

**FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING**

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

**Department of Information Technology****B.E. (I.T.) (Semester VII) (2018-2019)****Lesson Plan**

Subject: Wireless Technology

Credits: 05

**Syllabus:**

Course Code	Course Name	Teaching Scheme (hrs/week)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical/Oral	Tutorial	Total
BE ITC704	Wireless Technology	04	02	---	04	01	---	05

Course Code	Course Name	Examination Scheme								
		Theory Marks				End Sem. Exam	Term Work	Practical	Oral	Total
		Internal assessment			Avg. of 2 Tests					
		Test 1	Test 2							
BEITC 704	Wireless Technology	20	20	20	80	25	---	25	150	

**Course Objectives:**

Get acquainted with modern wireless communication networks. Evolution of cellular networks, to understand basic framework of various protocols and standards used to develop wireless personal and wide area networks

**Course Outcomes:**

1. Understand the new trends in mobile/wireless communications networks
2. Understand the characteristics of mobile/wireless communication channels
3. Understand the multiple radio access techniques
4. Understand the multiuser detection techniques
5. Understand various wireless networks and their technologies
6. Understand need of securities and economies in wireless systems

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**DETAILED SYLLABUS:**

Sr. No.	Module	Detailed Content	Hours
1	Fundamentals of wireless Communication	<ul style="list-style-type: none"> <li>• Fundamentals of Wireless Communication Advantages, Limitations and Applications</li> <li>• Wireless Media</li> <li>• Infrared Modulation Techniques</li> <li>• DSSS And FHSS</li> <li>• Multiple access technique: TDMA, CDMA, FDMA, CSMA, OFDMA [ fundamentals]</li> <li>• Frequency Spectrum</li> <li>• Radio and Infrared Frequency Spectrum</li> </ul>	08
2	Wireless technology	<ul style="list-style-type: none"> <li>• The cellular concepts: Frequency Reuse, Channel assignment strategies, Handoff strategies Interference and System Capacity [Design problems]</li> <li>• Evolution of cellular networks 1G, 2G, 3G, 4G</li> <li>• GSM: System Architecture, Radio Subsystem, Channel Types, GSM frame structure</li> <li>• CDMA: Architecture, Frequency and channel specifications, forward and Reverse CDMA Channels.</li> </ul>	10
3	Wire less in local loop (WLL)	User requirements of WLL systems, WLL system architecture, MMDS, LMDS, WLL subscriber terminal, WLL interface to the PSTN	04
4	Wire less local area networks (WLAN)	Introduction, WLAN Equipment, WLAN topologies and Technologies, IEEE 802.11 WLAN : Architecture, Physical Layer, Data Link Layer , MAC Layer, Security Latest developments of IEEE 802.11 standards	08
5	Wireless personal area networks (WPAN)	<p>Introduction , WPAN technologies and Protocols,</p> <p>Bluetooth (802.15.1)[ Protocol stack and network connection establishment, security aspects]</p> <p>HR –WPAN ( UWB) ( IEEE 802.15.3 )</p> <p>LR-WPAN ( IEEE 802.15.4 ) Zigbee [ Stack architecture, components , Network Topologies , Applications]</p> <p>Wireless Sensor networks [ Network model and protocol stack ,</p>	08

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		routing algorithms, Applications ]	
6	Wireless metropolitan area networks	IEEE 802.16 [ Protocol Architecture], IEEE 802.16a [Wimax] Wimax and LTE /3GPP comparison	04
7	Security issues in Wireless Systems	The need, attacks , security services, wired equivalent privacy protocol(WEP), Mobile IP, VPN [ PPTP, L2TP, IPSec]	03
8	Economies of Wireless Network	Economic Benefits, Economics of Wireless industry Wireless data forecast, charging issues	03

**Text Books:**

1. Modern wireless communication systems: by Simon Haykin, Michael Moher, adapted by David Koilpillai ; Pearson (Indian edition 2011)
2. Wireless Networks: by Nicopolitidia, M S Obaidat, GI Papadimitriou; Wiley India (student edition 2010)
3. Wireless communications: by T L Singal; Tata McGraw Hill Education private Ltd.( edition 2011)

**References:**

1. Wireless and Mobile Networks: Dr. Sunilkumar S. Manvi & Mahabaleshwar S. Kakkasageri
2. Wireless Communications and Networking: by Vijay K. Garg
3. Wireless Communications: by Theodore S. Rappaport

**Term work:** Students are asked to perform lab sessions using Ns-2 Simulator and Matlab platform.

Assignments should be given based on syllabus.

**Theory Examination:**

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Total 4 questions need to be solved.
3. Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
4. Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

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**Course Outcome:**

Sr.No.	Course Outcome Statement
1	Understand the characteristics of mobile/wireless communication systems and different multiple access techniques.
2	Understand the new trends in mobile/wireless communication systems.
3	Understand the multiuser detection techniques.
4	Understand various wireless networks and their technologies.
5	Understand need of securities in wireless systems.
6	Understand need of economies in wireless systems.

