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**B. E. (Fifth Semester) Examination,
April-May 2018**

(New Scheme)

(Et & T Branch)

DIGITAL COMMUNICATION

Time Allowed: Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) is compulsory from each unit & carries equal 2 marks. Attempt any two parts of part (b), (c) and (d) of each question. All questions carry equal 7 marks.

Unit-I

1. (a) What is Nyquist frequency?

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PTO

(b) The Bandpass signal

$$V(t) = \cos 10 \omega_0 t + \cos 11 \omega_0 t + \cos 12 \omega_0 t$$

is sampled by an impulse train.

$$S(t) = T \sum_{k=-\infty}^{\infty} \delta(t - kTs)$$

(i) Find the maximum time between samples T_s to ensure reproduction without error.

(ii) Obtain an expression

$$V_s(t) = S(t) \cdot V(t)$$

(iii) The sampled signal $V_s(t)$ is filtered by a rectangular low pass filter with a B.W. $B = 2f_0$. Obtain and expression for the filter output.

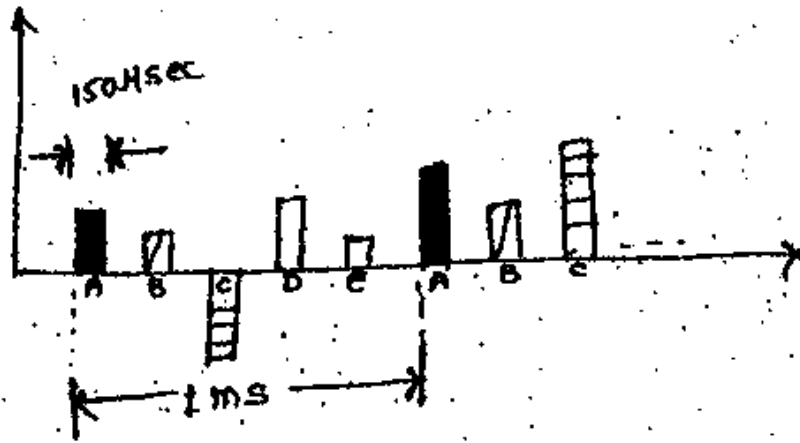
(c) State sampling theorem in case of Bandpass signal.

(d) Define signaling rate of TDM-PAM signal. What is the relation between signaling rate and transmission Bandwidth of TDM-PAM signal.

Below mentioned figure represent PAM-TDM signal

(i) If each pulse width of 150 μ sec than find the Guard time.

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Unit-II

2. (a) What are the drawbacks that produce in Delta modulation. Explain any one of them.
- (b) Define PCM and prove that the signal to noise ratio in PCM system is :

$$\left(\frac{S}{N}\right)_{db} \leq (4.8 + 6N)_{db}$$

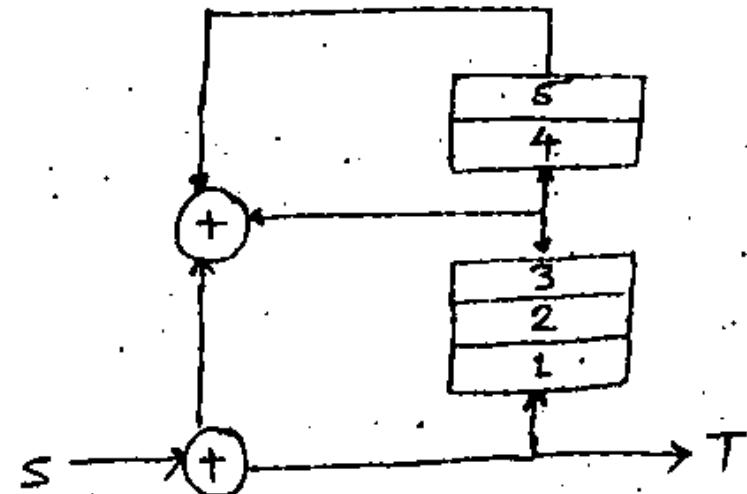
- (c) The Bandwidth of i/p signal to the PCM is restricted to 4 kHz. The i/p signal varies in amplitude from - 3.8 V to + 3.8 V and average power is 30 mW. The required SNR is given as 20 db. The PCM

modulator produces binary O/P and by assuming uniform quantization find out the no. of bits require per sample.

- (d) What is Adaptive delta Modulation. Explain with the suitable block diagram.

Unit-III

3. (a) What is scrambling.
- (b) The data stream 1010101000000111 is fed to the scrambler is shown in figure below. Find the scrambler output T, assuming the initial content of the register to be zero



- (c) What is eye pattern. Explain it with the suitable diagram.
- (d) Derive an expression for power spectral density (PSD) of NRZ polar format.

Unit-IV

4. (a) What are the different type of digital Modulation techniques.
- (b) Explain the generation and Demodulation of BPSK signal by using suitable block diagram.
- (c) The bit stream $d(t)$ is to be transmitted using DPSK if $d(t)$ 001010011010 determine $b(t)$ show that $b(t)$ $b(t - T_s)$ yields the original data.
- (d) What is OOK signal. Derive the equation of ASK signal and draw its signal space representation.

Unit-V

5. (a) What is White Gaussian Noise? What it is called as Gaussian noise.
- (b) Derive the Equation of Error. Probability (P_e) for Matched filter.

- (c) Derive the equation for signal to noise ratio of optimum filter.
- (d) Find the probability of error for the BASK signal.