

R13

Code No: 115AK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B. Tech III Year I Semester Examinations, November/December - 2016****ANALOG COMMUNICATIONS****(Electronics and Communication Engineering)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Define noise. [2]
- b) What are the similarities and differences between narrowband FM and AM systems? [3]
- c) What is threshold effect in envelope detector? [2]
- d) Distinguish between simple AGC and delayed AGC. [3]
- e) Define the terms frequency deviation and modulation index for FM wave. [2]
- f) Explain the need for modulation. [3]
- g) Give the classification of radio transmitters. [2]
- h) Explain the need of amplitude limiter in FM receiver. [3]
- i) Calculate the percentage saving in power if only one side band transmission is used over the DSB-SC system at (i) 100% modulation (ii) 50% modulation. [2]
- j) State the sampling theorem. [3]

PART - B**(50 Marks)**

- 2.a) Define modulation and explain the need of modulation.
 - b) A carrier with amplitude modulated to a depth of 50% by a sinusoidal, produces side band frequencies of 5.005 MHz and 4.995 MHz. The amplitude of each side frequency is 40V. Find the frequency and amplitude of the carrier signal. [5+5]
- OR**
- 3.a) Draw the block diagram and explain generation of DSB-SC signal using balanced modulator.
 - b) A modulating signal is a multi-tone signal given by $m(t) = A_1 \cos \omega_1 t + A_2 \cos \omega_2 t + A_3 \cos \omega_3 t$. The signal $m(t)$ modulates a carrier $A_c \cos \omega_c t$. Plot the signal sided spectrum and find the bandwidth of the modulating signal. Assume that $\omega_3 > \omega_2 > \omega_1$ and $A_3 > A_2 > A_1$. [5+5]
- 4.a) What is SSB Modulation and what are its advantages? Draw the block diagram for SSB generation using Phase discrimination method and explain its operation.
 - b) Explain how the base band signal can be recovered from the VSB Signal plus carrier using envelope detector. [5+5]

OR

5.a) Mention applications of different AM Systems.

b) A vestigial filter has a transfer function $H(f)$ with $f_c = 10^5 \text{ Hz}$. Find the VSB modulated signal when $e_m(t) = \cos(2\pi f_m t)$ and $e_c(t) = 2\cos(2\pi f_c t)$. Assume $f_m = 10^3 \text{ Hz}$. [5+5]

6.a) Discuss the effect of modulation index on the band width of FM. Explain the generation of WBFM from NBFM with neat sketch.

b) A carrier is frequency modulated by a sinusoidal modulating of frequency 2 kHz, resulting in a frequency deviation of 5 kHz. What is the bandwidth occupied by the modulated waveform? The amplitude of the modulating sinusoid is increased by a factor 2 and its frequency lowered by 500 Hz. What is the new bandwidth? [5+5]

OR

7.a) Compare the direct and indirect methods of generating FM signals. Explain Armstrong method of generating FM signals with a neat block schematic diagram.

b) Draw the spectral representation of FM wave and derive the expression the Transmission bandwidth. [5+5]

8.a) Draw the AM receiver model and determine the signal to noise ratio of AM system.

b) What is the noise equivalent band width? Discuss the trade off between bandwidth and S/N ratio. [5+5]

OR

9. Explain the following:

a) Resistive noise source.

b) Shot noise.

c) In phase and quadrature phase components and its properties.

d) Noise Figure. [10]

10.a) Explain the operation of Superhetrodyne receiver with a neat schematic diagram.

b) Explain the terms:

i) Automatic Gain Control (AGC).

ii) Amplitude limiting

iii) Squelch circuit. [5+5]

OR

11.a) Compare the pulse modulation systems and continuous modulation systems.

b) What is Multiplexing? What are the advantages of Multiplexing? Explain how do you generate Time Division Multiplexing (TDM) signals. [5+5]

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