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QUESTION BANK

BRANCH: CSE   **YR/SEM:** II/IV   **BATCH**: 2020 - 2024

SUB CODE/NAME: EC8395- COMMUNICATION ENGINEERING

UNIT-I

ANALOG MODULATION

PART – A

1. What will be the power in each sideband in amplitude modulated signal if power of carrier wave is 176 W and there is 60% modulation?**(A/M 2019)**
2. What is pre-emphasis and de-emphasis circuit? Where these circuits are used?**(A/M 2019)**
3. What is the relationship between phase modulation and frequency modulation**(N/D 2018)**
4. A 400 W carrier is amplitude modulated to a depth of 100% calculate the total power in case of the AM and DSBC techniques. How much power saving in watts is achieved foe DSBSC? If the depth of modulation is changed to 75%, then how much power in W is required for transmitting the DSBC wave? Compare in the power required for DSBC in both cases and comment on the reason for change in the power levels**(N/D 2018)**
5. Define quantization error**(A/M 2018)**
6. Compare narrow band FM and Wide band FM?**(A/M 2018)**
7. Define depth of modulation in AM**(N/D 2017)**
8. Compare frequency modulation with amplitude modulation**(N/D 2017)**
9. Define narrow band FM**(A/M 2017)**
10. What is the difference between VSB and SSB modulations? **(A/M 2017)**
11. Define Coherent Detection
12. Define modulation.
13. What are the needs for modulation?
14. Define Amplitude modulation
15. Define Frequency modulation
16. Define Phase modulation
17. Compare AM with DSB-SC and SSB-SC? ?(**N/D 2015**)
18. What is the relationship between frequency and phase modulation**(A/M 2016)**
19. List the source of external and internal noise? **(N/D 2016)**
20. Write heterodyning principle.
21. Write the concepts for detecting FM signals.
22. Write the mathematical expression for FM and PM.

PART – B

ANALOG MODULATION

1. Explain the theory of amplitude modulation**(A/M 2016, N/D 2015,2016)**
2. Compare AM and narrow band FM with phasor diagram and expression?**(N/D 2018)**
3. Explain the operation of diode detector in the process of demodulating AM signal?(8) **(N/D 2017)**
4. Derive the frequency spectrum of AM signal. What is the power distribution in the AM signal?(10)**(A/M 2017)**

5. Derive the expression for AM. Draw the spectrum and phasor diagram. Draw the waveform representing modulating signal, carrier signal and modulated signal for AM?(13) (**N/D 2018**)
6. Discuss in detail about the working of a SSB transmitter and receiver?(13)(**A/M 2018**)
7. Discuss the generation of SSB using filter and phasing method?(8)(**N/D 2018**)
8. Compare and contrast the three classes of AM, namely full AM,DSB/SC and SSB?(8)(**A/M 2017**)
9. The efficiency η of ordinary AM is defined as the percentage of the total power carried by the side bands, that is η= p_s /p_t *100%.Where p_s is the power carried by the sidebands and p_t is the total power of the AM signal.
   1) Find η for μ =0.5
   2) Show that for a single tone AM, η max is 33.3 percent at μ =1. (**A/M 2019**)

ANGLE MODULATION

1. Describe Armstrong method of FM generation? (6)(**A/M 2017**)
2. i) Compare and contrast FM ,AM and PM?(8)(**A/M 2017**)(**N/D 2018**)
   ii) Explain in details about FM modulation? (8) (**A/M 2018**)
3. i) Discuss the method for the generation of FM using direct method.(6) (**A/M 2019**)
   ii) Explain the detection of FM using PLL detector? (7) (**A/M 2019**)

SUPER HETERODYNE RECEIVERS:

1. Explain the operation of super heterodyne receiver with neat block diagram?(16) (7) (**N/D 2017**)(**A/M 2019**)
2. Demonstrate with neat diagram about the operation of a super heterodyne receiver. (**8**)

UNIT-II
PULSE MODULATION
PART – A

1. What is bit depth in PCM?(**A/M 2019**)
2. What is companding?(**A/M 2019**)
3. What is sampling and quantization?(**N/D 2018**)
4. What is meant by aliasing? how do you avoid aliasing?(**N/D 2018**)
5. What is meant by aliasing?(**A/M 2018**)
6. Analyse,why FSK is preferred over ASK?(**A/M 2018**)
7. State sampling theorem. Determine the minimum sampling frequency required for a 3.4 Khz B.W speech signal?(**N/D 2017**)
8. State sampling theorem?(**A/M 2017**)
9. A discrete memoryless source emits 5 symbols, each with probability 0.2 .compute the entropy of DMS ?(**A/M 2017**)
10. Distinguish PCM and DPCM.
11. Write the concept of ADPCM.
12. Write the principle of ADM.
13. Identify the function of channel vocoder
14. Express the pitch of the voice
15. why do we need multiplexing technique
16. Differentiate the two basic multiplexing techniques.
17. Compare synchronous TDM with asynchronous TDM.
18. Explain the basic concept of frequency division multiplexing (FDM).
19. Discuss the use of guard bands in FDM.
20. Write the two fold effects of quantization process.
PART – B

