

Course Number and Name	
BEC016 - COGNITIVE RADIO	
Credits and Contact Hours	
3 and 45	
Course Coordinator's Name	
Dr S.Arulselvi	
Text Books and References	
Text Books	
1. Joseph Mitola III, "Software Radio Architecture: Object-Oriented Approaches to Wireless System Engineering", John Wiley & Sons Ltd. 2000.	
2. Thomas W.Rondeau, Charles W. Bostain, "Artificial Intelligence in Wireless communication", ARTECH HOUSE .2009.	
3. Bruce A. Fette, "Cognitive Radio Technology", Elsevier, 2009.	
4. Ian F. Akyildiz, Won – Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, "Next generation / dynamic spectrum access / cognitive radio wireless networks: A Survey" Elsevier Computer Networks, May 2006.	
References:	
1. Simon Haykin, "Cognitive Radio: Brain –Empowered Wireless Communications", IEEE Journal on selected areas in communications, Feb 2005.	
2. Hasari Celebi, Huseyin Arslan, "Enabling Location and Environment Awareness in Cognitive Radios", Elsevier Computer Communications , Jan 2008.	
3. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, "Software Defined Radio", John Wiley, 2003.	
4. Huseyin Arslan, "Cognitive Radio, SDR and Adaptive System", Springer, 2007.	
5. Alexander M. Wyglinski, Maziarnekovee, Y. Thomas Hu, "Cognitive Radio Communication and Networks", Elsevier, 2010	
6. www.nptel.ac.in	
Course Description	
<ul style="list-style-type: none"> • Learn the design of the wireless networks based on the cognitive radios • Understand the concepts of wireless networks and next generation networks. 	
Prerequisites	Co-requisites
Computer Communication Networks	Nil
required, elective, or selected elective (as per Table 5-1)	
Selected Elective	
Course Outcomes (COs)	
CO1: Describe the basics of the software defined radios.	
CO2 : To learn the hardware and software architecture of software defined radio	
CO3 : Design the wireless networks based on the cognitive radios.	
CO4 : Gives an understanding of cognitive radio architecture	
CO5: Explain the concepts behind the wireless networks and next generation networks	
CO6 : To have a better understanding of cognitive techniques	

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	H				M	M		H	M	H	
CO2	M	M	M		M		H				
CO3	M	H		M		M					H
CO4	M	H		L			M	M		M	
CO5		M	M		H	M		M	M		M
CO6				M	H	H			M		

List of Topics Covered**UNIT I INTRODUCTION TO SOFTWARE DEFINED RADIO****9**

Definitions and potential benefits, software radio architecture evolution, technology tradeoffs and architecture implications.

UNIT II SDR ARCHITECTURE**9**

Essential functions of the software radio, basic SDR, hardware architecture, Computational processing resources, software architecture, top level component interfaces, interface topologies among plug and play modules,.

UNIT III INTRODUCTION TO COGNITIVE RADIOS**9**

Marking radio self-aware, cognitive techniques – position awareness, environment awareness in cognitive radios, optimization of radio resources, Artificial Intelligence Techniques.

UNIT IV COGNITIVE RADIO ARCHITECTURE**9**

Cognitive Radio - functions, components and design rules, Cognition cycle - orient, plan, decide and act phases, Inference Hierarchy, Architecture maps, Building the Cognitive Radio Architecture on Software defined Radio Architecture.

UNIT V NEXT GENERATION WIRELESS NETWORKS**9**

The XG Network architecture, spectrum sensing, spectrum management, spectrum mobility, spectrum sharing, upper layer issues, cross – layer design.