-18 (1st & 2nd units)	19-36 (3rd & 4th units)	1-45 (units 1-5)

ASSIGNMENT DETAILS

ASSIGNMENT NUMBER	I	II	III
TOPIC NUMBER FOR REFERENCE	1-18 (1st & 2nd units)	19-36 (3rd & 4th units)	1-45 (units 1-5)
DEAD LINE			

ASSIGNMENT NUMBER	BATCH	DESCRIPTIVE QUESTIONS/TOPIC (Minimum of 8 Pages)
I	B1	Time dispersion parameters-Coherence bandwidth

II	B1	Fading due to Doppler spread
III	B1	hand off- interference & system capacity

PREPARED BY **VERIFIED BY**

R.KUTTIMANI, AP/ECE **HOD/ECE**

APPROVED BY

PRINCIPAL