LOW PASS SAMPLING THEOREM

1. Discuss an ideal sampling process and derive interpolation formula for reconstructing the original signal from the sequence of samples. (13)
2. What is the main idea of Quadrature sampling of band-pass signals? and Describe reconstruction of band-pass signal. (13)

QUANTIZATION

1. Sketch slope overload error and explain how that error could be minimized?(4)**(A/M 2017)**
2. Explain the types of quantizer and inspect the mid tread and midrise type characteristics of uniform quantizer with suitable diagram. (13)

PAM

1. Explain the basic principle of Pulse Amplitude Modulation (PAM). (6)

LINE CODING

2. List and explain the properties of line codes(8) **(N/D 2011)**
3. Derive the expression for power spectral density of unipolar NRZ line code. hence discuss its characteristics?(16)**(N/D 2013)**

PCM, DPCM

1. Explain the steps involved in PCM encoder and decoder .derive the expression for signal to noise ratio for PCM?(13) **(N/D 2018)**
2. Describe PCM waveform coder and decoder with neat sketch and list the merits compared with analog coders. (13)
3. Give the principle of quantization and obtain the expression for the signal to quantization noise ratio in PCM system. (8)
4. Write the block diagram of Differential Pulse Code Modulation system and elaborate the working principle of DPCM at transmitter and receiver. (7)

DM, ADPCM, ADM

1. Develop the block diagram of Delta Modulator (DM) and Adaptive Delta Modulator (ADM) and explain how the performance of Delta Modulator is improved by making the step size control?(13)
2. . Describe delta modulation in detail with neat block diagram. Also describe the quantization error in delta modulation?(13**) (A/M 2019)**
3. Draw the block diagram of delta modulation and explain the working principles. Discuss the distortion occurring in delta modulation with neat waveform. Explain the ways to overcome the distortion?(13)**(N/D 2018)**

(OR)

4. With neat block diagram explain the delta modulation scheme. Discuss its disadvantages and method to overcome?(16)**(N/D 2017)**
5. i) Define the term adaptive quantization. (3)
   (ii)Explain about the quantization schemes and prediction in Adaptive Differential Pulse-Code Modulation (10)

CHANNEL VOCODER

1. Explain the working principle of channel vocoder. And synthesizes the human voice signal for real time applications. (5)
2. Design a Vocoder for real-time synthesis of speech signal with high quality. (10)

TDM

1. Draw and explain the TDM with its applications? (13)**(A/M 2019)**
2. (i)List the drawbacks of synchronous Time Division
   Multiplexing. (5)
   (ii)How does statistical TDM improve efficiency over synchronous TDM? (8)
3. Evaluate the function of Time Division multiplexing. (7)

(ii) Write the importance of synchronizing pulse in TDM. (6)
4. (i)Differentiate synchronous TDM with asynchronous TDM. (5)

(ii)Explain about Address overhead in synchronous TDM. (8)

FDM

1. Demonstrate the basic concept of FDM multiplexing and demultiplexing process with necessary diagrams. (13)

UNIT-III

DIGITAL MODULATION AND TRANSMISSION

PART – A

1. What is duo binary encoding? Why precoding is used? **(A/M 2019)**
2. Draw the constellation diagram of QPSK? **(A/M 2019)**
3. Draw the modulated waveform representing PSK and QPSK**?(N/D 2018)**
4. Explain the term 'ISI'? How do you alleviate ISI **?(N/D 2018)**
5. A discrete memory less source emits 5 symbols, each with probability 0.2.compute the entropy of the DMS**?(A/M 2017)**
6. List the type of characters used in data communication mode. **(A/M 2018)**
7. Give the significance of AMI code**? (A/M 2018)**
8. Determine the entropy of the source with alphabet S={S1,S2} with probabilities 0.25,0.75 respectively? **(A/M 2017)**
9. Draw the constellation diagram of QPSK modulation scheme? **(A/M 2017)**
10. Define bandwidth efficiency? **(A/M 2016)**
11. How to avoid ISI?
12. Draw the eye pattern diagram?
13. What is coherent detection?
14. Draw geometric representation of PSK?
15. What is interchannel interference?
16. Draw the 8-QAM modulator phasor diagram? **(A/M 2012)**
17. Sketch the QPSK signal for the binary sequence 11001100? **(A/M 2016)**
18. Define bandwidth efficiency**?(A/M 2016)**
19. For a 8 PSK system operating with an information bit rate of 24 kbps .Determine bandwidth efficiency**?(N/D 2016)**
20. Why is FSK and PSK signals are preferred over ASK Signals**?(N/D 2015)**

