Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PCEC 4302

Fifth Semester Examination – 2013

ANALOG COMMUNICATION TECHNIQUE

BRANCH : ETC, EC

QUESTION CODE : C-316

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

(a) Find out the Fourier transform of a signum function.

(b) How many AM broadcast station can be accommodated 100 KHz bandwidth if the highest frequency component in the baseband signal is 5 KHz ?

(c) What do you mean by inter symbol interference (ISI) ? How it can be minimized ?

(d) What are the generating methods for SSB-sc signal ?

(e) What is wideband FM (WBFM) ? Draw the spectrum of WBFM.

(f) What do you mean by noise bandwidth ? What is noise bandwidth of a low-pass RC filter ?

(g) What do you mean by vestigial sideband modulation ? Draw its frequency spectrum.

(h) Define signal to noise ratio (SNR) and Noise figure of a system.

P.T.O.

(i) What is capture effect of FM signal ?

(j) What is the transmission bandwidth for FM and PM signal ?

2. (a) A waveform consist of single pulse of amplitude A of duration T centered at t = 0, (i) Find the autocorrelation function of this waveform, (ii) Also calculate PSD of this pulse. 5

(b) State and prove Parseval's theorem for energy signal. 5

3. (a) Explain the square law diode modulation method for AM generation. Draw the spectrum of the AM signal. 5

(b) A carrier signal of frequency f_c is DSB-SC modulated using the message signal $x(t) = 10 \sin c^2 1000t$. The resulting modulated signal is to be demodulated using a coherent detector whose locally generated carrier frequency may be assumed to be in perfect synchronism with that of the demodulator. Determine the lowest value of f_c for which the coherent detector output yields x (t). 5

4. (a) Explain the Armstrong method for generation of wide band FM. 5

(b) A NBFM signal generated with a carrier frequency of 100 KHz and a frequency deviation of 30 KHz is applied to a frequency multiplier chain consisting of 5 doublers and than a frequency multiplier chain consisting of 3 triplers. Assuming the modulating signal to be a 2 KHz tone determines frequency deviation and modulation index at the end of the doubler chain and at the end of the tripler chain. 5

5. (a) Explain how PAM signal is generated and detected. 4

(b) Explain how PPM signal is converted into PAM. 2

(c) A band limited signal x(t) is sampled by a train of rectangular pulses of width δ and period T.

(i) Find the expression for the sampled signal

(ii) Determine the spectrum of the sampled signal. 4

6. (a) Derive the expression for PSD of noise at the output of discriminator of a FM receiver. 5

(b) Explain the noise equivalent bandwidth of an amplifier. 5

7. (a) Explain the effect of noise in an envelope detection for AM. 3

(b) Explain the (S_0/N_0) for AM and FM. Show that FM behaves as AM for $m_t \leq 0.5$. 5

(c) What is capturer effect of FM? 2

8. Write short notes on any **two** : 5×2

(a) Threshold in frequency modulation

(b) Vestigial sideband (VSB)

(c) Ratio detector

(d) Generation of WBFM by direct methodion.