

- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions out of remaining **six** questions.
 (3) Assume **suitable** data if **required**.
 (4) Questions should be written one below the other and in every front page only.
 (5) Marks assigned to **each** question should be stated against **each** question.

Q.1 Answer the following:

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- (a) Give sources/causes of all types of internal noise.
 (b) Explain pre emphasis and de emphasis in relation to FM receivers.
 (c) Show how companding reduces the quantization error. Give compander characteristics.
 (d) Compare TDM and FDM.

Q.2 (a) Define noise figure. Derive the Friiss formula for calculation of total noise figure for a two amplifiers connected in cascade.

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(b) State advantages and disadvantages of digital transmission. With neat block diagram explain the operation of single channel, simplex PCM transmission system.

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Q. 3 (a) What are the advantages of low level modulation? Draw the circuit of single transistor emitter modulator and explain its operation with output waveforms.

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(b) For an AM DSBFC modulation with a carrier frequency $f_c = 100$ KHz and a maximum modulating signal frequency $f_{m(max)} = 5$ KHz, determine

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- (i) Frequency limits for the upper and lower sidebands.
 (ii) Bandwidth.
 (iii) Upper and lower side frequencies produced when the modulating signal is a single frequency 3 KHz tone.
 (iv) Draw the output frequency spectrum.

Q.4 (a) Define the following terms with respect to FM and PM:

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- (i) Instantaneous phase deviation
 (ii) Instantaneous phase
 (iii) Instantaneous frequency deviation
 (iv) Instantaneous frequency
 (v) Deviation sensitivity
 (b) Draw the block diagram of Crosby direct FM transmitter and explain its operation.

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Q.5 (a) Draw and explain AM receiver with forward AGC. What is the purpose of Squelch circuit?

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(b) State and prove sampling theorem.

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Q.6 (a) Explain generation and demodulation of PWM signal with the help of suitable diagrams.

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(b) Explain the operation of Foster Seely discriminator with the help of circuit diagram and phasor diagrams.

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Q.7 Write short notes on: (any four)

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- (i) Single Side Band transmitter using Filter method
 (ii) Two channel PCM - TDM system
 (iii) Delta Modulation transmitter
 (iv) Primary causes of Intersymbol Interference (ISI)
 (v) TRF receiver