

B.E. DEGREE EXAMINATIONS: MAY/JUNE 2013

Fifth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

ECE110: Communication Theory

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Band width of SSB_SC is =
 - a) f_m
 - b) $2 f_m$
 - c) $f_m /2$
 - d) $f_{m/2}$
2. Sensitivity is
 - a) ability of the receiver to deliver a constant amount of output for a given a given period of time
 - b) ability to select the desired signals among the various signals
 - c) measure of its ability to receive weak signals
 - d) Losses in transmitting several message signals simultaneously
3. Narrow Band FM has modulation index =
 - a) Greater than 1
 - b) Lesser than 1
 - c) Equal =0
 - d) Equal =0.5
4. Frequency Deviation
 - a) deviation of the total angle from the carrier angle
 - b) bandwidth of an FM Signal generated by a single tone-modulating signal
 - c) maximum possible amplitude of the modulation signal $m(t)$, to the highest modulation frequency
 - d) maximum departure of the instantaneous frequency from the carrier frequency
5. What is the figure of merit of DSBSC system
 - a) Unity
 - b) Less than 1
 - c) Greater than 1
 - d) Equal to 0
6. What is Capture effect?
 - a) premodulation
 - b) as the carrier to noise ratio is reduced much a crackling sound is heard
 - c) When the interference signal and FM input are of equal strength, the receiver fluctuates back and froth between them
 - d) As the input noise power is increased the carrier to noise ratio is decreased the receiver breaks

7. Thermal noise
- a) noise arising from the random motion of electrons in a conductor. b) appearing in transistors operating at low audio frequencies.
- c) proportional to the emitter current and junction temperature and inversely proportional to the frequency d) Due to preprocessing of a narrowband filter whose bandwidth is large enough
8. Give the expression for equivalent noise temperature in terms of hypothetical temperature
- a) $T_e = (F-1) T_0$ b) $T_e = (F+1) T_0$
c) $T_e = (F-1)/T_0$ d) $T_e = (F+1)/T_0$
9. What happens when the number of coding alphabet increases?
- a) Capacity becomes maximum b) efficiency does not change
c) efficiency of the coding technique increases d) efficiency of the coding technique decreases
10. channel capacity of a BSC
- a) $C=1+q$ b) $C=1+p\log_2 p +(1-q)\log_2(1-q)$
c) $C=1+p\log_2 p +(1-p)\log_2(1-p)$ d) $C=(1-p)$

PART B (10 x 2 = 20 Marks)

11. Define modulation index for an AM wave.
12. Define the transmission efficiency of AM signal
13. Define Carson's rule
14. Mention the advantages of FM
15. Define image frequency.
16. Write the working principle of PLL.
17. Define shot noise.
18. State the reasons for higher noise in mixers.
19. What is channel capacity of binary synchronous channel with error probability of 0.2?
20. Write down the formula for the mutual information.

PART C (5 x 14 = 70 Marks)

21. a) Draw the block diagram for the generation and demodulation of a VSB signal and explain the principle of operation.

(OR)

- b) Explain the generation of SSB using balanced modulator

22. a) Derive the expression for the frequency modulated signal. Explain what is meant by narrowband FM and wideband FM using the expression?

(OR)

b) Discuss the indirect method of generating a wide-band FM signal.

23. a) Explain the working of Super heterodyne receiver with its parameters.

(OR)

b) Draw the circuit diagram of Foster-Seelay discriminator and explain its working.

24. a) Explain how various noises are generated and the method of representing them.

(OR)

b) Explain the significance of pre-emphasis and de-emphasis in FM system.

25. a) Write short notes on Differential entropy, derive the channel capacity theorem and discuss the implications of the information capacity theorem.

(OR)

b) Five symbols of the alphabet of discrete memory less source and their probabilities are given below. $S=[S_0,S_1,S_2,S_3]$; $P[S]=[.4,.2,.2,.1,.1]$. Encode the symbols using Huffman coding.
