Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–IV • EXAMINATION – SUMMER • 2014

Subject Code: X41101 **Date: 17-06-2014**

Subject Name: Electronic Communication

Time: 10:30 am - 01:00 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)**	Explain super-heterodyne FM receiver with necessary block diagram.	**07**
	(b)	What is modulation? What is the need of modulation?	**07**
Q.2	**(a)**	Define demodulation. Explain envelop detector for AM demodulation. What is the effect of value of RC time constant?	**07**
	(b)	What are the different methods of SSB generation? Explain filter method with block diagram	**07**
		OR	
	(b)	Derive the equation for AM wave and draw the frequency spectrum for the AM wave.	**07**
Q.3	**(a)**	Three resistors have values R1=10KΩ, R2=15KΩ, and R3=24KΩ. It is known that the thermal noise voltage generated by R1 is 0.3 μV. Calculate the thermal noise voltage generated by the three resistors connected in: a) series b) parallel	**07**
	(b)	The output current of a 60% modulated AM generator is 1.5A. To what value will this current rise if the generator is modulated additionally by another audio wave, whose modulation index is 0.7?	**07**
		OR	
Q.3	**(a)**	A modulating signal is given by $e_m = \sin \omega_m t + 3 \sin 3\omega_m t$ and the carrier by $e_c = 10 \sin \omega_c t$, and f_c=500 KHz and $f_m = 4KHz$. Draw the spectrum for modulated wave and determine the average powers for a) carrier, b) each sideband, given that load resistance is 50 Ω.	**07**
	(b)	What is a signal? Explain different types of signal distortion over a communication channel.	**07**
Q.4	**(a)**	Define Pre-Emphasis and De-emphasis. Why we need this network in FM?	**07**
	(b)	Find the Fourier transform of the signal: a) $y(t) = A * sin\omega_0 t$ b) $x(t) = 5[u(t+3) + u(t+2) - u(t-2) - u(t-3)]$	**07**
		OR	
Q.4	**(a)**	Describe the following properties of Fourier transform: (1)Time differentiation (2) Frequency shifting	**07**
	(b)	What is multiplexing? Write a short note on FDM.	**07**
Q.5	**(a)**	Explain briefly thermal noise, partition noise and solar noise. Why they are generated?	**07**
	(b)	Draw parallel tuned circuit and derive the equation for resonant frequency and Q factor.	**07**

OR

Q.5	**(a)**	Derive the formula for the instantaneous value of an FM voltage and define the modulation index.	**07**
	(b)	Draw series tuned circuit and derive the equation for resonant frequency and Q factor.	**07**

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