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

Total number of printed pages – 3

B. Tech

PCEC 4302

Fifth Semester (Back/Special) Examination – 2013

ANALOG COMMUNICATION TECHNIQUES

BRANCH : ETC, EC

QUESTION CODE : D 260

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) Distinguish between the spectra of a periodic signal and an aperiodic signal ?

   (b) Sketch the spectrum of a dc voltage of 5V.

   (c) Give an example of a power signal and an energy signal each.

   (d) Compute the probability of at most two heads turning up when a fair coin is tossed three times.

   (e) What is a probability density function ? Give an example.

   (f) Give the spectrum of a signal expressed as

   $x(t) = 2 \sin 200\pi t + 1.2 \sin 350\pi t$.

   (g) Give at least applications where SSBSC is more beneficial than any other amplitude modulation scheme.

P.T.O.

(h) For a given baseband signal, which modulation scheme requires more transmission bandwidth? AM or NBFM ?

(i) What is narrow in NBFM ? Why ?

(j) What kind of signal your cell phone works with ?

2. (a) State and prove the differentiation property of Fourier transform. 5

(b) Derive the spectrum of a triangular pulse from a rectangular pulse of width T. Which properties of the Fourier transform are used here ? 5

3. (a) Give the Fourier series of a half wave rectified sinewave. 5

(b) Give the Fourier series of a periodic impulse train of period T. 5

4. (a) Suggest two suitable circuits for generating a DSBSC signal. Explain the operation of the circuits in a very neat manner. 5

(b) Suggest suitable demodulator circuit(s) for the modulated signal as in (4a). 5

5. (a) Explain with the help of a neat sketch, the operation of a Foster-Seeley discriminator. What does it do? 5

(b) Derive the spectrum of an FM signal when the modulating signal is a rectangular pulse of width T. 5

6. (a) What is the minimum sampling frequency required for a signal expressed as

$x(t) = 2\sin 200\pi t + 1.2 \sin 350\pi t + 0.75\cos^2 400\pi t$?

Sketch the sampled spectrum. 5

(b) Draw and explain suitable circuits for generating PWM and PPM signals. 5

7. (a) Give the output power appearing at the output of an RC low pass filter of cutoff frequency f_c when white noise of PSD $\frac{N_0}{2}$ is input to it. 5

(b) Derive the figure of merit for a SSBSC transmission system. 5

8. (a) Draw and explain an FM receiving system. How is it different from its AM counterpart ? 5

(b) Explain preemphasis and deemphasis with the help of appropriate diagrams and equations. 5