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Code No: 135SA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, August - 2022
ANALOG COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Consider a two-stage product modulator with a BPF after each product modulator, where the input signal consists of a voice signal occupying the frequency band 0.3 to 3.4 KHz. The two local oscillator frequencies have the value f_1 = 100 KHz and f_2 = 10 MHz. Calculate the following:
i) Sidebands of DSBSC modulated waves appearing at the two product modulator outputs.
ii) Sidebands of SSB modulated waves appearing at the BPF outputs.
iii) The pass-bands of the two BPF's.
b) Draw a neat block diagram COSTAS receiver used for demodulation of DSBSC wave. [8+7]

2.a) How an envelop detector is used for demodulation of AM?
b) Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of (i) 100% and (ii) 50%. [7+8]

3.a) Explain the scheme of generation and demodulation of VSB modulated wave with relevant spectrum of signals and mathematical expressions.
b) With a neat block diagram, explain the operation of phase discrimination method of SSB generation. [8+7]

4.a) What is Hilbert transformation? Derive an expression for impulse response of the Hilbert transformer.
b) Represent SSB both in Time Domain and Frequency Domain giving its spectrums. Also give some advantages and disadvantages of SSB. [7+8]

5.a) With relevant mathematical analysis, explain reconstruction of message signal from FM wave by PLL.
b) With neat schematic and frequency response, explain the operation of balanced discriminator for demodulation of FM wave. [8+7]

6.a) With a block diagram and necessary equations, explain generation of NBFM.
b) A carrier wave of amplitude 5 V and frequency 90 MHz is frequency modulated by a sinusoidal voltage of amplitude 5 V and frequency 15 KHz. The frequency deviation constant is 1 KHz/V. Sketch the spectrum of the modulated FM wave. Given J_0=0.96, J_1 =0.18 and J_2=0.02. [8+7]

7.a) Derive an expression for Figure of merit for noise in AM receivers.
b) Explain the threshold effect in angle modulation systems. [8+7]

8.a) Explain the principle of working of AGC in detail. Discuss the merits of delayed AGC as compared with simple AGC.
b) Explain the generation and recovery of PAM (Flat-top) signal with necessary equations and spectrum diagram. [8+7]

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