

R15

Code No: 125AK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, January/February - 2023

ANALOG COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

- 1.a) What is the bandwidth required for an amplitude modulated signal? [2]
- b) A carrier signal $c(t) = 20\cos(2\pi 106t)$ is modulated by a message signal $m(t) = 5\cos(2\pi 104t)$ to generate a DSBSC signal. Calculate bandwidth and power? [3]
- c) Draw the frequency domain representation of SSB Modulated wave. [2]
- d) For a 100% modulation what is the relationship between the voltage amplitudes of the side band? [3]
- e) Define the term modulation index for FM in the case of single-tone modulation. [2]
- f) Explain about transmission bandwidth of FM wave. [3]
- g) Draw the block diagram of the model used for the channel and the receiver to study the noise performance of AM system. [2]
- h) Explain the need for pre-emphasis and de-emphasis in case of FM systems. [3]
- i) Distinguish between simple AGC and delayed AGC. [2]
- j) A TRF receiver is turned to 1000 KHz AM radio broadcast signal by a variable tuned circuit with 1 KHz bandwidth. Find the bandwidth when receiver is returned to 1550 KHz and 550 KHz. Determine the recovered baseband. [3]

PART - B

(50 Marks)

- 2.a) Explain the generation of AM signal using square law modulator.
- b) What is COSTAS loop? Where it is used? [6+4]

OR

- 3.a) Explain radio frequency spectrum and its application used in communication system with a neat Sketch.
- b) With necessary expressions, explain power relations in AM. [5+5]
4. Explain the functionality of each block of phase discriminator for generation of SSB wave. [10]

OR

- 5.a) How to generate a VSB modulated wave? Explain any one method with neat circuit diagram.
- b) Compare all AM Techniques. [6+4]

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6.a) A 107.76MHz carrier signal is frequency modulated by a 7 kHz sine wave. The resultant FM signal has a frequency deviation of 50 kHz. Determine carrier swing, highest and lowest frequencies of frequency modulated signal, and modulation index of FM wave.

b) Explain how balanced frequency discriminator is used to generate FM wave. [4+6]

OR

7. Derive the expression for narrow band FM. Explain its generation using a neat block diagram and give its phasor representation. [10]

8.a) Explain in detail about noise triangle with respect to angle modulation.

b) Derive the Signal to noise ratios for coherent reception with SSB modulation. [5+5]

OR

9. Derive the canonical representation of the narrow band noise. Prove that both the in-phase noise $n_c(t)$ and quadrature noise $n_s(t)$ have the same power spectral density. [10]

10. Explain the operation of super hetero dyne receiver with the block diagram and mention its advantages and disadvantages. [10]

OR

11.a) What is intermediate frequency in receivers? How to choose it?

b) Draw the PWM, PPM and PAM modulate waves and explain any one method to generate PPM wave. [5+5]

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