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B. TECH
THEORY EXAMINATION (SEM-V) 2018-19
PRINCIPLES OF COMMUNICATION

Time : 3 Hours *Max. Marks : 70*

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided

SECTION – A

1. Attempt all parts of the following questions: 2×7=14

(a) What is the function of limiter and frequency discriminator?
(b) Define Modulation? List different types of AM.
(c) Draw the waveforms of PAM, PPM and PWM.
(d) Define Power Spectral Density? What is the PSD of AWGN?
(e) What is noise? Discuss superposition of noise
(f) What is line coding? Give its types?
(g) Give Carson's rule? Find the bandwidth of Narrowband FM.

SECTION B

2. Attempt any three parts of the following questions: 3×7=21

(a) Derive the mathematical expression for single-tone FM.
Determine the frequency deviation and carrier swing for a frequency-modulated (FM) signal which has a resting frequency of 105.00 MHz and whose upper frequency is 105.007 MHz when modulated by a particular wave. Find the lowest frequency reached by the FM wave.

(b) What are the disadvantages of PAM and PWM signals? Discuss the generation of PPM signals using PWM signals. List the advantages of PPM.

(c) Given that the bit sequence given below is to be transmitted
Bit sequence= 10110010
Draw the resulting waveform, if the sequence is transmitted using
(i) Unipolar RZ
(ii) Polar RZ
(iii) AMI
(iv) Split phase Manchester
(v) M-ary where m=4 (Polar Quaternary)

(d) A television signal having a bandwidth of 10.2 MHz is transmitted using binary PCM system. Given that the number of quantization levels is 512. Determine

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(i) Codeword length
(ii) Transmission bandwidth
(iv) Final bit rate
(v) Output signal to quantization noise ratio

(e) Define Figure of merit. Derive the mathematical expression of figure of merit for FM system.

SECTION C

Attempt any one part of the following question: 1×7=7

3. (a) State and prove Sampling theorem. What is the criterion to remove Aliasing effect?

Determine the Nyquist rate and Nyquist interval for a continuous-time signal

$$x(t) = 6\cos 50\pi t + 20\sin 300\pi t - 10\cos 100\pi t$$

(b) Explain in detail Superheterodyne AM Receiver with labelled block diagram.

Attempt any one part of the following question: 1×7=7

4. (a) Explain the indirect method (Armstrong method) of generation of FM.
(b) What is multiplexing? Explain TDM Hierarchy for digital communication in detail. List the advantages of digital multiplexing.

Attempt any one part of the following question: 1×7=7

5. (a) Explain the working of PLL-FM demodulator with supporting diagrams and mathematical expressions.
(b) What is delta modulation? Discuss the errors in Delta Modulation. How they are overcome in Adaptive Delta Modulation?

Attempt any one part of the following question: 1×7=7

6. (a) Define Figure of Merit. Derive an expression of figure of merit for AM system.
(b) What are vocoders? List various types of vocoders and discuss them briefly.

Attempt any one part of the following question: 1×7=7

7. (a) What is the need for modulation? List the differences between AM and FM.
(b) Explain TRF receiver in detail. What are the drawbacks of TRF receivers?

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