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Question Paper Code : 40442

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Third/Fourth/Sixth Semester

Electrical and Electronics Engineering

EC 8395 – COMMUNICATION ENGINEERING

(Common to Computer Science and Engineering /
Electronics and Instrumentation Engineering /
Instrumentation and Control Engineering

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What are the needs of Modulation?

2.   Why SSB is not used for broadcasting?

3.   Define the terms (a) Nyquist Rate (b) Nyquist Interval.

4.   Draw block diagram of Regenerative repeater.

5.   List the advantage of gray coding of the input to QPSK system.

6.   Define bit rate and baud rate with an example.

7.   What do you mean by Information rate?

8.   Calculate the amount of information if it is given that $P(x_i) = 1/4$.

9.   If the PN sequences are not orthogonal, is CDMA still possible?

10. State the features of spread spectrum communication system.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the working of Ring modulator for generation of DSB-SC signal. Draw all relevant diagrams and signals.

(6.5+6.5=13)

(ii) Describe the working of Armstrong method for generation of FM with necessary block diagram and phase diagrams. (13)

Or

(b) (i) Explain Super Heterodyne Receiver structure for Analog Communication System. (5+4+4=13)

(ii) Discuss various types of distortions in diode detector.

(iii) A transmitter (AM DSBFC) with a carrier power of 10 W at a frequency f 25 MHz operates into a 50 ohms load. It is modulated at 60% by a 2 KHz sine wave:

(1) Sketch the signal in frequency domain, show power and frequency scales.

(2) What is the total signal power?

(3) What is the RMS voltage of the signal?

12. (a) (i) State and Prove Sampling Theorem. (6.5+6.5=13)

(ii) Derive an expression for Power Spectral Density of Unipolar NRZ format.

Or

(b) (i) In a DM system, the voice signal is sampled at a rate of 64,000 samples/sec. the maximum signal amplitude is Amax = 1. Determine: Minimum value of step size to avoid slope overload, Quantization noise power if voice signal bandwidth is 3.5 kHz. Assuming voice signal to be a sine wave, determine signal power and SNR. (6.5+6.5=13)

(ii) Derive the expression for Maximum Signal to Quantization Noise Ratio for PCM.

13. (a) (i) Explain the working of M-ary PSK Transmitter and Receiver in detail. (6.5+6.5=13)

(ii) "MSK is Special case of FSK". Justify the statement along with its Transmitter Structure.

Or

(b) (i) Explain the working of BPSK with transmitter and receiver structure. What is the advantage of DPSK over BPSK? (6.5+6.5=13)

(ii) Discuss the causes and remedies for Inter Symbol Interference.

14. (a) (i) For a (7,4) cyclic code, determine the generator matrix if $G(p) = 1+p+p^3$. Also determine all the possible code vectors.

(6.5+6.5=13)

(ii) A DMS X has five equally likely symbols. Construct a Shannon-Fano code for X, and calculate the efficiency of the code. Repeat for the Huffman code and compare the results.

Or

(b) An analog signal having 4 KHz bandwidth is sampled at 1.25 times the Nyquist rate, and each sample is quantized into one of equally likely levels. Assume that the successive samples are statistically independent.

(i) What is the information rate of source?

(ii) Can the output of this source be transmitted without error over an AWGN channel with a bandwidth of 10 khz and SNR of 20 dB?

(iii) Find the SNR required for error free transmission for part (i).

(iv) Find the bandwidth required for an AWGN channel for error free transmission of the output of this source if the SNR is 20 dB?

15. (a) (i) Explain FHSS transmitter and receiver with the aid of block diagram. (6.5+6.5=13)

(ii) Present the types of interference in CDMA technique.

Or

(b) Compare FDMA, TDMA and CDMA in detail. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain the working of DPCM Transmitter and Receiver with the help of block diagram. (15)

Or

(b) Consider a data stream of 101010101010101010.... (10 repeated 18 times) which is required to be codes using Lampel-Ziv coding algorithm. Illustrate the process of LZ encoding algorithm. (15)

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