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B. Tech
CPEC 5301

Fifth Semester Examination – 2008

ANALOGUE COMMUNICATION TECHNIQUES

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

Make suitable assumptions if required.

*The figures in the right-hand margin
indicate marks.*

1. Answer the following questions : 2×10
- (a) What is the objective of Fourier series ?
How is it useful ?
 - (b) What is the bandwidth required to transmit
2 Mbps data ?

P.T.O.

- (c) State and prove time shifting property of Fourier transform.
- (d) Compare convolution and correlation of two waveforms.
- (e) Give the spectra of DSB with Carrier and DSB-SC type of AM schemes.
- (f) Write one advantage and one disadvantage of an SSB modulated signal.
- (g) Draw a simple squaring circuit.
- (h) What is the effect of linear filtering on the expected value of noise ?
- (i) What is the figure of merit in an AM receiver ? Why ?
- (j) Why FM sound is clearer than the AM signal for a given SNR ?
2. Find out the Fourier series of periodic rectangular waveform of amplitude A volt and time period T sec. Draw its spectrum with proper amplitude and time units. 10

3. The Fourier transform of $g(t)$ is $G(f)$. Find out the Fourier transform of $g(t) \cos 2\pi f_c t$. Sketch the resulting spectrum for any arbitrary shape of $G(f)$. What is its physical meaning ? 10

4. An FM signal is given by

$$V(t) = \cos \left(\omega_c t + \sum_{k=1}^3 \beta_k \cos k \omega_0 t \right)$$

Compute the instantaneous frequency and the maximum frequency deviation. What is the maximum phase deviation ? Hence establish the relationship between frequency modulation and phase modulation. 10

5. Compare the noise power outputs as obtained at a differentiator and an integrator output when white noise of PSD $\frac{N_0}{2}$ is passed through them. 10
6. Derive the output SNR in case of a DSB-SC scheme. 10

7. Explain threshold in frequency modulation. What is the effect of modulation index on SNR and bandwidth in an FM system? 6+4
8. (a) Find out the signal power at the output of a limiter. What is its importance? 5
- (b) Show how the objective of preemphasis is realized. 5

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