

CBCS SCHEME

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17EC44

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 $10 \cos[(2\pi \cdot 10^5 t) + 15 \sin(2\pi \cdot 100 t)]$. 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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8=50, will be treated as malpractice.

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 msec. (06 Marks)
 c. Represent the binary data given below in terms of i) unipolar NRZ signaling ii) Split phase. Binary data : 0 1 1 0 1 0 0 1. (04 Marks)
