

JK Lakshmipat University, Jaipur

Institute of Engineering and Technology

End Term Examination

B.Tech 2nd Year/ 5th semester 2013-14

Course Name: Analog Communication

Course Code: ECE502

Max Marks: 40

Time: 03.00 hr

Instructions:

1. Attempt all sections.
2. All subparts of section A is of 1 Mark.
3. Attempt any Five Questions from Section B. Each Question in this section is of 4 Marks.
4. Use of Scientific Calculator is allowed.

Section A**(10 Marks)**

Q.1

- a) What is need for Modulation ?
- b) Find the energy and power content of the signal $\sin(2\pi f_0 t + \phi)$.
- c) Prove that the following function $x(t) = t^6 + 2t^4 + 3t^2 + 4$ is even. Also show that the odd part is Zero.
- d) Write a MATLAB Program to generate to sine wave of frequency 100 Hz.
- e) Write the frequency Range of Amplitude Modulation and FM .

Q.2

- a) What is Modulation Index in case of FM ?
- b) What is IF (Intermediate Frequency) in case of Amplitude Modulation and FM ?
- c) What is Figure of Merit in case of Amplitude Modulation?
- d) What is Double Spotting in AM Receiver?
- e) What is Sensitivity in AM Receiver ?

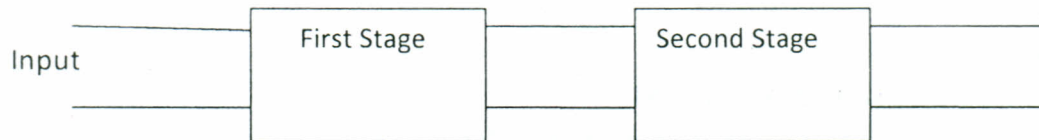
Section B**(5*4 Marks)**

Q. 3 The first stage of a two stage amplifier has a voltage gain of 10, a 600 ohm input resistor, a 1600 ohm equivalent noise resistance and a 27 K ohm output resistor. For the second stage, these values are 25, 81 K ohm, and 1 M ohm respectively. Find the equivalent input noise resistance of this two stage amplifier.

Q. 4

- a) Two resistors R_1 and R_2 at absolute temperature T_1 and T_2 are connected in series to form a white noise source. Find the equivalent noise temperature T_{eq} .
- b) What is Image Frequency and its Rejection ?

Q. 5 A cascaded two stage amplifier has been shown in figure below. The first stage has a noise figure of 2 dB and a power gain of 12 dB. The second stage has a noise figure of 6 dB and a power gain of 10 dB. Find the overall noise Figure in dB.



Q. 6 Calculate the FOM for Amplitude Modulation (Envelope Detector Method).

Q. 7 Compute the transmission bandwidth B_T and the required transmitted power S_T of DSB, SSB and AM systems for transmitting an audio signal which has a bandwidth of 10 KHz with an output SNR of 40 dB. Assume that the channel introduces a 40 dB power loss and channel noise is AWGN with power spectral density (psd) $n/2 = 10^{-9}$ W/Hz. Assume $u^2 S_x = 0.5$ for AM.

Q. 8 In a broadcast superheterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 100. If the IF frequency is 455 KHz, Determine

- The image frequency and its rejection ratio for tuning at 1.1 KHz station.
- The image frequency and its rejection ratio for tuning at 25 MHz station.

Section C

(7+3 Marks)

Q. 9

- Explain Superheterodyne Receiver with different blocks.
- Write short note on AWGN.