



Kadi Sarva Vishwavidyalaya
Gandhinagar-382015

B.E Semester: 7
Electronics & Communication Engineering
Subject Name: Wireless & Mobile Communication
Subject Code : EC-702

A. Course Objective:

The educational objectives of this course are

- To present a problem oriented introductory knowledge of Wireless And Mobile Communication.
- To address the underlying concepts and methods behind Wireless And Mobile Communication.

B. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY	IE	CIA	PR. / VIVO		
CODE	NAME	Hrs	Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks		
EC- 702	Wireless & Mobile Communication	4	0	2	6	5	3	70	30	20	30	150

C. Syllabus

- 1 **Introduction:** Overview of wireless Communication: History, Technical issues, brief of current wireless systems.
- 2 **Multiple Access Techniques:** Introduction, Comparisons of multiple Access Strategies TDMA, CDMA, FDMA, OFDM .
- 3 **The Cellular Concept- System Design Fundamentals:** Cellular system, Hexagonal geometry cell and concept of frequency reuse, Channel Assignment Strategies Distance to frequency reuse ratio, Channel & co-channel interference reduction factor, S/I ratio consideration and calculation for Minimum Co-channel and adjacent interference, Handoff Strategies, Umbrella Cell Concept, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular System-cell splitting, Cell sectorization , Repeaters, Micro cell zone concept, Channel antenna system design considerations.



Kadi Sarva Vishwavidyalaya

Gandhinagar-382015

- 4 **Mobile Radio Propagation Model, Small Scale Fading and diversity:** Large scale path loss:-Free Space Propagation loss equation, Path-loss of NLOS and LOS systems, Reflection, Ray ground reflection model, Diffraction, Scattering, Link budget design, Max. Distance Coverage formula, Empirical formula for path loss, Indoor and outdoor propagation models, Small scale multipath propagation, Impulse model for multipath channel, Delay spread, Feher's delay spread, upper bound Small scale ,Multipath Measurement parameters of multipath channels, Types of small scale Fading, Rayleigh and rician distribution, Statistical for models multipath fading channels and diversity techniques in brief.
- 5 **Digital Cellular Mobile Systems :** Introduction, GSM(The European TDMA Digital Cellular Standard) ,IS-136 (The north American TDMA Digital Cellular Standard),PDC (The Japan TDMA Digital Cellular Standard), IS-95(North American CDMA Digital Cellular Standard)
- 6 **Mobile Data Communications :** Introduction , Circuits –switching data Service on cellular Networks. ,Packet –switch Data Service on Cellular Networks, DECT(Digital Enhanced Cordless Telecommunications)
- 7 **Recent trends:** Introduction to Wi-Fi, WiMAX, ZigBee Networks, Software Defined Radio, UWB Radio, Wireless Adhoc Network and Mobile Portability, Security issues and challenges in a Wireless network. Third generation global mobile communication, four generation mobile communication system.

D. Lesson Planning

Sr. No.	No. of Hrs.	% Weight-age in Exam	Topic
1	03	07	Introduction Overview of wireless Communication: History, Technical issues, brief of current wireless systems
2	05	08	Multiple Access Techniques: Introduction, Comparisons of multiple Access Strategies TDMA,CDMA, FDMA, OFDM



Kadi Sarva Vishwavidyalaya

Gandhinagar-382015

3	12	22	<p>The Cellular Concept- System Design Fundamentals: Cellular system, Hexagonal geometry cell and concept of frequency reuse, Channel Assignment Strategies Distance to frequency reuse ratio, Channel & co-channel interference reduction factor, S/I ratio consideration and calculation for Minimum Co-channel and adjacent interference, Handoff Strategies, Umbrella Cell Concept, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular System-cell splitting, Cell sectorization , Repeaters, Micro cell zone concept, Channel antenna system design considerations</p>
4	12	22	<p>Mobile Radio Propagation Model, Small Scale Fading and diversity: Large scale path loss:-Free Space Propagation loss equation, Path-loss of NLOS and LOS systems, Reflection, Ray ground reflection model, Diffraction, Scattering, Link budget design, Max. Distance Coverage formula, Empirical formula for path loss, Indoor and outdoor propagation models, Small scale multipath propagation, Impulse model for multipath channel, Delay spread, Feher's delay spread, upper bound Small scale ,Multipath Measurement parameters of multipath channels, Types of small scale Fading, Rayleigh and rician distribution, Statistical for models multipath fading channels and diversity techniques in brief.</p>
5	10	15	<p>Digital Cellular Mobile Systems : Introduction, GSM(The European TDMA Digital Cellular Standard) ,IS-136 (The north American TDMA Digital Cellular Standard),PDC (The Japan TDMA Digital Cellular Standard), IS-95(North American CDMA Digital Cellular Standard)</p>
6	10	15	<p>Digital Cellular Mobile Systems : Introduction, GSM(The European TDMA Digital Cellular Standard) ,IS-136 (The north American TDMA Digital Cellular Standard),PDC (The Japan TDMA Digital Cellular Standard), IS-95(North American CDMA Digital Cellular Standard)</p>
7	08	11	<p>Recent trends: Introduction to Wi-Fi, WiMAX, ZigBee Networks, Software Defined Radio, UWB Radio, Wireless Adhoc Network and Mobile Portability, Security issues and challenges in a Wireless network Third generation global mobile communication, four generation mobile communication system.</p>
TOTAL	60	100	

E. Instructional Method & Pedagogy

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed



Kadi Sarva Vishwavidyalaya

Gandhinagar-382015

- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weight age should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- Experiments shall be performed in the laboratory related to course contents.

Suggested list of Experiments

Sr. No	Name Of Experiment
1	To study about spectrum analyzer 8010/8010tg.
2	To analyze uplink and downlink frequency in spectrum analyzer 8010/8010tg.
3	Process a binary data stream using a communication system that consists of a base band modulator, channel and demodulator. Compute the system's ber. (assume 16-qam).
4	Generate gaussian distribution and rayleight distribution. Plot and compare it with the theoretical gaussian function.
5	To study the effgect of awgn for the sinusoidal signal.
6	Estimate path loss using okumura hata model for a medium size city using given data.
7	To study gsm trainer kit & at command concerning modem and sim card hardware.
8	To study about cdma trainer kit & command concerning trainer kit.
9	To study about wi-fi and wi-max networks.
10	To study about zig-bee network.
11	To study about wireless ad-hoc networks.



Kadi Sarva Vishwavidyalaya

Gandhinagar-382015

12 To study about opnet modeler 14.5.

F. Students Learning Outcomes

On successful completion of the course

- The student can identify different areas of Wireless communication. Can find the applications of all the areas in day to day life. Can identify the operations, working, construction, material etc. aspects of link budget, losses, fading.

G. Recommended Study Materials

Text/ Reference Books:

1. "Wireless Communication", Theodore S. Rappaport, Prentice hall
2. Mobile and personal Communication system and services by Rajpandya , IEEE press (PHI)
3. "Wireless Communications and Networking ",Vijay Garg, Elsevier
4. "wireless mobile communication" T.G.Palanivelu ,R. Nakkeeran,phi