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Question Paper Code : 73446

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Fourth Semester

Electronics and Communication Engineering

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

(Regulations 2008)

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

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. An amplitude modulation transmitter radiates 1000 watts of unmodulated power. If the carrier is modulated simultaneously by two tones of 40% and 60% respectively, calculate the total power radiated.
2. Calculate the local oscillator frequency if incoming frequency is f_1 and translated carrier frequency is f_2 .
3. Define the modulation index of the FM wave and specify how you will distinguish narrow band and wide band FM respectively.
4. Draw a simple schematic of a PLL demodulator.
5. Define noise figure.
6. Define SNR.
7. State the principle behind FM threshold effect.
8. Does the reduction in frequency range improve SNR of both SSB and DSB-SC reception? Why?
9. Define entropy and its properties.
10. Define mutual information and channel capacity.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find the Fourier coefficients of the periodic train of pulses of amplitude A and duration τ . (4)
- (ii) Describe a method each for generation and demodulation of AM signal. (8)
- (iii) Briefly describe FDM. (4)

Or

- (b) (i) The signal $m(t) = 3 \cos(200\pi t) + \sin(600\pi t)$ is used to amplitude modulate the carrier $c(t) = \cos(2 \times 10^5 t)$. The modulation index is 0.85. Determine the power in the carrier component and in the sideband components of the modulated signal. (5)
- (ii) Compare and contrast the amplitude modulation systems. (6)
- (iii) With the respective block diagram, describe the balanced modulator. (5)
12. (a) (i) Derive the expression for Wide band FM in terms of Bessel functions. (10)
- (ii) How can FM be derived from PM and vice versa? Explain in detail. (6)

Or

- (b) Explain any two methods used for FM detection, with neat sketches. (16)
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.
- (ii) Discuss the source coding theorem.

Or

- (b) (i) State and explain Shannon's theorems on channel capacity.
- (ii) Differentiate lossless and lossy coding.
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