B.E. / B.Tech. Electronics & Communication / Telecommunication Engineering (Model Curriculum) Semester-IV

SE203 - Analog and Digital Communication

P. Pages : 2

Time : Three Hours

Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Show that **8**

$$\mu = \frac{V_{c_{max}} - V_{c_{min}}}{V_{c_{max}} + V_{c_{min}}}$$

Where,

μ is modulation index of AM signal

V_{cmax} is maximum amplitude of carrier after modulation

V_{cmin} is minimum amplitude of carrier after modulation

b) Explain how a DSBSC signal is detected using a coherent detector. Also explain quadrature null effect. **8**

OR

2. a) With the help of circuit diagram explain the operation of square-law diode modulator & demodulator for AM. **8**

b) Consider an AM signal **8**

$s(t) = 4\cos 1800\,\pi t + 10\cos 2000\,\pi t + 4\cos 220\,\pi t$

Apply Fourier transform to the above signal sketch the spectrum. Also calculate Bandwidth, power and efficiency.

3. a) What is the relation between the time domain equations of Frequency Modulated (FM) and Phase Modulated (PM) signal? How can FM signal be obtained using PM modulator? **8**

b) The time domain equation of a FM signal is as given below: **8**

$s(t) = 10\cos\left[2\pi 10^6 t + 8\sin\left(4\pi 10^3 t\right)\right]$

i) Calculate Modulation index, Frequency deviation, Bandwidth and Power
ii) Repeat the above calculations when the message amplitude is doubled.

OR

4. a) Starting from the time domain equation of WBFM signal calculate the power required to transmit the signal. Draw the spectrum. **8**

b) Explain the demodulation of FM signal using Phase discrimination method. **8**

5. a) Explain the need for pre-emphasis and de-emphasis in FM systems. **8**

	b)	Explain the operation of Tuned Radio Frequency (TRF) receiver with the block diagram and mention its advantages and disadvantages.	**8**

<div align="center">**OR**</div>

6.	a)	Draw block diagram of Super-heterodyne AM receiver and explain function of each block.	**8**
	b)	What do you mean by image frequency? Explain with an example.	**4**
	c)	Define i) Noise bandwidth ii) Noise figure	**4**
7.	a)	Draw the block diagram of ADM transmitter and with the help of relevant waveform explain its working..	**8**
	b)	If a TV signal of 4.5MHZ bandwidth is transmitted using 8-bit binary PCM, determine i) The maximum signal to quantization noise ratio ii) The minimum bit rate.	**8**

<div align="center">**OR**</div>

8.	a)	Describe in detail the PCM technique with focus on its sampling rate, and signal to quantization Noise ratio.	**8**
	b)	A signal whose amplitude varies from 0 to 10 V is bandlimited to 4 kHz and transmitted through a channel using 5 bit PCM. The sampling rate is 50% higher than the Nyquist rate. Calculate Number of Quantization level, step size, Maximum Quantization error, Bit rate and Maximum bandwidth.	**8**
9.	a)	Explain the process of generating FSK signals.	**8**
	b)	With the help of constellation diagram, compare QPSK and 8-QAM.	**8**

<div align="center">**OR**</div>

10.	a)	Plot and compare the probability of error for the non-coherent detection of binary ASK and binary FSK.	**8**
	b)	Describe the process of detecting DPSK signals.	**8**

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