

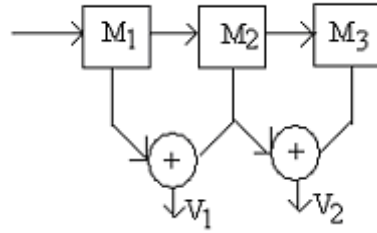
III B.Tech II Semester Supplementary Examinations, January 2005
DIGITAL COMMUNICATIONS
(Electronics & Communication Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) State and prove the sampling theorem in time-domain.
 (b) Find the Nyquist rate and Nyquist interval for the following signals.
 - i. $f(t) = \frac{1}{2\pi} \cos(4000\pi t) \cdot \cos(1000\pi t)$.
 - ii. $f(t) = \frac{\sin(500\pi t)}{\pi t}$.
2. (a) Compare and contrast PAM, PPM and PDM.
 (b) Sketch the naturally sampled PAM waveform that results from sampling a 1 KHZ sine wave at a 4 KHZ rate. Also sketch the flat top sampled waveform. Take duty cycle $\frac{\tau}{T_s} = \frac{1}{5}$.
3. (a) Derive an expression for minimum probability error of an optimum filter for noise immunity.
 (b) A binary PAM wave is to be transmitted over a low pass channel with an absolute maximum bandwidth of 75KHZ. The bit duration is 10 micro seconds. Find a raised cosine pulse spectrum that satisfies these requirements.
4. (a) A signal $x(t)$ is uniformly distributed in the range $\pm x_{\max}$. Calculate maximum single-to-noise for this signal.
 (b) Explain the difference between cross-talk and inter symbol interference?
5. (a) Explain the principle of adaptive delta modulation system with a block diagram.
 (b) A voice frequency signal band limited to 3 KHZ is transmitted with the use of the DM system. The pulse repetition frequency is 30,000 pulses per second, and the step size is 40mV. Determine the maximum permissible signal amplitude to avoid a slope overload.
6. (a) Explain synchronous and asynchronous time division multiplexing of PCM signals.
 (b) Eight channels each band limited to 5KHZ, are to be time division multiplexed. Each sample is coded into a 6-bit word. Find the o/p rate in bits/sec and the required bandwidth.
7. (a) The generator polynomial of a (7,4) cyclic code is $g(x) = 1+x+x^3$. Find the 16 code words of this code.
 (b) The encoder for a convolutional code is shown below.
 Find all the code words for a 6-bit input data.



8. Write short notes on any two:

- (a) Differences between TDM and FDM.
- (b) Scramble and unscrambler
- (c) M-ary signaling schemes.
