Diploma, Anna Univ UG & PG Courses

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EC8071 COGNITIVE RADIO

DETAILED SYLLABUS

OBJECTIVES:

The student should be made:

- To understand the evolving software defined radio and cognitive radio techniques and their essential functionalities
- To study the basic architecture and standard for cognitive radio
- To understand the physical, MAC and Network layer design of cognitive radio
- To expose the student to evolving applications and advanced features of cognitive radio

UNIT I INTRODUCTION TO SOFTWARE-DEFINED RADIO AND COGNITIVE RADIO

Evolution of Software Defined Radio and Cognitive radio: goals, benefits, definitions, architectures, relations with other radios, issues, enabling technologies, radio frequency spectrum and regulations.

UNIT II COGNITIVE RADIO ARCHITECTURE

Cognition cycle – orient, plan, decide and act phases, Organization, SDR as a platform for Cognitive Radio – Hardware and Software Architectures, Overview of IEEE 802.22 standard for broadband wireless access in TV bands.

UNIT III SPECTRUM SENSING AND DYNAMIC SPECTRUM ACCESS

Introduction – Primary user detection techniques – energy detection, feature detection, matched filtering, cooperative detection and other approaches, Fundamental Tradeoffs in spectrum sensing, Spectrum Sharing Models of Dynamic Spectrum Access - Unlicensed and Licensed Spectrum Sharing, Fundamental Limits of Cognitive Radio.

UNIT IV MAC AND NETWORK LAYER DESIGN FOR COGNITIVE RADIO

MAC for cognitive radios – Polling, ALOHA, slotted ALOHA, CSMA, CSMA / CA, Network layer design – routing in cognitive radios, flow control and error control techniques.

UNIT V ADVANCED TOPICS IN COGNITIVE RADIO

Overview of security issues in cognitive radios, auction-based spectrum markets in cognitive radio networks, public safety and cognitive radio, cognitive radio for Internet of Things.

TEXT BOOKS:

1. Alexander M. Wyglinski, Maziar Nekovee, Thomas Hou, ―Cognitive Radio Communications and Networks‖, Academic Press, Elsevier, 2010. (Unit I to IV)

2. Huseyin Arslan (Ed.), ―Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Springer, 2007. (Unit V)

REFERENCES:

1. Bruce Fette, ―Cognitive Radio Technology‖, Newnes, 2006.

2. Kwang-Cheng Chen, Ramjee Prasad, ― Cognitive Radio Networks‖, John Wiley and Sons, 2009.

3. Ezio Biglieri, Professor Andrea J. Goldsmith, Dr Larry J. Greenstein, Narayan B. Mandayam, H. Vincent Poor, ―Principles of Cognitive Radio‖, Cambridge University Press, 2012.