PART – B

PHASE SHIFT KEYING-BPSK, DPSK, QPSK:

1. Derive the expression of probability of error in BPSK? (8) **(A/M 2019)**
2. Explain coherent detection of BPSK signal and derive the expression for probability of error? **(A/M 2019) (13)**
3. Discuss the operation of QPSK modulator with neat diagram. Draw its phasor and constellation diagrams? (**16) (N/D 2018)**
4. Define DPSK .draw the waveform representing DPSK with neat diagram; explain the generation and detection of DPSK with neat block diagrams? (16**) (N/D 2018)**
5. Discuss the operation of a BPSK modulator and demodulator with neat diagram. (13)
6. Discuss the operation of a DPSK modulator and demodulator with neat diagram
7. Examine QPSK transmitter, receiver and   signaling with diagrams. (6)

PRINCIPLES OF M-ARY SIGNALING M-ARY PSK:

1. Write a note on M-ary PSK transmitter and receiver. (8)

QAM:

1. Explain QAM modulation system with its constellation and schematic diagrams? (A/M 2019) (5)
2. **Compare and contrast QPSK and QAM?(A/M 2017) (13)**
3. Show the power spectral density and bandwidth of QAM signal with neat diagrams (6)

ISI:

1. Describe how Nyquist criterion eliminates interference in the absence of noise for distortion less baseband binary transmission
2. Express the Nyquist first criterion for ISI elimination. (7)
3. Explain how ISI occurs in base-band binary data transmission system.
4. Explain the pulse shaping method to minimize ISI. (7)

DUO-BINARY ENCODING:

1. Analyze Duo binary signaling scheme with and without precoder and explain. (7)
2. **Explain modified duo-binary signaling scheme without and with precoder?(N/D 2012)(10)**

COSINE FILTERS:

1. Design the categorization of equalization. Using filters (10)

EYE PATTERN:

2. Describe how eye pattern illustrates the performance of data transmission system with respect to Inter Symbol Interference with neat sketch (13)
3. List the interference made from the eye pattern?(8)

EQUALIZERS:

1. **Explain zero-forcing equalizer with neat diagram?(A/M 2012) (10)**
2. Explain adaptive equalization for data transmission?(A/M 2016) (8)
3. **Draw the block diagram of an adaptive filter and explain the LMS algorithm?(10) (A/M 2016)**

UNIT-IV

INFORMATION THEORY AND CODING

PART – A

1. What is the need of channel coding?(A/M 2019)
2. List the properties of cyclic codes? (A/M 2019)
3. Define entropy?(N/D 2018)
4. What is prefix code? Give examples?(N/D 2018)
5. A discrete memory less source emits 5 symbols, each with probability 0.2.compute the entropy of the DMS?(A/M 2017)
6. What is error control coding?(A/M 2017)
7. Determine the entropy of the source with alphabet S={S1,S2} with probabilities 0.25,0.75 respectively? (A/M 2017)
8. State the difference between source coding and error coding? (N/D 2017)
9. What is Viterbi algorithm?

10. Define channel –hartley theorm
11. What is channel capacity theorem?
12. Define source coding theorem.
13. Define Sequential decoding
14. Define Shannon–Fano coding?
15. What is convolutional coding
16. What is syndrome decoding?
17. Define entropy coding or data compaction?
18. Write the concept of Lempel-Ziv algorithm
19. Write the properties of cyclic codes
20. What is measure of information?

PART – B

ENTROPY
1. Consider a binary memory less source X with two symbols X1and X2 .show that H(X) is maximum when both X1 and X2 are equiprobable?(6) (A/M 2019)
2. A discrete memory less source has five symbols x1 ,x2,x3,x4,x5 with probabilities 0.4, 0.15, 0.15, 0.15 .respectively attached to every symbol .construct a entropy and Huffman code and calculate code efficiency (13)
3. i) Describe the Entropy Techniques. (7)
   (ii)Write the entropy properties and explain in detail. (6)

SOURCE CODING THOREM
1. Explain shannon's channel capacity theorem?(A/M 2019)(6)
2. State and prove shannon's noiseless coding theorem?(13)(A/M 2018)
3. Describe the concept of source coding theorem?(13)(A/M 2018)
4. With an example explain the Huffman coding schemes and its coding efficiency?(12)(N/D 2017)
5. What is source coding? Discuss source coding procedure, with an example source code(8) (A/M 2017)
6. Examine the Huffman code for a discrete memory less source with probability statistics 0.1,0.1,0.2,0.2, 0.4 . (7)
7. Explain Lempel –ziv coding with examples.(10)
8. A generator polynomial of a (7,4) cyclic code is G(P) =P^3+P+1.Find code vector for the code in non systematic form(13)
9. A generator polynomial of a (7,4) cyclic code is G(P) =P^3+P+1.Find code vector for the code in systematic form
10. A source generates five messages m0, m1, m2, m3 and m4 with probabilities 0.55, 0.15, 0.15,0.10 and 0.05 respectively. The successive messages emitted by the source are statistically independent. Deduce the code words for the messages and efficiency using Shannon Fano Algorithm. (13)