**CO-PO and CO-PSO Mapping**

Course Name	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2											1	1	
CO2	2	2					1				1			1
CO3	1	2					1				1			1
CO4	1	2					2							
CO5	1							1				1	1	1
CO6	1							1				1		

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**CO Assessment tools with target.**

	Direct Methods								Indirect Methods
	Test1	Assig1	Lab Work	Test2	Assig2	University Theory Result	University Oral Result	MCQ	Course Exit Survey
CO1	25%	15%	20%	-	-	20%	20%	-	100%
CO2	30%	30%	10%	-	-	10%	20%	-	100%
CO3	-	-	10%	30%	30%	30%	20%	-	100%
CO4	-	-	30%	20%	20%	20%	10%	-	100%
CO5	-	-	20%	20%	20%	20%	20%	-	100%
CO6	-	-	10%	20%	20%	20%	30%	-	100%

**Lecture Plan:**

<b>No of classes Planned:</b>	<b>28</b>	<b>No of Classes taken:</b>	<b>29</b>	
<b>Sr. No.</b>	<b>Topic Planned</b>	<b>Planned Date</b>	<b>Actual Date</b>	<b>Delivery Mechanisms</b>
1.	Fundamentals of Wireless Communication, Advantages, Limitations and Applications.	01/08/18	02/08/18	Board
2.	Wireless Media, Infrared Modulation Techniques, DSSS and FHSS	02/08/18	03/08/18	PPT, Board
3.	Multiple Access Technique: TDMA, CDMA, FDMA, CSMA, OFDMA, Frequency Spectrum: Radio and Infrared Frequency Spectrum	03/08/18	07/08/18	PPT, Board

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4.	The cellular Concepts: Frequency Reuse, Channel Assignment Strategies, Handoff Strategies	07/08/18	08/08/18	PPT, Board
5.	Interference and System Capacity	08/08/18	09/08/18	PPT, Board
6.	Evolution of Cellular Networks 1G, 2G, 3G and 4G	09/08/18	21/08/18	PPT
7.	GSM: System Architecture, Radio Subsystem, Channel Types, GSM Frame Structure	10/08/18	23/08/18	PPT
8.	GPRS Architecture, EDGE Technology	21/08/18	24/08/18	PPT
9.	CDMA: Architecture, Frequency and channel specifications, forward and reverse CDMA channels	22/08/18	28/08/18	PPT
10.	WLL System: User Requirements, Architecture, LMDS	23/08/18	29/08/18	PPT
11.	MMDS, WLL Subscriber Terminal, WLL interface to PSTN	24/08/18	30/08/18	PPT
12.	WLAN Equipment, WLAN topologies and technologies	28/08/18	31/08/18	PPT
13.	IEEE 802.11 WLAN Architecture	29/08/18	04/09/18	PPT
14.	WLAN Physical Layer, Data Link Layer, MAC Layer	30/08/18	05/09/18	PPT
15.	WLAN Security, Latest Developments of IEEE 802.11 standards	31/08/18	06/09/18	PPT
16.	WPAN technologies and Protocols	04/09/18	07/09/18	PPT
17.	Bluetooth (802.15.1) Protocol Stack and Network Connection Establishment	05/09/18	11/09/18	PPT
18.	Bluetooth Security Aspects, HR-WPAN (UWB) (IEEE 802.15.3)	06/09/18	12/09/18	PPT

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19.	LR-WPAN (IEEE 802.15.4) Zigbee [Stack architecture, components, Network Topologies, Applications)	07/09/18	17/09/18	PPT
20.	Wireless Sensor Networks [Network model and protocol stack]	11/09/18	18/09/18	PPT
21.	WSN Routing algorithms, Applications	12/09/18	19/09/18	PPT
22.	WMAN (IEEE 802.16) [Protocol Architecture]	18/09/18	19/09/18	PPT
23.	IEEE 802.16a [Wimax], Wimax and LTE/3GPP Comparison	19/09/18	21/09/18	PPT
24.	The need of security in wireless networks, attacks, security services	21/09/18	24/09/18	PPT
25.	Wired Equivalent Privacy (WEP) Protocol, Mobile IP	25/09/18	24/09/18	PPT
26.	VPN [PPTP, L2TP, IPsec]	26/09/18	25/09/18	PPT
27.	Economic Benefits, Economics of Wireless Industry	27/09/18	26/09/18	PPT
28.	Wireless Data Forecast, Charging Issues	28/09/18	27/09/18	PPT
29.	Revision	-	27/09/18	Board

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**Lab Plan**

<b>No.</b>	<b>Name</b>	<b>Batch A</b>	<b>Batch B</b>	<b>Batch C</b>	<b>Batch D</b>
1	Installation of NS2 in Ubuntu.	02/08	08/08	03/08	03/08
2	Simple Wired and Wireless Communication in NS2.	02/08	08/08	03/08	03/08
3	MAC Contention Window	23/08	29/08	24/08	24/08
4	RF Propagation Models	23/08	29/08	27/08	24/08
5	DSR Protocol	30/08	05/09	07/09	07/09
6	DSDV Protocol	06/09	12/09	21/09	21/09
7	AODV Protocol	06/09	12/09	21/09	21/09
8	LEACH Protocol	27/09	19/09	28/09	28/09
9	CDMA in Matlab	03/10	03/10	05/10	03/10
10	Spread Spectrum Techniques in Matlab	05/10	03/10	05/10	05/10