

III B.Tech I Semester Supplementary Examinations, November 2007
COMMUNICATION ENGINEERING
(Electronics & Control Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain with the help of sketches and mathematical expressions how VSB modulation can be obtained and mention its applications.
(b) An AM broadcast station has a modulation index, which is 0.75 on the average. What would be the average power saving if it could go over to SSB-SC transmission, while having to maintain the same signal strength in the reception area? [10+6]
2. (a) Explain the indirect method of FM generation.
(b) A 500Hz modulating voltage fed into a PM generator produces a frequency deviation of 2.25kHz. What is the modulation index if the amplitude of the modulating voltage is kept constant but its frequency is raised to 6kHz? What is the new deviation? [8+8]
3. (a) Explain the operation of ISB transmitter with block diagram. Where it is used?
(b) What is the function of crystal filters in SSB transmitter?
(c) State and explain with respect to 'Q', various types of filters used to separate side bands? [4+6+6]
4. (a) With reference to an AM superheterodyne receiver explain the need for AGC and indicate simple method of obtaining it. What is delayed AGC circuit and in what respects it differs from a simple AGC circuit.
(b) Explain the measurement of sensitivity, selectivity and fidelity of receiver. [8+8]
5. (a) Define noise figure and derive the expression for the overall noise figure of Cascaded linear networks, in terms of network parameters $F_1, N_{n1}, G_1; F_2, N_{n2}, G_2$, etc.,
(b) Draw an experimental set up to measure the Noise figure of a system and explain. [10+6]
6. (a) What is Pulse Modulation? Classify pulse modulation systems.
(b) State and explain Sampling Theorem. [8+8]
7. Draw the block diagram of DPSK transmitter and receiver and explain the operation. [16]

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Set No. 1

8. Discriminate between the reset and restart error recovery procedures used in the packet layer of X.25 and explain their operation. [16]

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1. (a) An AM transmitter has antenna current of 2A with modulation index of 60 percent. What will be the total antenna current if one more identical antenna is connected in parallel with the previous one, keeping the transmitter output same? Will it affect the modulation index?
(b) An audio frequency signal $10 \sin(2\pi \times 500t)$ is used to amplitude modulate a carrier of $50 \sin 2\pi 10^5 t$. Calculate
 - i. Modulation index
 - ii. Side band frequencies
 - iii. Amplitude of each side band frequencies
 - iv. Bandwidth required
 - v. Total power delivered to the load of 600 ohms
 - vi. Transmission efficiency. [8+8]
2. (a) Explain Balanced slope detector for detecting FM signal.
(b) The maximum deviation allowed in an FM broadcast system is 75 KHz. If the modulating signal is a single-tone sinusoid of 10 KHz, find the bandwidth of the FM signal. [12+4]
3. (a) Explain the operation of ISB transmitter with block diagram. Where it is used?
(b) What is the function of crystal filters in SSB transmitter?
(c) State and explain with respect to 'Q', various types of filters used to separate side bands? [4+6+6]
4. (a) What are the drawbacks of Tuned Radio frequency receivers and explain how they are overcome in superheterodyne receivers?
(b) Discuss the criteria for the choice of local oscillator frequency and Intermediate Frequency (IF) in a superheterodyne receiver. [8+8]
5. (a) Derive Noise figure formula for cascaded network
(b) A mixer circuits has a noise figure of 12 dB. It is preceded by an amplifier that has an equivalent noise temperature of 200 K and a power gain of 30 dB. Calculate the equivalent noise temperature of the combination referred to the amplifier input. [8+8]
6. (a) Discuss the principle behind the Frequency Division Multiplexing.

- (b) Compare and contrast PAM, PWM, PPM methods. [6+10]
7. (a) Draw the block diagram of a Delta Modulation and explain its operation with waveform.
- (b) What is meant by Slope-overload error in Delta modulation? Explain. [8+8]
8. (a) Write the comparisons of communication switching techniques?
- (b) Draw the event timing for circuit switching and packet switching and explain? [8+8]

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 - vi. Transmission efficiency. [8+8]
2. (a) Distinguish between phase and frequency modulation. Show that FM can be derived using PM and vice versa with the help of differentiator or integrator networks.
(b) Compute the bandwidth requirement for the transmission of FM signal having a frequency deviation 75 KHz and an audio bandwidth of 10KHz.
(c) In a FM system the frequency deviation constant is 1KHz/V. A sinusoidal modulating signal of amplitude 15 V and frequency 3 MHz is applied, Calculate
 - i. Peak frequency deviation
 - ii. Modulating index. [6+4+6]
3. (a) Explain the requirements of carrier frequency for a radio transmitter.
(b) Explain the working of broadcast transmitter? [8+8]
4. (a) Explain the necessity for AGC in a radio receiver.
(b) Discuss the consideration that governs the choice of IF in a receiver.
(c) Explain the operation of superheterodyne receiver. [5+5+6]
5. (a) Define noise figure and derive the expression for the overall noise figure of Cascaded linear networks, in terms of network parameters $F_1, N_{n1}, G_1; F_2, N_{n2}, G_2$, etc.,

- (b) Draw an experimental set up to measure the Noise figure of a system and explain. [10+6]
6. (a) Explain the generation and demodulation of pulse-position modulation.
(b) What is meant by Cross-talk? Explain in detail. [10+6]
7. (a) Discuss the bandwidth efficiency of M-ary digital modulation techniques.
(b) Draw the signal space diagram of coherent QPSK system and explain. [8+8]
8. (a) Explain the common - channel-signaling modes?
(b) Consider a simple telephone network consisting of two end offices and one intermediate switch with a 1-MHz full-duplex trunk between each end office and the intermediate switch. The average telephone is used to make four calls per 8-hour workday, with a mean call duration of six minutes. Ten percent of the calls are long distance, what is the maximum number of telephones an end office can support? [8+8]

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 - iv. Bandwidth required
 - v. Total power delivered to the load of 600 ohms
 - vi. Transmission efficiency. [8+8]
2. (a) A sinusoidal modulating wave of amplitude 5V, and frequency 1kHz is applied to a frequency modulator. The frequency sensitivity of the modulator is 45Hz/V the carrier frequency is 100kHz. Calculate its frequency deviation and modulation index.
(b) Explain analytically how do the AM and narrow-band FM differ each other. Show that the average power of FM is constant. [6+10]
3. (a) Explain the operation of ISB transmitter with block diagram. Where it is used?
(b) What is the function of crystal filters in SSB transmitter?
(c) State and explain with respect to 'Q', various types of filters used to separate side bands? [4+6+6]
4. (a) Distinguish between simple AGC and delayed AGC.
(b) Draw a block diagram of a superheterodyne receiver and explain the function of each stage.
(c) What is meant by the term "tracking error"? Explain. [5+6+5]
5. (a) Explain why inductance and capacitance do not generate noise.
(b) Define noise factor, in terms of input and output signal to noise ratios of a network.
(c) The noise factor of an amplifier is given as 5:1. If the input S/N is 50 db. Calculate the output S/N ratio in decibels. [5+6+5]

6. (a) Explain the generation and demodulation of pulse-position modulation.
(b) What is meant by Cross-talk? Explain in detail. [10+6]
7. Draw the block diagram of DPSK transmitter and receiver and explain the operation. [16]
8. (a) Which is more efficient, circuit switching or virtual circuits switching? Why?
(b) What are the three switching methods? Explain [8+8]
