

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-V • EXAMINATION – WINTER 2013

Subject Code: 151004**Date: 02-12-2013****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)** Answer the following in brief **08**
- (i) Explain the need of communication.
 - (ii) A receiver connected to an antenna whose resistance is $60\ \Omega$ has an equivalent noise resistance of $40\ \Omega$. Calculate the receiver's noise figure in decibels and its equivalent noise temperature.
 - (iii) What is the difference between SSB and VSB wave?
 - (iv) Explain what double spotting is and how it arises.
- (b)** Answer the following **06**
- (i) Compare FM and AM
 - (ii) A broadcast AM transmitter radiates 50 kW of carrier power. What will be the radiated power at 85 % modulation?
- Q.2 (a)** Define signal to noise ratio and noise figure of a receiver. When might the latter be a more suitable piece of information than the equivalent noise resistance? **07**
- (b)** A parallel tuned circuit, having a Q of 20, is resonated to 300 MHz with a 20 pica farad capacitor. If this circuit is maintained at 19°C , what noise voltage will a wideband voltmeter measure when placed across it? **07**
- OR**
- (b)** The RF amplifier of a receiver has an input resistance of $800\ \Omega$, and equivalent shot noise resistance of $1800\ \Omega$, a gain of 20, and a load resistance of $100\ \text{k}\Omega$. Given that the bandwidth is 1.1 MHz and the temperature 15°C , calculate the equivalent noise voltage at the input to this RF amplifier. If this receiver is connected to an antenna with an impedance of $65\ \Omega$, calculate the noise figure. **07**
- Q.3 (a)** What are the advantages of SSB modulation? Explain the SSB and derive the total power in SSB. **07**
- (b)** A 350 W carrier is AM to a depth of 100%. Calculate the total power in case of SSB technique. How much power saving is achieved for SSB compared to AM. If the depth of modulated is changed to 75%, then how much power is required for transmitting the SSB wave? Compare the powers required for SSB in both the cases and comment on the reason for change in power level. **07**
- OR**
- Q.3 (a)** Mention the different component of VSB wave. Explain the various techniques for generation of VSB signals. **07**

- (b) The output power of 60% modulated AM generator is 2 A. To what value will this current rise if the generator is modulated additionally by another audio wave, Whose modulation index is 0.6? What will be the percentage power saving if the carrier and one of the sideband are now suppressed. **07**
- Q.4** (a) Of all the frequencies that must be rejected by superheterodyne receiver, why is the image frequency so important? What is the image frequency, and how does it arises? If the image frequency rejection of a receiver is insufficient, what steps could be taken to improve it? **07**
- (b) Write short note on series and parallel tuned circuits. **07**
- OR**
- Q.4** (a) List and discuss the factors influencing the choice of intermediate frequency for a radio receiver. **07**
- (b) Write short note on signal energy and energy spectral density and signal power and power spectral density. **07**
- Q.5** (a) Draw the complete block diagram of the Armstrong frequency modulation system and explain the functions of the mixer and multipliers shown. In what circumstances can we dispense with the mixer? **07**
- (b) Calculate the image rejection of receiver having RF amplifier and an IF of 450 kHz , if Qs of the relevant coils are 65, at an incoming frequency of (i) 1200 kHz (ii) 20 MHz. **07**
- OR**
- Q.5** (a) Explain fully the difference between frequency and phase modulation, beginning with the definition of each type and the meaning of the modulation index in each case. **07**
- (b) Write short note on Pre-emphasis and De- emphasis. **07**
