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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; May/June - 2018

Digital Communication

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1a. Explain the natural sampling with relevant wave forms with all time domain and frequency domain equations. 8

b. A low pass signal g(t) and its spectrum id given by,

$$G(f)\begin{cases}1-\dfrac{|f|}{200} & |f|<200\ Hz\\ 0 & \text{Elsewhere}\end{cases}$$ 6

i) Assume that *g(t)* is ideally sampled, $f_s = 300\ Hz$. Sketch the spectrum of the signal

ii) Repeat part (i) for f_s = 400 Hz.

c. With a neat block diagram, explain the operation of digital communication system. Explain functioning of each block. 6

2a. A signal $g(t) = 10\cos(20\pi t).\cos(200\pi t)$ is sampled at the rate of 250 samples/s

i) Sketch the spectrum of the sampled signal

ii) Specify the cut-off ideal reconstruction filter so as to recover *g(t)* from $g_\delta(t)$ 8

iii) Specify the Nyquist rate for the signal *g(t)*

b. Explain the different channels used in digital communication system. 6

c. Discuss the concept of practical sample and hold circuit along with block diagram and spectrum of output signal. 6

UNIT - II

3 a. Explain the concept of mid-riser and mid-tread type of quantizing with related graphs. 6

b. With block diagrams, explain DPCM transmitter and receiver. 8

c. What is the necessity of non- uniform quantization? Explain two compounding methods used in practice. 6

4 a. With block diagram and equations, explain adaptive delta modulation. 8

b. The bandwidth of a signal is 34 kHz, if this signal is converted to PCM bit stream with 1024 levels. Determine the number of bits/s generated by the PCM system. Assume that the signal is sampled at the rate of 20% above the Nyquist rate. 6

Contd…2

c. A PCM system uses a uniform quantizer by n-bits encoder. Show that the rms signal to quantization noise ratio is approximately given by *SNR = 1.8 +6n dB*. Assume that input to PCM system is a sinusoidal signal. 6

UNIT - III

5 a. Estimate the power spectral density of a bipolar NRZ pulse. 8

b. Sketch the encoded wave form for the bit stream 011100101 for the following schemes : 6

i) RZ-unipolar ii) Bipolar NRZ iii) Manchester

c. Explain adaptive equalizing filter for base band transmission. 6

6 a. Explain raised cosine spectrum solution to reduce ISI. 10

b. The binary data 001101001 are applied to the input of a modified duo binary system 10

i) Construct the modified duo binary coder output without pre-coder

ii) Suppose that due to error in transmission the level produce the 3rd digit is reduced to zero construct a new receiver output

UNIT - IV

7 a. Explain coherent binary PSK. And also derive the equation of probality error. 10

b. Explain in detail transmitter and receiver of QPSK. 10

8 a. Explain the working of DPSK transmitter and receiver with block diagram. 10

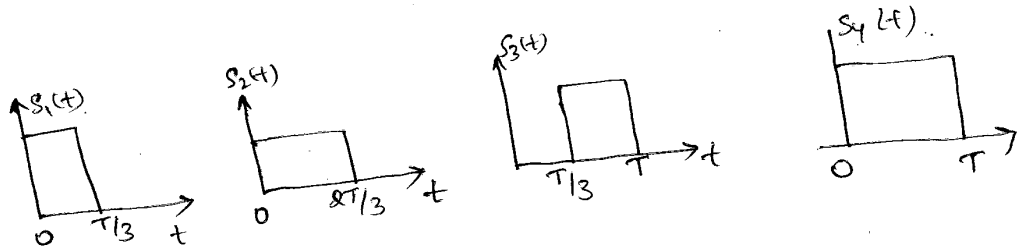
b. Derive probality of error for coherent FSK system 10

UNIT - V

9.a Explain the Gram-Schmidt orthogonalization procedure with related diagram. 10

b. With a neat block diagram, explain matched filter. 10

10 a. Consider the signal $S_1(t)$, $S_2(t)$, $S_3(t)$, $S_4(t)$ as given below



10

Find an orthonormal basis function for these set of signal using Gram-Schmidt orthogonalization procedure.

b. Explain the importance of geometric interpretation of signals. Illustrate the geometric representation of signals for case of a 2-dimesnional signal space with 3 signals. 10

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