020506

December 2023

B.Tech. (RAI) – V SEMESTER

Communication Systems (PCC–RAI–504–21)

Time : 3 Hours]   [Maximum Marks : 75

Instructions :

1.   It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.

*2.   Answer any **four** questions from Part-B in detail.*

3.   Different sub-parts of a question are to be attempted adjacent to each other.

PART–A

1.   (a)   What is the difference between baseband and broadband system?   (1.5)

     (b)   What is meant by modulation and explain the benefits of modulation.   (1.5)

     (c)   Discuss about different sources of noise.   (1.5)

     (d)   Why is FM superior to AM in performance?   (1.5)

     (e)   What is Shannon's limit for information capacity?
                                                                    (1.5)

     (f)   What is aliasing? What is the effect of aliasing? (1.5)

(g) Differentiate between natural and flat top sampling.

(1.5)

(h) What do you mean by companding? (1.5)

(i) What is AFC? (1.5)

(j) State Nyquist sampling theorem/sampling rate (1.5)

PART–B

2. (a) Draw block diagram of square law demodulator for AM wave and explain function of each block. (7)

(b) Define signal to noise ratio (S/N), noise factor and noise figure. A radio receiver with 10KHz bandwidth has a noise figure of 30dB. Determine the signal power required at the input of receiver to achieve input SNR at 30dB.

(8)

3. (a) A single-tone FM is represented by the voltage equation as: $v(t) = 12\cos (6 \times 106t + 5\sin 1250t)$. Determine the following: (i) Carrier frequency (ii) Modulating frequency (iii) Modulation index (iv) What power will this FM wave dissipate in 10Ω resistors? (8)

(b) Explain the functionality of each block of phase shift discriminator. (7)

4. Explain generation and demodulation of PCM with mathematical analysis. Compare it with DPCM and Delta modulation technique. (15)

5. (a) Draw and explain the block diagram of analog communication system. (7)

(b) What is the difference between QPSK, BPSK and QAM. (8)

6. (a) Explain generation of DSB-SC signal with the help of balanced modulator using diodes. (10)

(b) In an Amplitude modulation system, the carrier frequency is Fc = 100KHz. The maximum frequency of the signal is 5 KHz. Determine the lower and upper side bands and the band width of AM signal. (5)

7. Write short notes on:

(a) Synchronous detection for SSB-SC.

(b) Pre-Emphasis and De-Emphasis circuits.

(c) Synchronous TDM. (15)

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