

SASTRA DEEMED UNIVERSITY

(A University under section 3 of the UGC Act, 1956)

End Semester Examinations

May 2024

Course Code: **ECE202**

Course: **ANALOG COMMUNICATION**

QP No. : **U017-4**

Duration: **3 hours**

Max. Marks: **100**

PART - A

Answer all the questions

10 x 2 = 20 Marks

1. A transmitter radiates the total power of 2.09W of 30% AM signal. How much power is contained in each of the sidebands?
2. A carrier wave is represented by $E_c(t) = 12 \sin \omega_c t$. Draw the waveform of an AM wave for the depth of modulation of 8/5.
3. Define flywheel effect.
4. Outline the block diagram of zero crossing detector.
5. Compare narrow band and wide band FM.
6. Consider a FM broadcasting signal which has been modulated by a single tone modulating signal of frequency 15KHz. The frequency deviation is same as followed by the international regulation. Find the bandwidth.
7. The intermediate frequency of super heterodyne receiver is 455 KHz. Calculate the image frequency at 1000 KHz signal.
8. Draw the frequency spectrum of FM stereo broadcasting.

9. Calculate the thermal noise power available from any resistor at a temperature of 17°C for a bandwidth of 1MHz.
10. What is capture effect?

PART – B

Answer any Four questions

4 x 15 = 60 Marks

11. a) Describe the working of a FET balanced modulator with a neat diagram and prove that it produces an output consisting of only sidebands with suppressed carrier. (8)
- b) With the block diagram, explain in detail how SSB-SC signal can be generated by phase shift method. (7)
12. a) Discuss the working of how the synchronous detector demodulates DSB-SC with the necessary expressions and show that any shift in frequency or phase of the locally generated carrier from that of the transmitted carrier results in phase error or frequency error. (8)
- b) Explain the Costas's receiver used for synchronous detection of DSB-SC signal with relevant block diagram. (7)
13. a) With the help of block diagram and phasor diagram, elaborate the indirect method of FM generation system. (12)
- b) Determine the value of the capacitive reactance obtainable from a reactance FET whose g_m is 12 millisiemens. Assume that the gate to source resistance is one-ninth of the reactance of the gate to drain capacitor and that the frequency is 5 MHz. (3)
14. a) Draw and explain the function of each block of super heterodyne receiver. Describe how the image signals are formed and how it can be eliminated. (12)
- b) What are the factors influencing the choice of IF? (3)

15. Construct the ISB transmitter and sketch the frequency spectrum of each stage using the following specifications, channel A and B input frequency range of 0-4KHz, a low frequency carrier of 100 KHz, a medium frequency carrier of 3 MHz and high frequency carrier of 15 KHz.

16. Derive the figure of merit for the DSB-SC system.

PART – C

Answer the following

1 x 20 = 20 Marks

17. a) Multi tone AM signal is given by

$$\phi_{AM}(t) = 10 \cos(2\pi \times 10^6 t) + 5 \cos(2\pi \times 10^6 t) \cos(2\pi \times 10^3 t) + 2 \cos(2\pi \times 10^6 t) \cos(4\pi \times 10^3 t)$$
 Find the various frequency components present and the corresponding modulation indices, modulated power, net modulation index and also draw the spectrum and find the bandwidth. (10)
- b) How threshold improvement is achieved in FM receiver using pre-emphasis and de-emphasis circuits? (5)
- c) Compare amplitude and frequency modulation. (5)
