Code No: NR221201 **NR**

II B.Tech II Semester Supplementary Examinations,
November/December 2005
COMMUNICATION THEORY
(Information Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) For the given waveform, write an expression for the power spectral density G(f). as shown in Figure 1

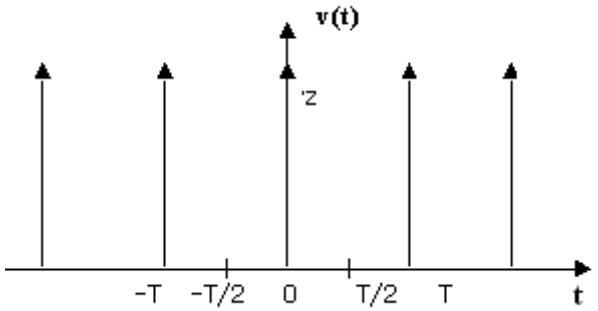

Figure 1:

(b) Derive Parseval's theorem $\int_{\infty}^{\infty} f^2(t)dt = \frac{1}{2\pi}\int_{\infty}^{\infty} |F(\omega)|^2 \, d\omega$ from the convolution Theorem. [8+8]

2. (a) What is meant by 'coherence'and 'non-coherence'? Give an example of non coherent system.

(b) Define cross correlation. Obtain a relation between coherence and cross-correlation of two signals. [8+8]

3. (a) Explain the operation of square law modulator.

(b) The message signal is given by m(t) = 20cos 2Πt volts and the carrier wave is c(t) = 50 cos 100Π volts. Find the power developed across a load of 100-ohms due to the AM wave with 75% modulation. [6+10]

4. (a) Explain with a diagram the operation of limiter circuit for FM demodulation.

(b) Explain analytically how do the AM and narrow-band FM differ from each other. Show that the average power of FM is constant. [8+8]

5. (a) Explain the concept of quantization of sampled signal and hence discuss the merits and demerits of it.

(b) Give the block diagram for PCM generation and reception and discuss the features of each block. [6+10]

6. (a) Explain the principle of pulse time modulation and obtain relation between the magnitude of low pass signal and the pulse repetition time T and pulse width τ of pube carries.

   (b) Give the block diagram to generate pube position modulation and explain its working. [8+8]

7. (a) Derive an expression for source entropy. Obtain the condition for maximum entropy.

   (b) A discrete source emits one of 5 symbols once every milli second. The symbol probabilities are 0.4, 0.2, 0.15,0.15, 0.1 respectively. Determine the source entropy and information rate. [12+4]

8. The generator polynomial of a (15,11) hamming code is defined by g(X) = 1+X+X^4. Develop the encoder and syndrome calculator for this code, using a systematic form for the code. Find all code vectors. [16]

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