

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, DECEMBER 2006**

EE 04 501—ANALOG AND DIGITAL COMMUNICATION

(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

Part A

1. (a) Find the Nyquist rate and the Nyquist interval for the signal

$$x(t) = \frac{1}{2\pi} \cos(4000\pi t) \cos(1000\pi t).$$

- (b) Explain what is meant by White process.
 (c) Explain what is meant by Selectivity of a radioreceiver.
 (d) Explain what is meant by narrow band and wide band FM system.
 (e) What is meant by granular noise ? Explain.
 (f) Explain what is meant by line coding.
 (g) Define the following :—
 (i) Mutual information.
 (ii) Discrete entropy.
 (iii) Channel capacity.
 (h) Compare Circuit switching and Packet switching.

(8 × 5 = 40 marks)

Part B

2. (a) Suppose that a signal $x(t) = 1, |t| \leq \frac{1}{2}$ is passed through an LTI system with impulse
 $= 0, |t| > \frac{1}{2}$

response $h(t) = e^{-t} u(t)$. Find the energy of the output of the system.

Or

- (b) State and prove any two properties of Gaussian random process.

(15 marks)

3. (a) Draw the circuit of a ring modulator and explain. (15 marks)

Or

- (b) (i) Derive the SNR at the output of an FM receiver. (8 marks)
(ii) Explain the circuit of pre-emphasis. (7 marks)

4. (a) Draw the block diagram of differential pulse code modulation system and explain. (15 marks)

Or

- (b) (i) Draw the block diagram of binary base band system and derive expression for ISI. (8 marks)
(ii) Explain what is meant by scrambling. (7 marks)

5. (a) Derive the expression for channel capacity of an additive White Gaussian band limited channel.

Or

- (b) (i) Draw the block diagram of frequency division multiple access system and explain.
(ii) Explain about synchronous transmission system.

[4 × 15 = 60 marks]