CHANNEL CAPACITY
11. A discrete memory less source X has four symbols X1,X2,X3,X4 with P (X1)=0.5 , P(X2)=0.25, P(X3)= P(X4)=0.125.Construct a shanon-fanno code for X;show that the code has the optimum property that ni=I(xi) and that the code efficiency is 100 percent?(7) (A/M 2019)
12. Explain the procedure of Shannon-fano algorithm and calculate the entropy for the following probabilities using the algorithm?(16)
13. A transmission channel has a bandwidth of 4 Khz and signal to noise power ratio of 1
    1. How much should the bandwidth be in order to have the same channel capacity if S/N ratio is reduced to 15?
    2. What will be the signal to noise power ratio required if the bandwidth is reduced to 3 Khz.(7) (A/M 2019)

ERROR CONTROL CODES
1. Explain the types and application of error control codes briefly?(8)
CYCLIC CODE
1. Explain the cyclic codes and types briefly?(13)
2. Analyze a syndrome calculator for a (7,4) cyclic code generated by the polynomial
   $G(x) = X3 + X + 1$. Test the syndrome for the received vector 1001101. (7)
3. Describe and Draw the generalized (n,k) cyclic encoder to implement an encoding procedure for an
   (n,k) cyclic code in systematic form and non systematic form
CONVOLUTION CODING
1. What is a convolution code? When is it used?(4)(**A/M 2017**)
2. Explain briefly about convolution and linear block codes with near block diagram with an
   example?(16)
3. Explain convolutional coding with various factors and with neat diagram? (13)

VITERBI DECODING
1. (i) Explain how Viterbi procedure is used for decoding convolution codes. (7)
   (ii) Write the importance of Viterbi algorithm. (6)
2. Explain viterbi decoding method with neat diagram? (10)

UNIT-V
SPREAD SPECTRUM AND MULTILE ACCESS
PART – A

1. What are the benefits of multiple access techniques in the communication system? (**A/M 2019**)

2. Define near-far problem in CDMA? (**A/M 2019**) (**A/M 2018**)

3. Give the working principle of TDMA?(**A/M 2018**)

4. What is meant by SDMA**?(N/D 2017)**

5. Write the practical applications of FDMA? (** N/D 2017**)

6. What is CDMA**?(A/M 2017)**

7. What is the most critical requirement of TDMA techniques**?(A/M 2017)**

8. What are the benefits of multiple access techniques in communication engineering**?(N/D 2016)**

9. Mention the significance of CDMA technique**?(N/D 2016)**

10. Define near-far problems in CDMA?(**A/M 2016**)

11. Define pseudo-noise sequence**?(A/M 2016)**

12. Define direct spectrum?

13. What is jammer?

14. Discuss about slow frequency hopping?

15. Define process gain?

16. Define pseudo-noise sequence?

17. List the properties of a maximum –length sequence.

18. Give the expression for effective jamming power of DS spread spectrum.

19. What are the types of FH spread spectrum?

20. Write the advantages of CDMA over TDMA?

PART – B

PN SEQUENCE

1. What are PN sequences? What are the properties of PN sequence? (4)(**N/ D 2018**)

2. What are the advantages of spread spectrum?(5) **(N/D 2018)**

DSSS

1. with neat transmitter and receiver block diagram of direct sequence spread coherent phase shift keying, explain its principles of operation?(12)

2. With is direct sequence pseudo-noise spread spectrum? explain with block diagram?(6)

PROCESSING GAIN

1. derive an expression for processing gain PG?(10)

2. what is processing gain and jamming margin?(16)

JAMMING

1. what is processing gain and jamming margin?(16)

FHSS

1.Explain the operation of FHSS .compare slow and fast FHSS ?(13)**(A/M 2019)**

2.What are the differences between FHSS and DSSS? **(N/D 2018) (4)**

3.Explain the operation of frequency hop spread with the help of block diagram?(10)

SYNCHRONISATION AND TRACKING

2. Explain early-late gate tracking circuits of frequency hopping(FH) signal?(16)

3. With a diagram and suitable waveform explain the acquisition circuits for FH signal?(16)

MULTIPLE ACCESS-TDMA,FDMA,CDMA

1. Discuss the FDMA and TDMA techniques used in wireless communication with their merits and demerits?(13)**(A/M 2019)**

2. Explain the various multiple access techniques with neat diagram. List the advantages and disadvantages of each technique?(**13**)**(N/D 2018)**