Digital Communication
(EC-304, Dec-2007)

Note: Section A is compulsory. Attempt any four questions from Section-B and any two from Section-C.

Section-A

1. a) What are the advantages of digital communication system over analog communication system?

   b) What are the sampling rates of the following signals: voice at 5 k Hz, high fidelity music at 20 k Hz.

   c) In a PCM system, the signal to noise (quantization noise) ratio is to be held to a minimum of 40 d B. Determine the number of quantization levels needed.

   d) Describe the difference between uniform and non-uniform companding.

   e) Explain Nyquist criterion for distribution less base band binary transmission.

   f) Why is clock recovery required in a BPSK demodulator circuit?

   g) What is MSK modulation scheme?

   h) Suggest some pulse shaping filter function to ensure zero Intersymbol interference.

   i) State the difference between coherent and non-coherent detection.

   j) Differentiate between unipolar and bipolar signaling

Section-B

2. What are companding laws? Explain their differences and similarities.

3. Describe delta-modulation (DM) and explain how DM improves the system's tolerance to slope overload?

4. Determine the range of variation for a T1 PCM-TDM system with jitter amplitude of 3 UI and jitter frequency equal to 200 Hz.

5. With the assistance of a block diagram, describe the function of a 16-QAM modulation scheme.

6. Describe M-ary modulation techniques. In what conditions M-ary signaling schemes are preferred over binary signaling schemes.

Section-C

7. Describe FSK modulation scheme using appropriate block diagram. Derive the output voltage relationship and the bandwidth relationship for FSK modulation.

8. (a) How eye patterns are useful for studying intersymbol interference in digital communication systems?

   (b) Explain how differential PCM improves system performance?

9. Write short notes on:

   (a) State and explain Shannon's channel capacity theorem.

   (b) Sketch the phase state diagram of a QPSK modulator.