CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Principles of Communication Systems

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a. Illustrate the amplitude modulation process. What is envelope distortion? **(10 Marks)**
    b. With the aid of neat block diagram, describe coherent detection of DSB-SC modulated wave. What is quadrature null effect? **(07 Marks)**
    c. A single of 5KHz frequency signal is modulated on a carrier wave of a frequency 2 MHz. What are the frequencies of the resultant signal? **(03 Marks)**

OR

2   a. Describe ring modulator. Why the ring modulator is referred as a double balanced modulator? **(10 Marks)**
    b. Describe quadrature carrier multiplexing. **(06 Marks)**
    c. What are the factors influencing the choice of VSB modulation for the transmission of analog TV signals? **(04 Marks)**

Module-2

3   a. Derive an expression for FM signal. **(08 Marks)**
    b. With the aid of neat block diagram, explain AM super heterodyne receiver. **(08 Marks)**
    c. The resulting FM signal is $10 \cos[(2\pi\ 10^5 t) + 15 \sin (2\pi\ 100t)]$. Find the approximate bandwidth of the FM signal. **(04 Marks)**

OR

4   a. Describe the PLL working. **(08 Marks)**
    b. With the aid of neat circuit diagram balanced frequency discriminator. **(08 Marks)**
    c. What are the RF frequency range and intermediate frequency for AM and FM ratio? **(04 Marks)**

Module-3

5   a. Define Mean, correlation and covariance Functions of a random process x(t). **(08 Marks)**
    b. Discuss Gaussian process and its properties. **(08 Marks)**
    c. Draw the characteristics of white noise. **(04 Marks)**

OR

6   a. Write the important properties of autocorrelation function. **(08 Marks)**
    b. Discuss shot noise, and thermal noise. **(08 Marks)**
    c. Define noise equivalent bandwidth. **(04 Marks)**

Module-4

7 a. Discuss noise in DSB-SC. Show that figure of merit for DSB-SC receiver is one. **(10 Marks)**
   b. Discuss pre-emphasis and de-emphasis in FM. **(10 Marks)**

OR

8 a. Derive the expression for figure of merit for FM. **(14 Marks)**
   b. Show that figure of merit for single tone AM modulation is equal to 1/3 for 100% modulation. **(06 Marks)**

Module-5

9 a. With the aid of block diagram, describe PPM Generation and detection. **(10 Marks)**
   b. Design a PCM multiplexing system using 256 levels signal quantizer for the transmission of 3 signals: m_1 m_2 and m_3 band limited to 5KHz, 10KHz and 5KHz respectively. Assuming that each signal is sampled at its Nyquist rate and 8 bits are transmitted simultaneously. Compute :
   i)   Maximum bit duration
   ii) Channel Bandwidth required to pass PCM signal
   iii) The commutator speed in RPM. **(10 Marks)**

OR

10 a. Describe the basic elements of a PCM system. **(10 Marks)**
   b. State sampling theorem. Find the Nyquist sampling rate for the signal.
   $g(t) = 10 \cos (50\pi t) \cos^2 (150\pi t)$ where t is in mscecs. **(06 Marks)**
   c. Represent the binary data given below interms of i) unipolar NRZ signaling ii) Split phase. Binary data : 0 1 1 0 1 0 0 1. **(04 Marks)**

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