COGNITIVE RADIO

Course Code	20EC6401B	Year	II	Semester	II
Course Category	Honors	Branch	ECE	Course Type	Theory
Credits	4	L-T-P	3-1-0	Prerequisites	--
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the design principles on software defined radio and cognitive radio(L2)
CO2	Develop the ability to design and implement algorithms for cognitive radio spectrum sensing and dynamic spectrum access(L3)
CO3	Apply the various routing protocols of cognitive radio in real time wireless applications(L3)
CO4	Apply the knowledge of advanced features of cognitive radio for real world applications(L3)

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)
Note: 1- Weak correlation   2-Medium correlation   3-Strong correlation
   * - Average value indicates course correlation strength with mapped PO

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	2				2									
CO2	3				3	2								3
CO3	2				2									
CO4	3				3	2								
Average * (Rounded to nearest integer)	3				3	2								3

Syllabus		
Unit No.	Contents	Mapped CO
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.	CO1, CO2
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	CO1, CO2
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.	CO1, CO3
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.	CO1, CO4
V	**Cognitive Radio Platforms** 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.	CO1, CO5

Learning Resources
Text Books
1. Alexander M. Wyglinski, Maziar Nekovee, Thomas Hou, ―Cognitive Radio Communications and Networks, Academic Press, Elsevier, 2010.
2. Linda E-Doyle CUP , Essentials of Cognitive Radio — 2009
Reference Books
1 Huseyin Arslan (Ed.), ―Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Springer, 2007. 2.Bruce Fette, ―Cognitive Radio Technology, Newnes, 2006. 3. Kwang-Cheng Chen, Ramjee Prasad, ― Cognitive Radio Networks, John Wiley and Sons,2009.
e- Resources & other digital material
1. https://www.youtube.com/watch?v=z-E5jIoUFbA 2. https://www.youtube.com/watch?v=rWtcfyNpvRM