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15EC45

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Principles of Communication Systems

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define Modulation. Explain need for modulation. **(06 Marks)**
 b. Derive expression of AM by both time and frequency domain representation with necessary waveforms. **(06 Marks)**
 c. A 400W carrier is modulated on a depth of 75%. Calculate the total power in the modulated wave in the following forms of AM.
 i) Double sideband suppressed carrier   ii) SSB. **(04 Marks)**

OR

2 a. Explain the generation of DSBSC wave using balanced modulator using diodes with relevant mathematical equations. **(08 Marks)**
 b. Explain the generation of SSB wave using phase discrimination method with the help of neat functional block diagram. **(08 Marks)**

Module-2

3 a. Describe angle modulation. **(06 Marks)**
 b. Explain the generation of frequency modulated wave using indirect method. **(08 Marks)**
 c. The carrier swing of a FM signal 70kHz and the modulating signal is a 7kHz sine wave. Determine the modulation index of FM signal. **(02 Marks)**

OR

4 a. Explain the working of PLL and obtain the modulating signal by using linear model of PLL. **(08 Marks)**
 b. Explain the working of a superheterodyne receiver using block diagram. **(08 Marks)**

Module-3

5 a. Describe Mean, Correlation and Covariance functions with respect to stationary random process. **(08 Marks)**
 b. Explain the properties of auto correlation function and power spectral density. **(08 Marks)**

OR

6 a. Discuss thermal noise in detail. **(06 Marks)**
 b. An amplifier operating over the frequency range from 450 to 460kHz has a 100KΩ input resistor. What is the rms noise voltage at the input to this amplifier if the ambient temperature is 17°C? Also calculate noise power and power spectral density. **(04 Marks)**
 c. What is white noise? Plot power spectral density and auto correlation function of white noise. **(06 Marks)**

Module-4

7 a. In any receiver how the noise is produced? Explain. **(06 Marks)**

b. Derive the equation for the signal to noise ratio at the output of DSBSC receiver. **(06 Marks)**

c. An AM receiver operating with a sinusoidal wave and 80% modulation ahs an output signal to noise ratio of 30dB. Calculate the corresponding carrier to noise ratio. **(04 Marks)**

OR

8 a. Discuss about threshold effect in FM receiving system. **(06 Marks)**

b. Derive the equation for figure of merit at the output of the FM receiver. **(10 Marks)**

Module-5

9 a. State the sampling theorem. Explain sampling theorem in frequency domain. **(06 Marks)**

b. Explain the generation of PAM. State its advantages, disadvantages and application.

(10 Marks)

OR

10 a. With the neat block diagram, explain the generation and reconstruction of PCM signals.

(06 Marks)

b. Derive an expression for quantization error and signal to quantization noise ratio for non-sinusoidal PCM signals. **(06 Marks)**

c. Write a short note on VOCODER. **(04 Marks)**

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