GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2020

Subject Code:2151004   Date:05/02/2021

Subject Name:Electronic and Communication

Time:10:30 AM TO 12:30 PM   Total Marks: 56

Instructions:
1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1	**(a)**	Define terms modulation and demodulation with respect to the communication process.	**03**
	(b)	Differentiate passive and active components used to design communication circuits. Also describe mutual inductance effect.	**04**
	(c)	With help of neat diagram describe the working principle of diode envelope detector circuit used for amplitude demodulation process. Also determine the total power radiated by an antenna, given that with modulation index 30% a transmitter supplies 8 KW carrier signal power to it.	**07**
Q.2	**(a)**	Comment on bandwidth requirement of a sinusoidal AM and FM wave during its propagation in channel medium.	**03**
	(b)	A sinusoidal carrier signal having amplitude 10 V and frequency 1000 KHz is amplitude modulated with sinusoidal information signal having amplitude 5 V and frequency 100 KHz. Calculate (1) power in side bands (2) total power in AM wave.(Assume R=1 ohm)	**04**
	(c)	Explain the trapezoidal method for monitoring the A.M waveform using oscilloscope in detail. Also define term Skin effect.	**07**
Q.3	**(a)**	Compare DSB-FC and SSB –SC modulation schemes and prove that use of SSB technology is preferable as compared to use of DSB technology.	**03**
	(b)	Compare FM and AM methods. Also describe the Armstrong method for generating FM waves with help of neat diagram.	**04**
	(c)	An FM wave is described as, $e(t) = 10 \sin (5 \times 10^8 t + 4 \sin 1250 t)$ Determine the values of (i) The carrier frequency (ii) Modulating frequency (iii) The modulation index and (iv) Carrier frequency deviation for the same.	**07**
Q.4	**(a)**	Describe the significance of synchronous product detector in SSB demodulation process.	**03**
	(b)	Explain the basic working principle of FM detector. Also describe working of foster seeley discriminator circuit with neat diagram.	**04**
	(c)	Enlist all SSB modulation schemes. Explain the Phasing method for the same.	**07**
Q.5	**(a)**	List out basic functions of communication receiver circuit.	**03**
	(b)	Define term tracking with respect to a superhetrodyne receiver. Also explain the three points tracking process used in radio receiver.	**04**

(c) Describe briefly shot noise, partition noise and flicker noise with all details. **07**

Q.6 **(a)** Describe the equations of resonance frequency, Q factor and the – 3 dB bandwidth of the series tuned circuits. **03**

(b) Derive the general Friis's formula to define noise factor of cascaded amplifiers. **04**

(c) With help of neat general diagram describe the working of a super heterodyne receiver. **07**

Q.7 **(a)** Mention the significance of series tuned circuit in the communication process. **03**

(b) Describe briefly about the HAM radio **04**

(c) State and prove properties of Fourier transform. **07**

Q.8 **(a)** Mention the significance of parallel tuned circuit in the communication process. **03**

(b) Describe utilization of HAM radio in natural calamities. **04**

(c) State the Parseval's theorem. Also define terms ESD and PSD. **07**

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