Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50964

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fourth/ Fifth/ Sixth Semester

Computer and Communication Engineering

EC 3491 – COMMUNICATION SYSTEMS

(Common to : Electronics and Communication Engineering / Electronics and Instrumentation Engineering / Electronics and Telecommunication Engineering / Instrumentation and Control Engineering)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A 500 W carrier is modulated to a depth of 60%. Determine the percentage of power saved in DSB-SC compared to conventional AM.

2. Find the frequency deviation Δf and Bandwidth using Carson's rule, for the FM signal $s(t) = 100 \cos [2\pi\, 5000\, t + 3 \sin (2\pi\, 200\, t)]$.

3. State Carson's Rule.

4. State the significance of sampling theorem.

5. What is Hamming Bound?

6. State any two properties of a (n, k) linear block code.

7. Differentiate between coherent and noncoherent receivers.

8. What is Minimum Shift Keying?

9. What is baseband pulse transmission?

10. What are the formats used for representing the data over a baseband channel?

PART B — (5 × 13 = 65 marks)

11. (a) Draw and explain the working of a square law modulator and square law detector.

Or

(b) Explain super heterodyne receiver and its advantages over Tuned Radio-Frequency receivers.

12. (a) Derive the output signal-to-noise ratio for an AM receiver using envelope detection and hence obtain the figure of merit, assuming that the noise is additive, white and Gaussian. Compare the results with that of SSB and DSB-SC receivers.

Or

(b) Draw and explain PPM and PWM signal generation circuit for PAM signal.

13. (a) Derive the expressions for quantization noise, receiver noise and overall signal-to-noise ratio of a DM system.

Or

(b) Explain the operation of a cyclic code (7,3) with a suitable generator polynomial.

14. (a) Derive the probability of error for Binary FSK modulation scheme and compare its BER performance with that of BPSK modulation scheme.

Or

(b) Derive the expression for the bit error probability of a QPSK system.

15. (a) Discuss the different modulation schemes in digital communication and derive the probability of error for any bandwidth efficient modulation technique.

Or

(b) State and prove Nyquist first criterion for zero ISI.

PART C — (1 × 15 = 15 marks)

16. (a) Identify the detector with the frequency response shown in Figure 1. Assuming an FM signal s(t) with carrier frequency $f_c = f_2$ Hz and bandwidth $B_T = (f_3 - f_1)$ Hz is given as input to the detector. Derive the output of the detector and hence show how the FM signal is demodulated.

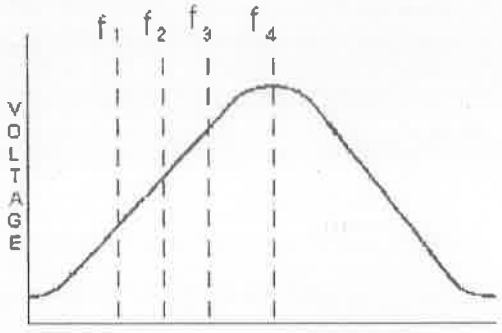

Figure 1

Or

(b) Explain the filtering scheme used for the generation of VSB modulated wave and show how VSB modulation is applied in commercial TV broadcasting. Also discuss about the waveform distortion caused by an envelope detector that is used to demodulate the video in VSB modulated signal.