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Question Paper Code : 21357

1.6.13-F

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fourth Semester

Electronics and Communication Engineering

EC 2252/EC 42/EC 1252/080290020 — COMMUNICATION THEORY

(Regulation 2008)

(Common to PTEC 2252 Communication Theory for B.E. (Part-Time) Third Semester ECE – Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of converting the low frequency signal into high frequency signal?
2. Compare Bandwidth and power requirement in terms of carrier power P_C, for AM, DSB-SC and SSB?
3. Define the modulation index of FM.
4. What is the need for pre emphasis?
5. Define white noise.
6. Define noise figure.
7. What is coherent system?
8. What is Carson's rule?
9. Define entropy and its properties.
10. Define mutual information and channel capacity.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss on the frequency components present in a periodic and non periodic signal? (4)

(ii) Derive the equation of an AM wave. Also draw the modulated AM wave for various modulation index. (8)

(iii) The antenna current of an AM transmitter is 8 ampere when only the carrier is sent. The current increases to 8.93 A when the carrier is modulated by a single sine wave. Find the percentage modulation. (4)

Or

(b) (i) Draw the VSB spectrum and explain the significance. (4)

(ii) How do you demodulate AM signal? Explain. (8)

(iii) A 1000 KHz carrier is simultaneously AM modulated with 300 Hz, 800 Hz and 1.5 KHz audio sine waves. What will be the frequencies present in the output? (4)

12. (a) (i) Derive the mathematical representation of FM wave. (10)

(ii) When the modulating frequency in an FM system is 400 Hz and the modulating voltage is 2.4 V, the modulation index is 60. Calculate the maximum deviation. What is the modulating index when the modulating frequency is reduced to 250 Hz and the modulating voltage is simultaneously raised to 3.2 V? (6)

Or

(b) (i) Explain the Armstrong method to generate FM signal. (10)

(ii) How is the phase and frequency modulation are related? Explain. (3)

(iii) Differentiate narrowband and wideband FM. (3)

13. (a) (i) Write notes on shot noise and thermal noise. (8)

(ii) Derive the relationship between noise figure and equivalent noise temperature. (8)

Or

(b) (i) Explain the following terms mean, correlation, covariance, ergodicity. (10)

(ii) How do you represent narrowband noise? (6)

14. (a) (i) Draw the super heterodyne receiver and explain the operation of each block. (10)

(ii) Derive the figure of merit for AM system for non coherent system, with suitable assumptions. (6)

Or

(b) (i) Derive the figure of merit of a FM system. (10)

(ii) Explain FM threshold effect. (6)

15. (a) (i) Find the Huffman coding for the probabilities $P = \{0.0625, 0.25, 0.125, 0.125, 0.25, 0.125, 0.0625\}$ and the efficiency of the code. (10)

(ii) State Shannon's theorems and explain. (6)

Or

(b) (i) Consider the following binary sequence 11101001100010110100... use the Lempel-Ziv algorithm to encode this sequence. Assume that the binary symbols 0 and 1 are already in the codebook. (10)

(ii) A telephone network has a bandwidth of 3.4 KHz. Calculate the information capacity of the telephone channel for a signal-to-noise ratio of 30 dB. (3)

(iii) Calculate the minimum signal-to-noise ratio required to support information transmission through the telephone channel at the rate of 9600 bits/sec with bandwidth of 9.6 KHz. (3)
