

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- V<sup>th</sup> SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 151004****Date: 05/06/2012****Subject Name: Electronics Communication****Time: 02:30 pm – 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.

- Q.1** Answer the following **14**
- (i) Draw the block diagram of the basic communication system
  - (ii) What is modulation and why modulation is required in communication?
  - (iii) Define : Amplitude modulation  
Frequency modulation
  - (iv) Explain briefly : Noise factor  
Signal to Noise ratio
  - (v) Define : Figure of merit ( Q- factor )  
Resonance frequency
  - (vi) Why IF is generated at receiver? List the factors influencing the choice of IF for radio receiver.
  - (vii) Write difference between FM and AM receivers

- Q.2** (a) Draw and explain block diagram of the Superhetrodyne Receiver with necessary waveforms **07**
- (b) Draw and explain working of parallel tuned circuit. Derive expression for resonance frequency, Q-factor and impedance of parallel tuned circuit. **07**

**OR**

- (b) A high frequency transformer has identical primary and secondary circuits for which  $L_p = L_s = 150 \mu\text{H}$  ,  $C_p = C_s = 470 \text{ pF}$  and the Q-factor for each circuit alone is 85. The co-efficient of coupling is 0.001. The load resistance is  $5000\Omega$  and the constant current source feeding the transformer has an internal resistance of  $75\Omega$ . Calculate the transformer impedance at resonance. **07**

- Q.3** (a) What are the natural sources of noise? Explain Shot noise, Partition noise and Flicker noise. **07**
- (b) Two resistance of  $20\text{K}\Omega$  and  $50 \text{ K}\Omega$  are at room temperature (290K). For a bandwidth of 100 kHz , calculate the Thermal noise voltage generated by (i) each resistor (ii) the two resistors in series (iii) the two resistors in parallel **07**

**OR**

- Q.3** (a) What tracking means in a superhetrodyne receiver? Explain three points tracking in radio receiver. **07**
- (b) What is image frequency? An AM broadcast receiver has an IF of 465 kHz and tuned to 1000 kHz and the RF stage has one tuned circuit with Q of 50. Calculate image frequency and image rejection in decibels. **07**

- Q.4** (a) (i) What advantages are of transform techniques? Write properties of Fourier Transform with their equations. (03) **07**
- (ii) Explain briefly : (04)
- signal energy and energy spectral density
- signal power and power spectral density
- (b) Draw and explain block diagram of double conversion superhetrodyne receiver with RF and IF stage response curve **07**

**OR**

- Q.4** (a) Compare DSB and VSB techniques for amplitude modulation with necessary waveforms and derivations. **07**
- (b) What are the different methods for generation of SSB signals? Explain SSB generation by phase shift method with necessary block diagram and derivations. **07**

- Q.5** (a) Compare and Contrast following : **07**
- Wideband and narrowband FM
- Frequency modulation and phase modulation
- (b) Draw only block diagram of Armstrong indirect FM transmitter and discuss the nature of distortion inherent in Armstrong indirect FM generator. **07**

**OR**

- Q.5** (a) (i) Define following for FM : (02) **07**
- Frequency deviation , Modulation index
- Deviation ratio , Percentage modulation
- (ii) An angle-modulated signal with carrier frequency  $\omega_c = 2\pi \times 10^5$  is describe by the equation (05)
- $\phi_{EM}(t) = 10\cos(\omega_c t + 5 \sin 3000t + 10 \sin 2000\pi t)$
- Calculate power of the modulated signal , frequency deviation , deviation ratio , phase deviation ratio and estimate the bandwidth of  $\phi_{EM}(t)$
- (b) (i) Sketch  $\phi_{EM}(t)$  for modulation indices  $\mu = 0.5$ ,  $m(t) = B\cos \omega_m t$ . Determine  $\eta$  and percentage of total power carried by sidebands of the AM waves for tone modulation **07**
- (ii) Draw and explain circuit of envelope detector for AM.

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