

Sub. Title : COMMUNICATION THEORY
Sub. Code : EC6402
Duration : 3 hours

Date : 29.1.2015
Branch : ECE
Max. Mark : 100

Answer all questions

Part A - (10x2 = 20)

1. What are the advantages of vestigial side band?
2. Calculate the local oscillator frequency if incoming frequency is f_1 and translated carrier frequency is f_2 ?
3. How many AM broadcast station can be accommodated in a 100 khz bandwidth if the highest frequency modulating a carrier is 5 khz?
4. What are the causes of linear distortion?
5. Compute the bandwidth of the amplitude modulated signal $c(t) = 23x \cos(230000\pi t)(1 + 0.8x \cos(310\pi t))$?
6. State carson's rule of FM bandwidth
7. What is modulation index?
8. What is the bandwidth required for an FM wave in which the modulating frequency signal is 2 khz and the maximum frequency deviation is 12 khz?
9. What is meant by detection? name the methods for detecting FM signals
10. Why is frequency modulation preferred for voice transmission?

Part B - (16x5=80)

11. (a) With suitable block diagram and equations show how will you generate

i) DSBSC

[8 marks]

ii) VSB signals

[8 marks]

[OR]

(b) With a help of a neat diagram, explain the operation of an envelope detector why does negative peak clipping take place?

[16 marks]

12. (a) i) Compare the characteristic of DSBFC, DSBSC, SSBSC and VSB schemes [8 marks]

ii) Discuss the operation of costas loop in detail?

[8 marks]

[OR]

(b) i) Draw the block diagram of superheterodyne receiver and explain the function in detail? [10 marks]

ii) In a superheterodyne receiver the input AM signal has a center frequency of 1425 kHz and bandwidth 10 kHz. The input is down converted to 455 kHz (single stage of down conversion). What is the image frequency? [6 marks]

13.(a)i) How SSB can be generated using weaver's method [8 marks]

ii) With necessary diagram and expression explain the demodulation of VSB? [8 marks]

[OR]

(b)i) An angle modulated wave is described by the equation $v(t) = 10 \cos(2 \times 10^6 \pi t + 10 \cos 2000 \pi t)$ find the

i) power of modulated signal

ii) Maximum frequency deviation

iii) Bandwidth [8 marks]

ii) Explain Armstrong method to generate FM signal? [8 marks]

14(a).i) Explain how FM is achieved using varactor diode? [8 marks]

ii) Make at least five comparisons of AM and FM system? [8 marks]

[OR]

(b) Write about the basic principle of FM detection and explain about ratio detector? [16 marks]

15.(a) Draw the circuit diagram of a Foster-Seeley discriminator and explain its working with relevant phasor diagram. [16 marks]

[OR]

(b)i) A 20 MHz is frequency modulated by a sinusoidal signal such that the maximum frequency deviation is 100 kHz. Determine the modulation index and approximate bandwidth of the FM signal for the following modulating signal frequencies, (1) 1 kHz (2) 100 kHz (3) 500 kHz. [10 marks]

ii) Compare Between wideband FM and narrow band FM. [6 marks]