Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014

Subject code: 734401 Date: 27-11-2014

Subject Name: Software Radio Design

Time: 02:30 pm - 05:00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Define Software Defined Radio (SDR). Discuss basic model of Software Defined Radio.	**07**
	(b)	List and explain advantages of Software Radio.	**07**
Q.2	**(a)**	Compare direct digital synthesis and analog signal synthesis.	**07**
	(b)	Discuss the ROM compression techniques with reference to direct digital synthesis.	**07**
		OR	
	(b)	Explain pulsed output approach for direct digital synthesis. What is its limitation?	**07**
Q.3	**(a)**	Discuss the decimation process for digital down conversion, with necessary equations and sketches.	**07**
	(b)	Write a short note on CIC filters.	**07**
		OR	
Q.3	**(a)**	With reference to software defined radio discuss any one RF transmitter front end topology.	**07**
	(b)	Justify the following statement: ñFor software defined radio the dynamic range is a principle challenge of receiver designò	**07**
Q.4	**(a)**	Discuss the role and significance of DSP processors for the implementation of software defined radio.	**07**
	(b)	What features do FPGAs have that are beneficial for the implementation of software defined radio?	**07**
		OR	
Q.4	**(a)**	List and explain benefits of smart antenna.	**07**
	(b)	Explain diversity combining techniques with respect to smart antenna algorithm.	**07**
Q.5	**(a)**	Explain how non-integer rate conversion is achieved in digital down conversion.	**07**
	(b)	Write a short note on SPEAKeasy Phase-I, as a case study of software defined radio.	**07**
		OR	
Q.5	**(a)**	For a discrete-time signal with sampling rate of 90 kHz. The signal has the desired information in the frequency band from 0 to 450 Hz (pass-band), and the band from 450 to 500 Hz is the transition band. The signal is to be decimated by a factor of ninety. The required tolerances are a pass-band ripple of 0.002 and a stop-band ripple of 0.001. Find the computational complexity in terms of number of multiplications per	**07**

second for decimation in three stages with decimation factors of 15, 3 and 2.

(b) Write a short note on wireless information transfer system, as a case study of software defined radio. **07**

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