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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:

- (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?