(b) Describe in detail the PCM technique with focus on its sampling rate, and signal to quantization Noise ratio. 5

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008402

May 2024

B. Tech. (ECE) (Fourth Semester)

Analog and Digital Communication (EC-401)

Time : 3 *Hours*] [*Maximum Marks :* 75

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

Part A

1. (a) List the drawbacks of baseband transmission. **1.5**

(b) Enumerate the advantages of delta modulation over PCM. **1.5**

(c) What is the principle of frequency hopping spread spectrum ? **1.5**

(d) What is VSB Transmission ? How is it used in TV broadcast ? **1.5**

(e) What are the disadvantages of single side band transmission ? **1.5**

(f) Define capture effect in angle modulated system. **1.5**

(g) Describe the general process of frequency changing in a superheterodyne receiver. **1.5**

(h) Prove that the figure of merit of DSB-SC receiver is unity. **1.5**

(i) What is the function of channel equalization ? **1.5**

(j) Explain about effective noise temperature and average noise bandwidth. **1.5**

Part B

2. (a) Define pulse amplitude modulation, Draw the waveform, explain the Generation and Demodulation of PAM. **10**

(b) Explain the terms "synchronous detection", "envelope detection", "coherent detection", and "non-coherent detection". **5**

3. (a) (i) Explain necessary expressions, waveforms and spectrums, Explain AM for an arbitrary baseband signal m(t).

(ii) The output power of an AM transmitter is 1 kW when sinusoidal modulated to a depth of 100%. Calculate the power in each side band when the modulation depth is reduced to 50%. **5**

(b) Describe the single tone modulation of SSB. Assume both modulating and carrier signals are sinusoids. Write SSB equation and plot all the waveforms and spectrums. **10**

4. (a) Describe the frequency analysis of Angle modulated waves. Explain their Bandwidth requirements. **10**

(b) Derive the relationship between the voltage amplitudes of the side band frequencies and the carrier and draw the frequency spectrum. **5**

5. (a) Differentiate between narrow band FM and wide band FM. **5**

(b) Draw FSK Transmitter and explain. Describe its Bandwidth Considerations. **10**

6. (a) Describe with a neat diagram, the operation of a QPSK modulator. Draw its phasor and constellation diagram. **10**

(b) What is carrier recovery ? Discuss how carrier recovery is achieved by the squaring loop and Costas loop circuits. **5**

7. (a) What is known as Binary phase shift keying ? Discuss in detail the BPSK transmitter and receiver and also obtain the minimum double sided Nyquist bandwidth. **10**