

**2005-PUNJAB UNIVERSITY**  
**B.TECH VII SEMESTER DEGREE EXAMINATION**  
**COMMUNICATION SYSTEM-II**  
**(ELECTRONICS AND COMMUNICATION ENGINEERING)**

**TIME-3HOUR**  
**MARKS-100**

**PART A [10\*2=20 MARKS]**

1.
  - (a) Differentiate with the help of neat diagram between sampling and quantization.
  - (b) What is a band limited signal?
  - (c) Explain the term 'Nyquist interval'.
  - (d) If the amplitudes of a signal  $m(t)$  is confined to the range of  $(-m_p, m_p)$  and the range is divided into  $L$  zones, each of step size  $\Delta$ , find out the expression for quantization noise.
  - (e) Draw the waveforms of an unmodulated carrier, data, ASK, PSK and FSK.
  - (f) State the advantages of DPSK and PSK.
  - (g) Sketch the QPSK waveform for the sequences 1101010010 assuming the carrier frequency to be equal to the bit rate.
  - (h) What is a spread spectrum modulation? Discuss briefly.
  - (i) What do you understand by paging? What are the different components of a paging system?
  - (j) List the different error control and detection techniques in a computer network . What do you understand by ARQ?

**PART B [10\*8=80 MARKS]**

2. Explain the receiver for the detection of DPSK signals.
3. Illustrate with the help of a neat diagram the phase relationship between symbols intervals of two users of a CDMA system.
4. Given the signal  $m(t) = 10 \cos 200\pi t \cos 800\pi t$ . What is the minimum sampling rate based on:
  - (a) The low pass uniform sampling theorem.
  - (b) Band pass sampling theorem.
5. In a binary PCM system, the output signal-to-quantizing-noise ratio is to be held to a minimum of 40 dB. Determine the number of required levels and find the corresponding output signal-to-quantizing-noise ratio.
6. What are the different elements of switching? Discuss cellular digital switching requirement.
7. Explain the following types of computer communication networks with proper diagram wherever applicable:
  - I. TYMNET
  - II. ARPANET

III. ISDN

IV. LAN

8. (a) Consider an audio signal comprised of the sinusoidal term  $s(t) = 3 \cos 500\pi t$

(i) Find the signal to quantization noise ratio when this is quantized using 10-bit PCM.

(ii) How many bits of quantization are needed to achieve a signal to quantization noise ratio at least 40 dB?

(b) Discuss the advantages and disadvantages of the following signaling formats:

(i) Unipolar NRZ

(ii) Bipolar RZ

(iii) Alternate mark inversion RZ

9 (a) Find the bit error probability for a BPSK system with a bit rate of 1 Mbit/s. The received waveforms  $s_1(t) = A \cos \omega t$  are coherently detected with a matched filter. The value of  $A$  is 10 mV. Assume that the single-sided noise power spectral density is  $N_0 = 10^{-11}$  W/Hz and that signal power and energy per bit are normalized relative to a 1 ohm load.

(b) Derive the expression for the throughput of Carrier Sense Multiple Access (CSMA)

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