CBCS SCHEME

USN [| | | | | | | | |]

18EC53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Principles of Communication System

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain in detail the working of switching modulator with diagram and necessary derivations. **(10 Marks)**

b. Explain the generation of DSBSC modulated waves using ring modulator. **(10 Marks)**

OR

2 a. Illustrate the amplitude modulation process and draw the waveform for modulation index $M > 1$ & $M < 1$. **(08 Marks)**

b. Explain with relevant block diagram and working of FDM system. **(08 Marks)**

c. A 400 W carrier is modulated on a depth of 75 percent. Calculate the total power in the modulated wave of following form AM.

(i) Double Side Band with Full Carrier (DSBFC)

(ii) Double Side Band Suppressed Carrier (DSBSC) **(04 Marks)**

Module-2

3 a. Derive the equations for frequency modulated wave. Define modulation index and frequency deviation. **(12 Marks)**

b. A 93.2 MHz carrier is frequency modulated by 5 kHz sine wave the resultant FM signal has frequency deviation of 40 kHz:

(i) Find the carrier swing of FM signal

(ii) What are highest and lowest frequencies of FM signal?

(iii) Calculate the modulation index of FM

(iv) B.W of FM signal **(08 Marks)**

OR

4 a. Explain the Narrow band FM with relevant expressions and phasor diagrams. **(10 Marks)**

b. Discuss the nonlinear effects in FM system. **(06 Marks)**

c. Assume that the maximum value of frequency deviation Δf is fixed at 50 kHz for a certain FM transmission. Given that the maximum modulating frequency is 15 kHz. Calculate the necessary transmission bandwidth. **(04 Marks)**

Module-3

5 a. Derive the expression for figure of merit for DSB-SC receiver. **(10 Marks)**

b. Find figure of merit for single tone FM. **(06 Marks)**

c. Write short notes on:

(i) Shot Noise

(ii) White Noise **(04 Marks)**

OR

6 a. With FM receiver model, derive the expression for figure of merit. **(10 Marks)**

b. Briefly explain the following as application to FM:
(i) Pre-emphasis
(ii) De-emphasis **(06 Marks)**

c. An AM receiver operating with a sinusoidal modulating signal has a following specifications: m = 0.8 and $(SNR)_0$ = 30 dB. What is carrier to noise ratio? **(04 Marks)**

Module-4

7 a. State sampling theorem and explain same with neat sketches and equation. **(10 Marks)**

b. With neat block diagram, explain the TDM. **(06 Marks)**

c. A Compact Disc (CD) audio signals digitally using PCM. Assume the audio signal bandwidth to be 20 kHz.
(i) What is the Nyquist rate?
(ii) If the Nyquist samples are quantized to L = 65, 536 levels and then binary coded, determine the number of bits required to encode a sample. **(04 Marks)**

OR

8 a. What are advantages digitizing the analog signals? **(06 Marks)**

b. With a block diagram, explain the generation and detection of PPM. **(10 Marks)**

c. Discuss Bandwidth – Noise trade off. **(04 Marks)**

Module-5

9 a. With a neat diagram, explain the basic elements of a PCM. **(08 Marks)**

b. Discuss the concept and operation of delta modulation in detail. **(08 Marks)**

c. PCM system uses uniform quantizer followed by a 7 bit binary encoder. The bit rate of the system is 50×10^6 bps. What is minimum message bandwidth? **(04 Marks)**

OR

10 a. Write a note on MPEG + Video. **(10 Marks)**

b. Draw the resulting waveform for 01101001 using unipolar NRZ, polar NRZ, unipolar Z2, Bipolar RZ. **(06 Marks)**

c. A TV signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of representation level is 512. Calculate:
(i) Codeword length
(ii) Final bit rate
(iii) Transmission bandwidth **(04 Marks)**

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