

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER V • EXAMINATION – WINTER - 2012****Subject code: 151004****Date: 16-01-2013****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.

- Q.1 (a)** An FM wave is given by $e(t) = 20\sin(6 \times 10^8 t + 7\sin 1250 t)$. Determine (i) The carrier frequency (ii) Modulating frequency (iii) The modulation index (iv) The maximum deviation. **07**
- (b)** The noise figure of a receiver is 20dB and it is fed by a LNA which has a gain of 40dB and noise temperature of 80 °K. Calculate the overall noise temperature of the receiver system and the noise temperature of the receiver. **07**
- Q.2 (a)** Define Superhetrodyne principal. Draw the superhetrodyne receiver block diagram with signal spectra and briefly explain each block. **07**
- (b)** With related to Amplitude modulation discuss following parameters **07**
- (i) Modulation index (ii) Modulation depth (iii) Bandwidth requirement
(iv) Power distribution in sidebands and carrier
- OR**
- (b)** A series tuned circuit has a Q of 130 and a tuning capacitance of 250pF and is resonant at 450kHz. Determine (i) the impedance at resonance, and (ii) the relative response of circuit at a frequency of 400 kHz. **07**
- Q.3 (a)** List the methods used to generate SSB modulation signal. Discuss any one method in detail. **07**
- (b)** Explain the working of amplitude demodulator circuit with the remedy for avoiding diagonal peak clipping and negative peak clipping. **07**
- OR**
- Q.3 (a)** Define noise factor. Drive the Friis's formula for noise factor when amplifiers are in cascade connection. **07**
- (b)** Define the energy spectral density. Estimate the essential bandwidth W rad/s of the signal $e^{-at} u(t)$ if the essential band is required to contain 97% of the signal energy. **07**
- Q.4 (a)** Define the unit impulse signal. Find the Fourier transform of unit impulse signal and sinusoidal signal $\cos 2\pi f_0$. **07**
- (b)** Write a short note on Automatic Gain control in Superhetrodyne receiver. **07**
- OR**
- Q.4 (a)** Discuss the importance of Pre-emphasis and De-emphasis circuits in FM broadcasting.. **07**
- Q.4 (b)** Discuss the basic principal of FM detection and explain Foster-seeley Discriminator. **07**
- Q.5 (a)** Find the equation for resonant frequency and -3db bandwidth in parallel tuned circuit. **07**
- (b)** State the Parseval's theorem. Prove it for the signal : $g(t) = e^{-at} u(t)$ ($a > 0$). **07**
- OR**
- Q.5 (a)** State and prove the following Fourier transform properties **07**
- (i) Time-Scaling property, (ii) Time integration property.
- (b)** Explain briefly what is meant by skin effect and why it is undesirable. What steps may be taken to reduce skin effect in inductors? **07**
