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Roll No: B TECH

(SEM V) THEORY EXAMINATION 2017-18

PRINCIPLES OF COMMUNICATION

Time: 3 Hours

Notes: Attempt all Sections. Assume any missing data.

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Q1. Attempt all parts in brief.

- a) What is baseband signal?
- b) Draw block diagram of analog communication System.
- c) What VSB Signal. How it is used for reduction of Bandwidth.
- d) Draw phasor diagram for AM system along with its application.
- e) What is Modulation? Why it is required.
- f) Why is Line Coding required in Communication System?
- g) What is Quantizer? What role does it play in Digital Transmission?
- h) List Comparison between Narrowband & Wideband FM.
- i) What is White Noise? Draw its Spectral Density Curve.
- i) What is Noise Figure? List Sources of Noise.

SECTION B

Q2. Attempt any three question .All question carry equal marks

- a) Calculate the percentage saving when the carrier and one of the sideband are suppressed in an AM wave modulated to a depth of i) 100% ii) 75%.
- b) Draw & Explain the block diagram of Phase shift method for generating the SSB Signal.
- c) Explain modulation and demodulation of PWM system using suitable waveform?
- d) What do you mean by Noise? Show the effect of certain types of filter on the noise What is slope overload distortion and granular or Idle noise
- e) What is Differential Pulse Code Modulation? Explain working of DPCM with a proper block Diagram.

Q3. Attempt any one question .All question carry equal marks

a) The efficiency η of ordinary AM is defined as the percentage of the total power carried by the sidebands, that is

 $\eta = P_{\rm s}/P_{\rm t}$ Where P_s is the power carried by the sidebands and P_t is the total power of the AM signal.

- i) Find η for $m_a = 0.5$ (50% modulation)
- ii) Show that for a single tone AM η max is 33% at $m_a=1$.
- b) Assuming sinusoidal modulation prove that AM system with envelop detection the output signal to noise ratio(SNR) is given by

$$(S/N) = (m^2/2+m^2) \gamma$$

Where m is modulation index for AM and $\gamma = (S_i / nf_m)$

Q4. Attempt any one question .All question carry equal marks

- a) In an FM system a 7 kHz modulating signal modulates 107.6Mhz carrier wave so that the frequency deviation is 50Khz.Determine
- i) Carrier Swing in the FM signal and modulation index.
- ii) The Highest and lowest frequency attained by the FM Signal
- b) Derive the expression for Narrowband FM signal and Wide Band FM. Explain advantage of Modulation Index

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Total Marks: 100

(2*10=20)

(10*3=30)

(10*1=10)

(10*1=10)



SECTION A



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(10*1=10)

(10*1=10)

(10*1=10)

Q5. Attempt any one question .All question carry equal marks

- a) A PCM system uses a uniform Quantizer followed by a 7-bit Binary encoder. The bit rate of the System is equal to 50×10^6 bits/sec. Calculate
- i) What is the maximum message signal bandwidth for which the system operates satisfactory?
- ii) Calculate the output signal to noise ratio when full load sinusoidal modulating wave of frequency 1Mhz is applied to the input
- b) Explain flat top sampling in detail?

Q6. Attempt any one question .All question carry equal marks

- a) Explain working of Adaptive Delta modulation with a proper block Diagram
- b) Show that maximum quantization error in PCM is given by $\frac{\Delta^2}{12}$

Q7. Attempt any one question .All question carry equal marks

- a) For a given sequence 1011001011 construct Unipolar NRZ, Unipolar RZ bipolar NRZ, bipolar RZ, Alternate Mark Inversion (AMI), and Manchester format?
- b) What is pre-emphasis and de-emphasis and how SNR improves by using pre-emphasis and de-emphasis? Find out the figure of merit in SSB-SC.

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