Paper Id | **130519** | Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

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

Time: 3 Hours   *Max. Marks: 100*

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:**   **2×10=20**
    (a) What is sampling? Name different types of sampling.
    (b) A signal has frequency components from 300 Hz to 1.8 KHz. What is the minimum possible rate at which the signal has to be sampled?
    (c) List the differences between AM and FM.
    (d) What is multiplexing? Compare FDM and TDM.
    (e) What is Quantizer? What role does it play in Digital Transmission?
    (f) What is the Nyquist sampling interval and Nyquist rate for the signal
$$x(t) = sin(1000t) + sin(1800t)$$
    (g) List the advantages of PPM over PAM and PWM?
    (h) What is modulation? What is the need of modulation?
    (i) Differentiate Delta modulation and Adaptive delta modulation.
    (j) What is noise? List sources of noise?

SECTION B

2. **Attempt any three parts of the following questions:**   **3×10=30**
    (a) Prove that the bandwidth of an FM wave is infinity. Also represent the single tone FM wave as a function of Bessel's Function.
    (b) How to generate PPM from PWM signal? Explain with proper block diagram and waveforms.
    (c) Derive the expression of the Figure of merit for DSB-SC system with supporting diagrams.
    (d) What are drawbacks of delta modulation? Discuss Adaptive Delta modulation which is used to overcome the drawbacks of delta modulation.
    (e) What are Vocoders? Discuss different types of vocoders used in communication system.

SECTION C

3. **Attempt any one part of the following question:**   **1×10=10**

    (a) Explain Stereophonic broadcast and receiver with supporting diagrams.
    (b) What are the drawbacks of TRF receiver? Explain in detail Superheterodyne receiver which is used to overcome the drawbacks of TRF receiver.

4. **Attempt any one part of the following question:** 1×10=10

   (a) An angle modulated signal with carrier frequency $\omega_c = 2\pi \times 10^5$ rad/sec is given by:

   $$\varphi_{FM}(t) = 10 \cos(\omega_c t + 5\sin 3000t + 10\sin 2000t)$$

   i) Find the power of the modulated signal
   ii) Find the maximum frequency deviation.
   iii) Find the maximum phase deviation.
   iv) Estimate the bandwidth of the FM signal

   (b) Describe in detail with supporting diagrams the working of Ring modulator for the generation of DSB-SC.

5. **Attempt any one part of the following question:** 1×10=10

   (a) Find out the figure of merit in FM. Why we use pre-emphasis and de-emphasis in FM systems? How SNR improves by using pre-emphasis and de-emphasis.
   (b) For a given sequence 10001111001 construct Unipolar RZ bipolar NRZ, bipolar RZ, Alternate Mark Inversion (AMI) and Manchester format.

6. **Attempt any one part of the following question:** 1×10=10
   (a) Discuss the Armstrong's method of indirect FM generation in detail.

   (b) Discuss the multiplexing of PCM system. Describe T1 digital system in detail.

7. **Attempt any one part of the following question:** 1×10=10

   (a) What is Differential Pulse Code Modulation? Explain working of DPCM with a proper block diagram.
   (b) Compare Wideband and Narrowband FM signals. Explain PLL-FM demodulator.