

Subject- Principles of Telecommunication (Topics covered- Syllabus and previous years paper)

Semester-6th Semester EE Department, BBEC, KOKRAJHAR

Part 1 (Covered -4 modules)

Date – 18-07-2021

Module 1 – Introduction to Communication issues

1. What is communication? Draw the block diagram of communication system and explain the function of each block in detail. (2+6)
2. Define Bandwidth. What is the frequency range and Bandwidth of the music signal in Hz? (2+2)
3. Differentiate between analog and digital signals. Explain the various process to convert analog signals to digital signals.
4. Define noise. What are the main sources of noise? (1+4)
5. Write a short note on (20) (2019)
 - i. Thermal noise
 - ii. Partition noise
 - iii. Shot noise
 - iv. Low frequency or flicker noise
 - v. High frequency or transit time noise
 - vi. Atmospheric noise
 - vii. White Gaussian noise
 - viii. Noise bandwidth
 - ix. Noise temperature
 - x. Noise Factor and Noise figure
 - xi. Signal to Noise ratio

Text Book – Communication System by Dr Sanjay Sharma (Shared in whatsapp)

Reference Book (Ebook shared in whatsapp)

Note – Go through remaining examples, MCQ, Fill up the blanks and problems from the text book.

Syllabus – Module 1

History of communication, Issues of noise in communication, Sources and characteristics of different noise, thermal and shot noise, concept of white Gaussian noise. Noise temperature, noise bandwidth and noise figure.

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Module 2 -Amplitude Modulation

1. Why is high frequency carrier need in a communication system? (2)
2. What is modulation? Explain the needs for modulation in communication system. Explain the different types of analog and digital modulation systems. (2+4+4) (2019)
3. What is Amplitude Modulation? What do you understand by amplitude modulation index? (4+3)(2019)
4. Classify AM wave based on value of percentage modulation. (3)
5. Write the expression for AM wave and determine its frequency components. Derive the expression of total power of an AM wave? (1+4)
6. Explain different types of Generation of AM waves (or)

Write a short note on-

- i. Square Law AM modulator (2019)
- ii. Switching modulator

7. Explain different types of Detection (Demodulation of AM waves) (Or)

Write a short note on-

- i. Square law detector
- ii. Envelope detector (2019)

8. What is the other name of Amplitude Modulation in terms of sideband? (2)
9. Classify different types of Amplitude modulation AM. (or)

Discuss both generation and detection of following modulation and write the wave expressions of each one of them

- i. DSB-SC (Balanced Modulator (2019) and Coherent detection)
- ii. SSB-SC (Frequency Discrimination method (Book) and Detection part see from net (2019))

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Syllabus – Module 2

Concept and need of Modulation, Generation and detection of Amplitude Modulation- AM-DSBFC, DSBSC, SSB, Square Law modulation, switching modulator, square law demodulator, Envelope detector, Balance Modulator, Power spectra of AM

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Module 3 - Angle Modulation

1. What is angle modulation? How is it different from amplitude modulation? Explain different types of angle modulation (classify based on phase angle). Explain with diagrams (2+2+4)
2. Show how Frequency modulation (FM) can be obtained by using phase modulator and Phase modulation (PM) can be obtained by using frequency modulator. (6) (2019)
3. Classify FM based on bandwidth. (4) or What are NBFM and WBFM? Derive the expression for single tone NBFM if the carrier is $A_c \cos \omega_c t$.
4. Explain in detail- FM generation and detection (Each carry 5-6 marks)
 - i. FM Generation – using direct method (Reactance modulator) from notes
 - ii. FM Generation - using indirect method or Armstrong method (2019)
 - iii. Demodulation of FM waves- Balanced frequency discriminator, Zero crossing detector and Phase locked loop
 - iv. Super heterodyne receivers
5. Write mathematical expressions for the following- (For numericals) (2019)
 - i. Frequency sensitivity
 - ii. Modulation index for FM
 - iii. Canon's rule – calculate BW
 - iv. General expression for FM and PM wave
 - v. Carrier swing (definition- page 340)

N.B – Refer numericals from lecture notes and book examples for this chapter

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Syllabus – Module 3

Generation and detection of Frequency and Phase Modulation – NBFM, WBFM, Transmission bandwidth, Indirect and direct method for FM generation, Frequency discrimination, PLL demodulation, Super heterodyne receivers, Frequency Division Multiplexing.

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Module 4 - Random Signal Theory

1. A probability theory is an essential mathematical tool in the design of communication system. Explain briefly. (3)
2. What are the properties of probability? (4)
3. Define random variable. Explain the different types of random variable. (2+4)
4. What are the mean, variance and standard deviation of random variable? Or (Statistical averages of random variable). Find the mean and variance of a random variable X having uniform distribution in the interval (Notes). (3+6)
5. Write short notes for following distribution function- (Each 4 marks)
 - i. Cumulative distribution function(CDF) and mention its 4 major properties
 - ii. Probability density function(PDF) and mention its 4 major its properties
 - iii. Relation between CDF and PDF
 - iv. Binomial distribution
 - v. Uniform Distribution
 - vi. Gaussian Distribution
 - vii. Rayleigh Distribution

N.B – Go through solved examples in book

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Syllabus – Module 4

Random variable – cumulative distribution function, probability distribution function, statistical averages, normal distribution, standard deviation, Gaussian and Rayleigh PDF