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EC6501/Digital Communication (Regulation-2013)

III Year/V Semester

UNIT-WISE EXPECTED QUESTIONS FOR UNIVERSITY EXAMINATION

UNIT 1- SAMPLING & QUANTIZATION

Part-A

1. Draw the basic block diagram of digital communication system. (NOV/DEC 2011, 2012)
2. ***Compare uniform and non-uniform quantization. (NOV/DEC 2011)***
3. ***State sampling theorem for low pass signals. (MAY/JUNE2011) (MAY/JUNE2012)***
4. ***What is meant by quantization? (MAY/JUNE2012)***
5. An analog waveform with maximum frequency content of 3KHz is to be transmitted over a M-ary PCM system, where M=16. What is the minimum number of bits/sample that should be used in digitizing the analog waveform? (NOV/DEC 2012)
6. ***State the advantages and disadvantages of a digital communication system over analog communication systems. (MAY/JUNE2011) (MAY/JUNE2013) (NOV/DEC 2013)***
7. State any two non-uniform quantization rules. (MAY/JUNE2013)
8. What is a channel? Give examples. (NOV/DEC 2013)
9. Write the A-Law of compression. (NOV/DEC 2013)
10. ***What is quantization error. (MAY/JUNE2011)***
11. ***Why is pre filtering is done before sampling? (NOV/DEC 2010)***
12. Define quantization noise power. (NOV/DEC 2013)

Part-B

1. Draw the block diagram of digital communication systems and explain each block detail. (10) (NOV/DEC 2010) (MAY/JUNE2012) (NOV/DEC 2014)
2. ***With neat block diagram, pulse code modulation and demodulation system. (10) (MAY/JUNE2012)***

3. ***State the advantages and disadvantages of a digital communication system. (4) (NOV/DEC 2012)***
4. ***Explain a PCM system. Derive the expression for quantization noise of a PCM system with uniform quantizer. (16) (MAY/JUNE2013)***
5. Explain the process of quantization and obtain an expression for signal to quantization ratio in the case of a uniform quantizer. (16) (NOV/DEC 2013) (NOV/DEC 2014)
6. ***Explain Nyquist sampling theorem and how the message can be reconstructed from its samples with an example. (10) (NOV/DEC 2014)***
7. ***Explain the non-uniform quantization process. (8) (MAY/JUNE2011)***

UNIT 2- WAVEFORM CODING

Part-A

1. What is meant by temporal waveform coding? (NOV/DEC 2011) (NOV/DEC 2014)

Part-B

1. ***Explain the noises in delta modulation systems. How to overcome this effect in Delta modulation? (8) (MAY/JUNE2012)***
2. ***Explain a DPCM system. Derive the expression for slope overload noise of the system. Show that SNR of DPCM is better than that of PCM. (16) (NOV/DEC 2012)***
3. ***Explain in detail about the working principle of delta modulation.***
4. Describe the block diagram of linear predictive coding.

UNIT 3- BASEBAND TRANSMISSION

Part-A

1. Draw the RZ-Bipolar line code format for the information 10110. (NOV/DEC 2011)
2. ***State Nyquist criterion for zero ISI. (NOV/DEC 2011)***
3. What is Manchester code? Draw the Manchester format for the data stream 10110? (MAY/JUNE2012)
4. ***What are the properties of matched filter? (MAY/JUNE2012)***
5. What are the information that can be obtained from eye pattern regarding the signal quality? (MAY/JUNE2012)
6. ***State any four desirable properties of a line code. (NOV/DEC 2012)***
7. State any two application of eye pattern. (MAY/JUNE2011) (NOV/DEC 2012)
8. ***'ISI cannot be avoided'. Justify the statement. (MAY/JUNE2013)***

9. ***What is line coding? (NOV/DEC 2013)***
10. ***Mention two properties of matched filter. (NOV/DEC 2013)***
11. ***What is the use of eye pattern? (NOV/DEC 2013)***
12. What is Manchester coding? What are its advantages? (NOV/DEC 2014)
13. ***What is the function of an equalizing filter? (NOV/DEC 2014)***
14. ***What is inter symbol interference? (NOV/DEC 2014)***
15. ***What is matched filter? (MAY/JUNE2011)***
16. Draw the NRZ and RZ code for digital data 10110001. (NOV/DEC 2010)

