Register Number: ……

B.E DEGREE EXAMINATIONS: NOV/DEC 2010

Fifth Semester

ELECTRONICS AND COMMUNICATION ENGIEERING

U07EC501: Communication Theory

Time: Three Hours **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. A SSB signal contains 3KW. The power of the carrier is

   (A) 0 KW (B) 1 KW (C) 2 KW (D) 3 KW

2. The modulation index of an AM wave is changed form 0 to 1. The transmitted power is

   (A) doubled (B) halved (C) increased by 50% (D) unchanged

3. In phase modulated signal, the frequency deviation is proportional to

   (A) frequency (B) amplitude (C) Both (A) & (B) (D) None of the above

4. In a FM signal the power _____ as the modulation index increases.

   (A) increases (B) decreases (C) remains constant (D) becomes zero

5. Sound information is transmitted in TV signals by

   (A) AM (B) FM (C) PAM (D) PWM

6. Thermal noise is otherwise called as

   (A) White noise (B) Shot noise (C) Man made noise (D) Cosmic noise

7. The overall noise figure of a three stage cascaded amplifier, each stage having a power gain of 10dB, and a noise figure of 6dB is

   (A) 4.33 (B) 5.33 (C) 10 (D) 16

8. Noise temperature is inversely proportional to

   (A) Bandwidth (B) Noise figure (C) Gain (D) Time

9. Entropy of an extended source is

   (A) H (s) (B) H (s^n) (C) n.H(s) (D) H (s/n)

10. Information of a symbol with probability p_i is

    (A) $\log_2 (p_i)$ (B) $\log_2 \left(\frac{1}{p_i}\right)$ (C) $\log_{10} (p_i)$ (D) $\log_{10} \left(\frac{1}{p_i}\right)$

PART B (10 x 2 = 20 Marks)

11. State the need for modulation.

12. Find the transmitted power of a message signal of frequency 1 KHz which is amplitude modulated by a carrier of frequency 10KHz of power 1KW.
13. State Carson's rule for finding the bandwidth of an FM signal.
14. Draw the spectrum of a narrowband FM signal.
15. What is diagonal clipping? How this can be removed in an envelope detector?
16. What is Quadrature carrier multiplexing?
17. What is capture effect?
18. State the need for pre-emphasis and de-emphasis in FM systems?
19. Find the entropy of an information source which emits 4 symbols A, B, C and D each with an equal probability of 0.25.
20. What is mutual information?

PART C (5 x 14 = 70 Marks)

21. a) (i) Derive an expression for an AM signal and draw the waveforms. (7)
(ii) Explain any one method of generation of DSBSC signal. (7)

(OR)

b) (i) Discuss how a VSB signal is generated from DSBFC signal. (7)
(ii) Describe the operation of an AM transmitter with a neat block diagram. (7)

22. a) (i) Derive an expression for NBFM and WBFM. (7)
(ii) Explain the difference between FM and PM signal and how one can be obtained from the other. (7)

(OR)

b) (i) Explain how narrowband FM signal can be generated? (7)
(ii) Explain the operation of an indirect FM transmitter with necessary sketch. (7)

23. a) (i) Discuss the operation of AM super heterodyne receiver. (7)
(ii) Explain the different receiver characteristics and their measurement. (7)

(OR)

b) (i) Explain the principle of an AM envelope detector. (7)
(ii) Explain the operation of Foster Seeley discriminator. (7)

24. a) (i) Explain the different types of noise in communication system. (7)
(ii) Derive an expression for the signal to noise ratio in an DSBSC system. (7)

(OR)

b) (i) Derive an expression for the signal to noise ratio in an FM system. (7)
(ii) Explain the threshold effect in FM system. (7)

25. a) (i) State and explain the Shannon's channel capacity theorem. (7)
(ii) Use Huffman coding to code the symbols from an information source with probability {0.3, 0.2, 0.1, 0.1, 0.2, and 0.1}. (7)

(OR)

b) (i) Use Shannon Fano coding to code the symbols from an information soured with probability {0.25, 0.05, 0.2, 0.1, 0.1, 0.2, 0.1}. (7)
(ii) State and explain the source coding theorem. (7)

****