KUMARAGURU college of technology
character is life

Register Number: ……..

M.E DEGREE EXAMINATIONS: JUNE 2018

(Regulation 2015)

Second Semester

COMMUNICATION SYSTEMS

P15COTE26 : Cognitive Radio

COURSE OUTCOMES

CO1: Appreciate the motivation and the necessity for cognitive radio communication.

CO2: Demonstrate Software Defined Radio techniques.

CO3: Demonstrate the impact of the evolved solutions in future wireless network design.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A): In digital communication systems, the metric of reliability for a given transmission is commonly referred to as the bit error rate (BER) or probability of bit error, which is measured at the receiver output CO1 [K_4]

   Reason (R): Several data transmission applications require a minimum data rate, where the amount of information transferred from information source to information sink must be achieved within a specific time duration

   a) Both A and R are Individually true and R is the correct explanation of A
   b) Both A and R are Individually true but R is not the correct explanation of A
   c) A is true but R is false
   d) A is false but R is true

2. SDR is based on which of the following principles CO1 [K_1]

   a) Dynamic Spectrum Cost
   b) Dynamic Spectrum Auction
   c) Dynamic Spectrum Access
   d) Dynamic Spectrum Overflow

3. Gaps in the bandwidth with respect to utilization is termed as, CO1 [K_2]

   a) Spectrum Gaps
   b) Spectrum Limited Access
   c) Spectrum Holes
   d) Spectrum Diversity

4. Match List I with List II CO1 [K_4]

List I	List II
A. SDR	i. PDR
B. Broadband DSP	ii. FPGA, SoC, GPPS & DSP
C. Noise reduction	iii. Simplex, Complex & Q Connected
D. Function call parameters	iv. Heterodyne & Super Heterodyne

	A	B	C	D
a)	ii	i	iv	iii
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	Iv

5. Assertion (A): In a heterodyne system, mixer is driven by an LO whose frequency determines the channel selection CO2 [K_3]

Reason (R): Phase noise is considered to be an important characteristic of an LO

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

6. The processing model core for decision making and trigger events in Cognitive Radio environments is called, CO2 [K_2]

a) Spectrum Manager
b) Spectrum Data Logger
c) Spectrum Allocator
d) Spectrum Data Core

7. Allocation of band to a secondary user is done through Spectrum _____ and vacating the band when needed is Spectrum _____ CO2 [K_2]

a) Mobility, Access
b) Sensing, Management
c) Sensing, Mobility
d) Access, Vacating

8. The stages of a Cognition Cycle for PnP devices are ordered as follows; CO2 [K_3]

a) Observe, Decide, Act, Learn
b) Observe, Act, Learn, Decide
c) Observe, Decide, Learn, Act
d) Observe, Learn, Decide, Act

9. Which IEEE standard determines the features of a Cognitive Radio? CO3 [K_2]

a) IEEE 802.11 b) IEEE 802.5

c) IEEE 802.22 d) IEEE 802.10

10. Which is a proper sequence for a DSP receiver? CO3 [K_2]

a) AGC, BPF, LNA, ADC b) ADC, BPF, AGC, LNA

c) BPF, LNA, AGC, ADC d) LNA, BPF, AGC, ADC

PART B (10 x 2 = 20 Marks)

11.	Compare software architecture with radio architecture	CO1	[K_4]
12.	Justice the reason for the following statement; “SDR does not require new architectural infrastructure”	CO1	[K_5]
13.	Name the functional components of Cognitive Radio Architecture	CO1	[K_2]
14.	What is a spectrum hand off?	CO2	[K_2]
15.	What is meant by plug and play in the SDR interface?	CO2	[K_1]
16.	Interpret the driving requirements in evolution of SDR	CO2	[K_2]
17.	Classify the sensing mechanism in cognitive radios	CO2	[K_4]
18.	Give the relationship between cognitive radio and SDR	CO2	[K_2]
19.	Categorize the design rules of cognitive radio	CO3	[K_4]
20.	Identify the parameters to represent the quality of the particular spectrum band	CO3	[K_3]

PART C (10 x 5 = 50 Marks)

21.	List primary reasons that the military sector might embrace the open architecture SDR	CO1	[K_4]
22.	Briefly discuss the importance of any six components to the overall performance of SDR	CO1	[K_6]
23.	Express how acoustic based sensors are utilized for cognitive location aware applications	CO2	[K_2]
24.	Discuss the methods to estimate the position using radio sensing sensors	CO2	[K_6]
25.	Compare intelligent radio and policy based radio	CO2	[K_5]
26.	Draw the block diagram of SDR	CO2	[K_1]
27.	Estimate the parameters that affect the quality of the user application in cross layer spectrum management.	CO3	[K_5]
28.	Elaborate the Challenges in spectrum management	CO3	[K_6]
29.	Classify the spectrum sensing techniques	CO3	[K_4]
30.	Assess the Open research issues for routing in XG networks	CO3	[K_5]

Answer any TWO Questions
PART D (2 x 10 = 20 Marks)

31.	(i) Describe RF front end in SDR architecture.	(5)	CO1	[K_2]
	(ii) Identify the components of Digital back end in SDR and explain.	(5)	CO1	[K_3]
32.	(i) Explain the XG network communication functionalities with an appropriate Diagram.	(5)	CO3	[K_2]
	(ii) Describe the physical architecture of the cognitive radio.	(5)	CO3	[K_2]
33.	(i) Examine how will emerging CR services differentiate products.	(5)	CO2	[K_4]
	(ii) Analyze the benefits of CR to users on the way to a vision of the future.	(5)	CO2	[K_4]

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