Part-B

1. List and explain the properties of line codes. (8) (NOV/DEC 2011)
2. ***Draw the block diagram of duo-binary signaling scheme for controlled ISI. Explain the scheme with and without pre coder. (10) (MAY/JUNE2012) (NOV/DEC 2012)***
3. ***State Nyquist pulse shape criterion for zero ISI and explain. (6) (MAY/JUNE2012)***
4. Derive the power spectral density of polar signaling and explain. (10) (MAY/JUNE2012)
5. ***Derive the expression for power spectral density of unipolar NRZ line code. and hence discuss its characteristics. (16). (NOV/DEC 2012)***
6. Derive and draw the power spectra of a NRZ, (i)Polar coded waveform (ii) Bipolar coded waveform. (16) (MAY/JUNE2013)
7. ***Derive the expression for bit error probability of a binary signal detected with a matched filter. (16) (MAY/JUNE2013)***
8. ***Derive and explain the Nyquist first criterion to minimize ISI. (16) (MAY/JUNE2013)***
9. Explain the important properties of a matched filter. (8) (NOV/DEC 2014)
10. ***Describe how eye pattern can be obtained and can be used for observing the characteristics of a communication channel. (8) (NOV/DEC 2014)***

UNIT 4- DIGITAL MODULATION SCHEME

Part-A

1. ***Why is PSK always preferable over ASK in coherent detection? (NOV/DEC 2011)***
2. ***Differentiate between coherent and non-coherent detection. (NOV/DEC 2011)***
3. ***What are the drawbacks of binary PSK system? (MAY/JUNE2012)***
4. What is meant by coherent and non-coherent detection? (MAY/JUNE2011) (MAY/JUNE2012)
5. ***What is QAM? (MAY/JUNE2013)***
6. What are coherent systems? (NOV/DEC 2013)

7. Draw constellation diagram of QAM. (NOV/DEC 2014)
8. ***Mention the advantages of PSK systems. (NOV/DEC 2014)***
9. Draw the PSK waveform for 011011. (MAY/JUNE2011)
10. Define QAM and draw its constellation diagram. (NOV/DEC 2010)

Part-B

1. ***Explain in detail the Gram-Schmidt orthogonalisation procedure. (NOV/DEC 2011) (NOV/DEC 2012)***
2. ***Explain the geometric representation of signals. (6) (MAY/JUNE2012) (NOV/DEC 2014)***
3. Derive the expression for error probability of QAM system. (8) (MAY/JUNE2012)
4. ***Draw the functional block diagram of modulator for QAM and explain its operation. (8) (MAY/JUNE2012)***
5. ***Draw the block diagram of QPSK transmitter and receiver. Explain the function of various block. (10) (MAY/JUNE2012)***
6. Discuss the representation and spectral characteristics of ASK, PSK, QAM, QPSK, and FSK signals. (16) (NOV/DEC 2012)
7. Compare the performance of various coherent and non-coherent digital detection systems. (16) (NOV/DEC 2012)
8. Derive the expression for bit error probability of a QPSK system. (16) (MAY/JUNE2013)
9. ***Describe with diagrams, the generation and detection of coherent binary FSK. Explain the probability error for this scheme. (16) (NOV/DEC 2013)***
10. ***Explain the generation and detection of binary PSK. (8) (NOV/DEC 2013)***
11. Describe with signal space diagram, quadrature amplitude modulation and its difference with respect to QPSK. (8) (NOV/DEC 2013)
12. Explain QPSK modulation. Describe with a block diagram the operation of a QPSK transmitter. (10) (NOV/DEC 2014)
13. Explain the bandwidth consideration of QPSK. (6) (NOV/DEC 2014)
14. Describe non-coherent and coherent FSK demodulation. (10) (NOV/DEC 2014)
15. Obtain the probability of error of a FSK system. (6) (NOV/DEC 2014)
16. Derive bit error probability due to QPSK receiver. Compare the performance of QPSK receiver with that of PSK receiver. (8) (MAY/JUNE2011)

