(3 hours) **[Total Marks: 80]**

Note: 1. Question No. 1 is Compulsory
2. Attempt any three questions out of the remaining five.
3. All questions carry equal marks.
4. Assume suitable data, if required and state it clearly.

Q.1. a) Explain line code? What are the parameters need to be considered for selecting a line code for a specific application?

b) Compare BASK, BFSK, BPSK based on
i. Bandwidth Requirement
ii. Error Probability
iii. Noise Immunity
iv. Reception Complexity
v. Bit rate or data rate

c) Discuss the limitations of TRF receiver? Explain how these limitations are avoided using superheterodyne receiver.
d) Explain in brief Pre-emphasis and De-emphasis.
e) For faithful recovery of a communication signal, comment on sampling theorem.

Q.2. A) Discuss the problem of ISI and its causes. Explain the measures to be taken to reduce ISI.
B) i) Compare High level and Low level AM transmitters.
ii) A modulating signal $15\sin(2\pi\times10^3 t)$ is used to modulate a carrier signal $25\sin(2\pi\times5\times10^3 t)$. Evaluate percentage modulation, sideband frequencies and their amplitudes. Sketch the spectrum. Determine the bandwidth of the modulated wave

Q.3. A) Explain in detail working operation of QASK transmitter and receiver system.
B) Classify and explain several sources of noises that affect communication.

Q.4. A) Explain noise triangle in FM. Differentiate between Wideband FM and Narrowband FM.
B) Draw and explain the generation of DSB-SC using diode based balanced modulator.

Q.5. A) Draw the block diagram of T1 digital carrier system and explain each block.
B) Explain in detail generation and coherent detection of BPSK signal.

Q.6. A) Write short notes on:
i. Automatic Gain control
ii. Automatic frequency control

B) Compare and contrast AM, FM and PM

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