Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V(OLD) EXAMINATION – SUMMER 2019

Subject Code:151004 **Date:20/06/2019**

Subject Name:Electronic Communication

Time:02:30 PM TO 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.**

			MARKS
Q.1	**(a)**	Draw the block diagram of a communication system and briefly describe the function of each block.	**07**
	(b)	List different types of noises in communication systems. Derive and expression for noise factor for amplifiers in cascade.	**07**
Q.2	**(a)**	List any five properties of Fourier Transform. Prove any two of them.	**07**
	(b)	Draw neat block diagram of a super heterodyne radio receiver and explain the function of each block.	**07**
		OR	
	(b)	Define the following terms with reference to radio receivers: Selectivity, Sensitivity, Fidelity, AGC, Tracking, Tuning range and Spurious responses.	**07**
Q.3	**(a)**	Define resonance. Draw the circuit of a series resonance circuit. Write expression for frequency of resonance. Define its Q factor. Express its impedance in terms of Q. Draw the magnitude of impedance vs. freq. graph for this circuit. Also, define 3-dB bandwidth.	**07**
	(b)	Two resistors of 20 Ω and 50kΩ are at room temperature. For a bandwidth of 100 kHz, calculate the thermal noise voltage generated by (i) each resistor (ii) two resistors in series (iii) the two resistors in parallel.	**07**
		OR	
Q.3	**(a)**	Define mutual inductance. State the use of dot conventions in inductive circuits. Write expressions for total series inductance, total parallel inductance, minimum inductance, maximum inductance and coupling factor for a circuit with mutual inductance.	**07**
	(b)	Explain Parseval's theorem for signal energy. Verify this theorem for a signal $g(t) = e^{-at} u(t)$ (a>0). Also, find Energy spectral density of this signal.	**07**
Q.4	**(a)**	A signal $m(t) = 3 \cos (2\pi\ 1000\ t)$ is amplitude modulated by carrier $c(t) = 10 \cos (2\pi\ 30{,}000\ t)$. Find modulation index. Draw spectrum of modulated signal. Determine the bandwidth of the modulated signal. Find upper side frequency and lower side frequency. Also, find total average power of the modulated signal, assuming the power is delivered to a ohm load resistor.	**07**
	(b)	Derive an expression for DSBSC signal for a single balanced FET modulator circuit.	**07**

OR

Q.4	**(a)**	Draw the block diagram and derive the expression for SSBSC signal generation using phasing method.	**07**
	(b)	Explain the working of envelope detector circuit with neat circuit and waveforms. Also, list the distortions observed in envelope detector and the conditions to avoid those distortions.	**07**
Q.5	**(a)**	Sketch angle θ(t) as a function of time for a 100MHz carrier wave which is modulated by a 1kHz square wave that has zero DC component and Vpp = 20 V. The frequency deviation constant is 9 kHz/V. Also, plot instantaneous freq. vs. time and graph and modulated signal.	**07**
	(b)	Draw the block diagram of Armstrong method of FM generation and explain its working.	**07**

OR

Q.5	**(a)**	Draw the block diagram of Phase Lock Loop FM- demodulator and explain its working with relevant equations.	**07**
	(b)	Compare AM, FM and PM signals in terms of its power, bandwidth, time domain waveforms, frequency domain waveforms, number of sidebands, modulation indexes and equation of modulated signal considering sinusoidal modulating signal.	**07**

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