Total No. of printed pages = 6

19/4th Sem/DECE 403

2022

DIGITAL COMMUNICATION SYSTEMS

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. Write down whether the following statements are True or False : 1×20=20

   (a) Digital Communication system is more noisy than analog communication system.

   (b) The source originates a message such as human voice, a television picture, an e-mail message or data.

   (c) If the data is non-electric (e.g., human voice, e-mail text ,video) then output transducer is needed to convert into an electric waveform.

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(d) Microphone, a computer keyboard or a CCD camera are the examples of input transducer.

(e) The receiver modifies the message signal for efficient transmission.

(f) The channel is a medium of choice that can convey the electric signals at the transmitter output over a distance.

(g) A signal that is specified for every value of time is a discrete time signal.

(h) A signal that is specified only at discrete points of $t = nT$ is a discrete time signal.

(i) Sampling theorem is the basis for determining the proper (lossless) sampling rate for a given signal.

(j) In the A/D converter, the sampling rate must be large enough to permit the analog signal to be reconstructed from the samples with sufficient accuracy.

(k) A digital signal is characterized by an amplitude that can take on any value over a continuous range.

(l) Analog signal amplitude can take on only a finite number values.

(m) Pulse code modulated output is a digital signal.

(n) Pulse code modulated output is a binary signal.

(o) Quantization is a process of converting infinite voltage level into finite voltage level.

(p) To covert a analog signal to digital form first we perform quantization next sampling next encoding.

(q) Prediction technique for quantization is used for DPCM system.

(r) BASK modulation technique modulates only the phase of the carrier signal.

(s) If we increase the number of quantization level then quantization error will be reduced.

(t) Difference between AM and BASK is that AM only modulates binary signal whereas BASK modulates analog signal.

2. (a) Draw the block diagram of digital communication system and explain each block function. 5+7=12

(b) State Sampling Theorem. 2

(c) If total number of quantization level is 3, then encode each level. 2

(d) Plot BPSK signal for bit stream 101. 2

(e) If max frequency content in a analog signal is 10.5 kHz. Find out maximum sampling time interval in microsecond. 2

3. (a) Draw the block diagram of PCM system and explain each block function. 3+5=8

(b) Compare PCM, DPCM, DM in brief. 4

(c) Plot BASK signal for bit stream 1011. 2

(d) Explain BASK generation with block diagram. 2+4=6

4. Write short notes on any *four* of the following : 5×4=20

(a) TDM

(b) FDM

(c) Quantization

(d) Sampling process

(e) BFSK transmitter

(f) BASK Receiver

(g) Sampling theorem.

5. Answer the following questions as directed :

(a) Time period of a signal is 10 microsecond. Find out frequency of operation in kHz. 1

(b) If maximum sampling time period of a signal is 5usec then find out maximum frequency present in the same signal. 2

(c) Plot the voltage transfer characteristics of a Quantizer. 1

(d) Plot sampled output of a analog signal. 1

(e) Plot BFSK signal for bit stream 101. 2

(f) Plot a continuous time signal and a discrete time signal. 2

(g) Write down the main differences between a continuous and discrete time signal. 2

(h) Plot a periodic and a non-periodic signal. 2

(i) Write down main differences between AM and ASK. 2

(j) Write down main advantages of digital modulation system over analog modulation. 2

(k) Sampling a analog signal coverts the signal into _____ time signal. (Fill in the blank) 1

(l) Plot 2 sin 2π1000t. 1

(m) Calculate frequency in hz for sin 500t signal. 1

6. (a) Describe Digital modulation techniques in detail. 10

(b) Describe analog to digital conversion in detail. 10

7. Distinguish the following :

(a) Analog modulation and digital modulation. 2

(b) Channel encoder and source encoder. 2

(c) Channel decoder and source decoder. 2

(d) TDM and FDM. 4

(e) FM and FSK. 2

(f) PCM and DPCM. 2

(g) ASK and BASK. 2

(h) Input and output transducer. 2

(i) Transmitter antenna and Receiver antenna. 2