UNIT 5- ERROR CONTROL CODING

Part-A

1. ***Mention the properties of cyclic code. (NOV/DEC 2011)***
2. ***What is convolutional code? How it is different from block codes? (MAY/JUNE2012)***
3. ***Find the hamming distance between 101010 and 010101. If the minimum hamming distance of a (n, k) linear block code is 3, what is its minimum hamming weight? (NOV/DEC 2012)***
4. ***State the significance of minimum distance of a block code. (MAY/JUNE2013)***
5. ***What are coherent and non-coherent receivers? (MAY/JUNE2013)***
6. ***Define code rate of a block code. (NOV/DEC 2013)***
7. ***What is the need for error control codes? (NOV/DEC 2014)***
8. ***Define hamming distance. (MAY/JUNE2011)***
9. ***Define hamming distance and calculate its value for two code words 11100 and 11011. (NOV/DEC 2010)***

Part-B

1. ***Construct a single error correcting (7,4) linear block code and the corresponding decoding table. (10) (NOV/DEC 2011)***
2. Determine the generator polynomial g(x) for a (7,4) cyclic code, and find code vectors for the following data vectors 1010, 1111 and 1000. (8) (NOV/DEC 2011)
3. Explain the transform domain approach analysis of convolutional code. (6) (MAY/JUNE2012)
4. Explain the error detecting and correcting capabilities of linear block code. (6) (MAY/JUNE2012)
5. ***Consider a (7,4) linear block code whose parity check matrix is given by (i)Find the generator matrix. (2) (ii) How many errors this code can detect? (2) (iii) How many errors can this code be correct? (2) (iv) Draw circuit for encoder and syndrome computation. (4) (MAY/JUNE2012)***
6. Design a block code for a message block of size eight that can correct for single errors. (6Marks) (NOV/DEC 2012)
6. Design a convolution encoder of constraint length 6 and rate efficiency ½. Draw its
7. tree diagram and trellis diagram .(10) (NOV/DEC 2012)
8. Describe the steps involved in the generation of linear block codes. Define an explain the properties of syndrome. (16) (NOV/DEC 2013)
9. Explain how convolutional codes can be generated. Illustrate with an example.

(8 Marks) (NOV/DEC 2013)

10. ***For a convolutional encoder of constraint length 3 and rate ½, obtain the encoded output for the input message 10011. (8) (NOV/DEC 2013)***

11. Explain the generation of (n,k) block codes and how block codes can be used for error control.(10) (NOV/DEC 2014)

12. Consider a (6,3) block code and explain how error syndrome helps in correcting a single error for a data 110. (6) (NOV/DEC 2014)

13. Describe how convolutional cades can be generated with an example. Draw and explain the tee diagram and trellis diagram representation of convolutional codes. (16) (NOV/DEC 2014)

14. ***Assume a (2,1) convolutional coder with constraint length 6. Draw the tree diagram, state diagram and trellis diagram for the assumed coder.(8) (MAY/JUNE2011)***

15. Find the (7,4) linear systematic block code word corresponding to 1101. Assume a suitable generator matrix. (8) (MAY/JUNE2011)

16. ***Explain how decoding is done by convolutional codes with an suitable example. (10) (NOV/DEC 2010)***

17. Explain tree diagram, trellis diagram and state transition diagram of convolutional codes. (8) (NOV/DEC 2010)

18. For (6,3) systematic linear block code,
Find (i) parity check matrix (ii) generator matrix (iii) all possible code words (iv) minimum weight and minimum distance (v) the error detecting and error correcting capability of the code (vi) if the received sequence if 10000, calculate the syndrome and decode the received sequence. (16) (NOV/DEC 2010)

****Note: The Bolded questions are most important expected questions in upcoming university examination.**