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Total number of printed pages – 3

B. Tech
PCEC 4302

Fifth Semester (Back/Special) Examination – 2013

ANALOG COMMUNICATION TECHNIQUES

BRANCH : ETC, EC

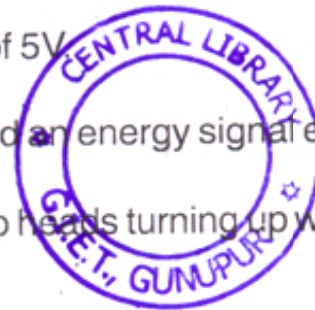
QUESTION CODE : D 260

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

