

L-16

Exam. Code: 0935
Sub. Code: 6983

1128
B.E. (Electrical and Electronics Engineering)
Fifth Semester
EE-507: Communication Engineering

Max. Marks: 50

Time allowed: 3 Hours

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

- Q.No.1 (i) What are the frequency components in an AM wave?
(ii) What do you mean by sensitivity?
(iii) What is frequency deviation?
(iv) What do you mean by figure of merit?
(v) What is sampling theorem?
(vi) What is a pulse modulation scheme?
(vii) What are the types of digital modulation techniques?
(viii) Define companding.
(ix) How non-uniform quantization improves the signal to noise ratio?
(x) What do you mean by Hilbert transform? (10x1=10)

Part - A

Q.No.2 (a) What do you mean by DSB-SC system? How a DSB-SC signal can be generated? Explain in detail. (5)

(b) An SSB transmission contains 10 kW. This transmission is to be replaced by a standard amplitude modulated signal with the same power content. Determine the power content of the carrier and each of the sidebands when the percent modulation is 80%. (5)

Q.No.3 (a) Draw the circuit of an IF amplifier in a superheterodyne receiver and explain its working. (5)

(b) In a broadcast superheterodyne receiver having no RF amplifier, the loaded quality factor of the antenna coupling circuit is 100. If the IF frequency is 455 kHz, determine:

- (i) The image frequency and its rejection ratio for tuning at 1.1 MHz station. (5)
(ii) The image frequency and its rejection ratio for tuning at 25 MHz. (5)

Q.No.4 (a) What do you mean by frequency discriminator circuits? Explain in detail Foster Seeley detection method for FM signals. (5)

(b) Determine the frequency deviation and carrier swing for an FM signal which has a carrier frequency of 100 MHz and whose upper frequency is 100.007 MHz when modulated by a particular modulating signal. Also find the lowest frequency reached by the FM wave. (5)

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Part -B

Q.No.5 (a) What are the various types of analog pulse modulation methods? How a PPM signal can be generated? Also explain the demodulation of a PPM signal. (5)

(b) The information in an analog waveform with maximum frequency 3 kHz is to be transmitted over an M-level PCM system where the number of quantization levels is $M=16$. The quantization distortion is specified not to exceed 1% of peak to peak analog signal.

(i) What would be the maximum number of bits per sample that should be used in this PCM system?

(ii) What is the minimum sampling rate and what is the resulting bit transmission rate? (5)

Q.No.6 (a) What do you mean by quantization and quantization error? Derive the expression for signal to quantization noise in a PCM system. (5)

(b) The information in an analog signal voltage waveform is to be transmitted over a PCM system with an accuracy of 0.1% (full scale). The analog voltage waveform has a bandwidth of 100 Hz and an amplitude range of -10 to +10 volts.

(i) Find the minimum sampling rate required.

(ii) Find the number of bits in each PCM word.

(iii) Find minimum bit rate required in the PCM signal.

(iv) Find the minimum absolute channel bandwidth required for the transmission of the PCM signal. (5)

Q.No.7 (a) What do you mean by BFSK technique? Write down the equation of BFSK system. How a BFSK signal is generated? Also explain the recovery of original binary signal from the BFSK signal. (5)

(b) With the help of neat diagrams, explain the transmitter and receiver of a PCM system. (5)