

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER-IV • EXAMINATION – SUMMER 2013

Subject Code: X41101

Date: 04-06-2013

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) Define (1) Modulation (2) Noise (3) Noise factor **03**
 - (b) Explain double conversion in superhetrodyne receiver. Which are the advantages of double conversion receiver compared to single conversion receiver? **04**
 - (c) (1) A standard AM transmission, sinusoidally modulated to a depth of 30%, produces side frequencies of 4.928 and 4.914 MHz. The amplitude of each side frequency is 75 V. Determine the amplitude and frequency of the carrier **04**
(2) Compare wideband and narrow band FM **03**
- Q.2**
- (a) A series tuned circuit has a Q of 130 and a tuning capacitance of 250 pF and is resonant at 450 KHz. Determine the impedance at resonance **03**
 - (b) List various properties of Fourier transform and briefly explain any two. **04**
 - (c) Draw block diagram of general communication system and explain function of each block **07**
- OR**
- (c) (1) Compare analog and digital communication system **03**
(2) Calculate the maximum bit rate for a channel having bandwidth 1600 Hz if (a) S/N ratio is 0 dB (b) S/N ratio is 20 dB **04**
- Q.3**
- (a) Derive voltage equation of FM wave. Explain clearly difference between Frequency and Phase Modulation **07**
 - (b) List various FM detectors and explain Foster Seeley discriminator with circuit **07**
- OR**
- Q.3**
- (a) Explain FM receiver with block diagram **07**
 - (b) A 20 MHz carrier is modulated by a 400 Hz audio sine wave. If the carrier voltage is 5 V and maximum deviation is 10 KHz, write the equation for this FM wave. If the modulating frequency is now changed to 2 KHz and carrier voltage is changed to 10 V, all else remaining constant, write an equation for this wave, calculate power dissipated across 100 ohm resistor by both the FM waves. **07**
- Q.4**
- (a) Draw block diagram of superhetrodyne receiver and explain function of each block **07**
 - (b) Explain thermal noise and shot noise **07**
- OR**
- Q.4**
- (a) Explain various characteristics of superhetrodyne receiver. **07**
 - (b) Derive Friis's formula for noise factor of amplifiers in cascade **04**

- (c) Given two resistors $R_1 = 10 \text{ k}\Omega$ and $R_2 = 15 \text{ k}\Omega$, calculate the thermal noise voltage at room temperature generated by (a) R_1 (2) R_2 (c) R_1 in series with R_2 . Assume a 20 MHz noise bandwidth **03**
- Q.5** (a) Explain filter method and phase shift method for the generation of SSB-SC signal **07**
- (b) Explain skin effect **03**
- (c) Derive the equation of total power in AM wave **04**
- OR**
- Q.5** (a) Explain Frequency Division Multiplexing in detail **07**
- (b) Sketch waveform of (1) AM wave (2) SSB-SC wave (3) DSB-SC wave **03**
- (c) Explain operation and applications of Phase Locked Loop **04**