

4E 4164

Roll No. _____

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4E 4164**B.Tech. IV Semester (Main/Back) Examination, May 2018****Computer Sc. & Engg.****4CS5A Principles of Communication****CS, IT****Time : 3 Hours****ersahilkagyan.com****Maximum Marks : 80****Min Passing Marks : 26**

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable by assumed and stated clearly.) Units of quantities used/calculated must be stated clearly.

UNIT - I

1. a) Explain in detail FDM? (8)
b) An angle modulated signal is given by $X_c(t) = 6 \cos(2\pi \times 10^7 t + 0.2 \sin(10^4 \pi t))$
i) If $X_c(t)$ is phase modulated signal with $K_p = 5 \text{ rad/volt}$, and
ii) If $X_c(t)$ is frequency modulated signal with $k_f = 5 \times 10^2 \text{ Hz/volt}$.
In each case determine modularity signal $X_c(t)$. (8)

OR

1. a) Calculate the percentage power saving when the carrier and one of the side bands are suppressed in an AM wave modulated to a depth of
i) 100%
ii) 50% (8)
b) With the help of a block diagram explain the FM demodulation method using phase locked loop. (8)

UNIT - II

2. a) State and prove Sampling theorem for low-pass signals. (8)
b) A signal $M_1(t)$ is bandlimited to 3.6 KHZ and three other signals - $M_2(t)$, $M_3(t)$, $M_4(t)$ are bandlimited to 1.2 KHz each. These signals are to be transmitted by mean of Time-Division-Multiplexing (TDM).
i) Set-up a scheme for accomplishing this multiplexing requirement with each signal sampled at its Nquist rate.
ii) What must be the speed of commutator (in samples / sec). (8)

OR

2. a) Explain the method of generation & detection of PPM. (8)
- b) The signal $x(t) = 2\cos 200\pi t + 6\cos 180\pi t$ is ideally sampled at frequency of 150 samples per sec. The sampled version is passed through a unit gain ideal low-pass filter (LPF) with cut-off of 110Hz. What frequency component will be present in the output of the LPF? Write down an expression for its O/P signal. (8)

UNIT - III

3. a) A PCM system uses a step size of Δ . Assuming quantization error is uniformly distributed, determine the mean square value of the quantization error. Also find the signal-to-quantization noise ratio for an n -bit binary PCM with sinusoidal message signal. [ersahilkagyan.com](http://www.ersahilkagyan.com) (10)
- b) With help of block diagram explain the working of a Delta Modulator (DM) transmitter and Receivers. (6)

OR

3. Describe and derive expression for the average probability of error for a binary encoded PCM receiver using matched filter. Assume that PCM wave uses the NRZ unipolar format $E_{\max}$ and T_b are peak signal energy and bit duration respectively. (16)

UNIT - IV

4. a) Derive the equation of Nyquist criterion for distortion-less baseband Transmission in the absence of Noise. <http://www.rtuonline.com> (8)
- b) With the help of block diagram explain the Coherent detection of binary FSK signal. (8)

OR

4. a) What do you mean by ISI in baseband transmission? Explain the method to minimize ISI. (8)
- b) Derive the expression of average probability of symbol error for binary PSK using Coherent detection. (8)

UNIT - IV

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UNIT - V

5. a) List and explain the properties of Pseudo-Noise (PN) sequence. (8)
- b) What are the modulation techniques used in FHSS systems. (8)

OR

5. a) What are the important application of Spread Spectrum (SS) system. (8)
- b) What is meant by Spreading a signal? (4)
- c) What are the modulation techniques used in DSSS systems. (4)

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