

College of Engineering, Pune
End Semester Exam – May 2012
S.Y. B.Tech. (Electronics & Telecommunication)
ET 207: Analog Communication Systems

Maximum Marks: 50

Duration – 3 hrs.

Instructions:

1. Assume suitable data wherever necessary.
2. **All questions are compulsory.**
3. Show *all* your working and reasoning. (a correct answer without any backup reasoning or supporting calculations will earn *zero* credit)
4. All answers should be to the point and brief.

	Marks
Q. 1 A Derive the relation between the output power of an AM transmitter and the depth of modulation, and plot it as a graph for values of the modulation index from zero to maximum..	5
B. The output current of a 60 percent modulated AM generator is 1.5 A. To what value will this current rise if the generator is modulated additionally by another audio wave, whose modulation index is 0.7? What will be the percentage power saving if the carrier and one of the sidebands are now suppressed?	5
Q. 2 A. In an FM system, if m_f is doubled by halving the modulating frequency, what will be the effect on the maximum deviation?	3
B. What is the effect of random noise on the output of an FM receiver fitted with an amplitude limiter? Develop the concept of the noise triangle.	4
C. Of the various advantages of FM over AM, identify and discuss those due to the intrinsic qualities of frequency modulation.	3
Q. 3 A. Calculate the image frequency rejection of a receiver having an RF amplifier and an IF of 450 kHz, if the Q s of the relevant coils are 65, at an incoming frequency of (i) 1200 kHz; (ii) 20 MHz.	4
B. What are the functions fulfilled by the intermediate-frequency amplifier in a radio receiver?	2

- C Using circuit diagrams, show how the Foster-Seeley discriminator is derived from the balanced slope detector, and how, in turn, the ratio detector is derived from the discriminator. In each step stress the common characteristic, and show what it is that makes each circuit different from the previous one. 4
- Q. 4 A Draw and explain a block diagram of a television receiver showing the signal waveforms at different sections. 5
- B What is the need of television standards? What are the major TV standards used worldwide? Discuss in brief. 5
- Q. 5 A The first stage of a two-stage amplifier has a voltage gain of 10, a $600\text{-}\Omega$ input resistor, a $1600\text{-}\Omega$ equivalent noise resistance and a $27\text{-k}\Omega$ output resistor. For the second stage, these values are 25, $81\text{ k}\Omega$, $10\text{ k}\Omega$ and $1\text{ M}\Omega$, respectively. Calculate the equivalent input-noise resistance of this two-stage amplifier. 4
- B A receiver connected to an antenna whose resistance is $50\ \Omega$ has an equivalent noise resistance of $30\ \Omega$. Calculate the receiver's noise figure in decibels and its equivalent noise temperature. 3
- C Discuss the types, causes and effects of various forms of noise which may be created within a receiver or an amplifier. 3