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M.Tech. Degree Examination, June / July 2014
CMOS RF Circuit Design

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. What is a non linear system? What are the effects of non linearity in RF communications? (12 Marks)
- b. For the receiver system shown in Fig. Q1 (b) calculate the overall noise figure of the system. Typical values of various parameters are shown in Figure. (08 Marks)

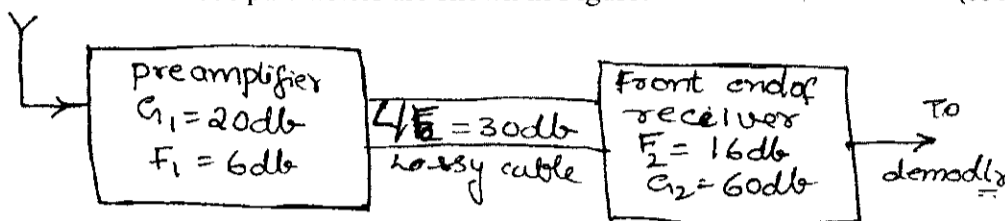


Fig. Q1 (b)

- 2 a. Derive an expression for overall third input intercept point A_{IP3} of a 2 stage cascaded system in terms of individual third input intercept point $IP3$ and gain of individual stages. (12 Marks)

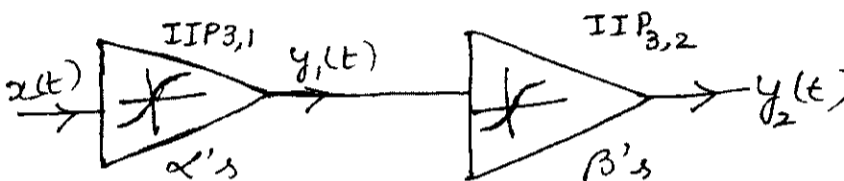


Fig. Q2 (a)

- b. Define sensitivity and dynamic range of a RF receiver. Write the expression for minimum input power P_{in} , maximum input power P_{imax} and spurious free dynamic range. (08 Marks)
- 3 a. Why pre-emphasis and de-emphasis are used in FM system. What is the difference in SNR at the output of FM detector if pre-emphasis is used? (08 Marks)
- b. What is matched filter receiver? How is it correlated to correlation receiver? What is the maximum SNR of matched filter? Obtain the expression for probability of error in BFSK and BPSK with respect to matched filter probability of error. (12 Marks)
- 4 a. With neat diagram and equation explain the implementation of $\frac{\pi}{4}$ QPSK and MSK schemes. (10 Marks)
- b. What is multipath effect with respect to mobile communication? What are the methods used to overcome this effect? (10 Marks)
- 5 a. Explain direct sequence CDMA. (10 Marks)
- b. Explain the concept of rejection of image versus suppression of interferer for high and low IF. (06 Marks)
- c. A wireless receiver down converts a 900 Mhz RF signal to an IF frequency of 70 MHz. Find the image frequency. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

- 6** a. Describe direct conversion and 2 step transmitters. (10 Marks)
b. Explain Hartley architecture and image rejection ratio. (10 Marks)
- 7** a. Mention the classification of power amplifiers and explain any two types with diagram. (08 Marks)
b. Derive an expression for power gain in bipolar mixers. (07 Marks)
c. Explain in brief SPICE model. (05 Marks)
- 8** a. Explain with neat diagram the need for fractional N architecture of frequency synthesizer. (08 Marks)
b. Draw the linear model of PLL and derive an expression for closed loop function $H(s)$. (07 Marks)
c. Bring out the differences between active and passive RF mixers. (05 Marks)

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