Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – SUMMER • 2015

Subject Code: 151004 **Date: 07/05/2015**

Subject Name: Electronic Communication

Time: 02.30pm-05.00pm **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)**	Find the Fourier transform of i) $u(t)$, ii) $\delta(2\pi f)$	**06**
	(b)	Draw block diagram of superheterodyne receiver and explain function of each block.	**06**
	(c)	Why we need modulation?	**02**
Q.2	**(a)**	An AM signal is represented by the expression $V(t) = 5[1 + 0.6\cos(6280t)]\sin(2\pi \times 10^4 t)$ volts Find the (a) Minimum amplitude of AM wave, (b) Maximum amplitude of AM wave , (c) Various frequency components and their amplitude in given signal.	**07**
	(b)	Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of (a) 100 percent, and (b) 50 percent.	**07**
		OR	
	(b)	An angle-modulation signal with carrier frequency $\omega_c = 2\pi \times 10^5$ is described by the equation $Ø_{EM} = 10\cos(\omega_c t + 5\sin 3000t + 10\sin 2000\pi t)$ (a) Find the Power of the modulated signal. (b) Find the frequency deviation Δf . (c) Find the Deviation ratio β. (d) Estimate the bandwidth of $Ø_{EM}(t)$.	**07**
Q.3	**(a)**	For series tuned circuit derive expression for resonance frequency, series Q-factor and the -3dB bandwidth. Give the uses of this circuit in communication.	**07**
	(b)	Define Shot Noise and Partition Noise. A Mixer stage has a noise figure of 20 dB and it is preceded by an amplifier with a noise figure of 9dB. Calculate the overall noise figure referred to the input.	**07**
		OR	
Q.3	**(a)**	Define the Noise, Noise factor, Equivalent noise temperature and importance of S/N ratio in communication.	**07**
	(b)	Discus the Phasing Method for SSB Generation.	**07**
Q.4	**(a)**	Explain the working of diode envelope detector and give the remedies for Diagonal Peak Clipping.	**07**
	(b)	What is Pre-emphasis? Why it is used? Sketch a typical pre-emphasis circuit and explain why de-emphasis must be used also.	**07**
		OR	
Q.4	**(a)**	Write a short note on " Automatic Gain Control " in superheterodyne receiver.	**07**
	(b)	List the various angle modulation detectors methods. Discuss any one in detail.	**07**

Q.5	**(a)**	State and prove the following Fourier Transform properties i) Time-scaling Property, ii) Frequency-shifting Property.	**07**
	(b)	Explain phase locked loop and vestigial sideband transmission.	**07**

OR

Q.5	**(a)**	Estimate the essential bandwidth W (in rad/s) of the signal $e^{-at}\,u(t)$ if the essential band is required to contain 95% of the signal energy.	**07**
	(b)	Find the Friiss formula (equivalent noise factor) for amplifiers connected in cascade.	**07**

****