Q.P. Code : 50776

(3hours) Total Marks:80

NB: 1. Question number 1 is compulsory
2. attempt any 3 questions from the remaining five questions
3. Assume suitable data wherever needed

Q.1 Attempt any 5 questions

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a) Why do we modulate a signal for transmission? Explain.

b) A single tone FM signal is given by
\[ e_{FM}(t) = 20 \cos (16 \pi 10^4 t + 25 \sin 2\pi 10^3 t) \] . find the modulation index, modulating frequency , deviation , carrier frequency and power in the FM signal

c) Compare Amplitude Modulation and Frequency Modulation in terms of
i) bandwidth, ii) signal quality, iii) effect of noise on the signal and iv) range

d) Draw a well labeled diagram of a super-heterodyne receiver.

e) Explain Shannon’s Sampling theorem and explain aliasing error.

f) Compare TDM and FDM.

Q.2 a) An AM signal is produced by modulating a carrier signal with peak voltage of 10V and frequency of 100KHz by an information signal with max. modulating frequency of 5KHz and max amplitude 4V. Determine:

a) Frequency limits for lower and upper sideband

b) Bandwidth of AM

c) Total power of the modulated wave if the load resistance, \( R_L = 10 \, \Omega \)

d) Draw the power spectrum.

e) Calculate the total transmitted current.

b) What are the methods employed for generation of SSB? Explain the third method of SSB generation with its advantages and disadvantages.

Q.3 a) Explain the indirect method of FM generation. 

b) What is image frequency and its rejection? Also explain double spotting.

c) In a Super heterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 80. If the IF is 455KHz, calculate the image frequency and its rejection ratio for tuning at (i) 100 kHz (ii) 20 MHz.

Q.4 a) What is multiplexing in communication system? Draw a block diagram of frequency division multiplexing to transmit 5 SSB signals.

b) Draw and explain the transmitter and receiver of Delta modulation. What is meant by slope overload distortion?

c) Bring out the merits and demerits of adaptive Delta modulation

Q.5 a) With the help of a neat block diagram explain the generation and detection of a PPM signal. Also explain the merits and demerits of a PPM transmission.

b) Explain the terms :Selectivity, Fidelity, Sensitivity, AGC

c) Explain companding

Q.6 Write short notes : any four

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a) Block diagram of PCM Transmitter and receiver

b) T1 digital carrier system

c) TRF receiver, its merits and demerits

d) Foster Seelay discriminator method

e) Pre-emphasis and deemphasis circuits

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