

3.5.14 AN

Dept. of ECE, CEG Campus, Anna University  
B.E/B.Tech (Part Time) End Semester Examination April-May, 2014  
PTEC 9044 RF Microelectronics (Reg 2009)

Answer All Questions

Part A (10x2=20 Marks)

- Q1. Define Noise Figure along with suitable expressions and specify the units for the same.
- Q2. Write the commonly used relation between input and output of a nonlinear amplifier.
- Q3. Distinguish between a heterodyne receiver and homodyne receiver (direct conversion receiver)
- Q4. Give any one expression for the Q of a resonant circuit.
- Q5. Name three the commonly used RF power amplifier topologies and explain their principle of operation.
- Q6. Explain what is meant by P1dB.
- Q7. Explain what is meant by the conversion of a mixer.
- Q8. Draw the circuit diagram of a typical inductor degenerated MOSFET LNA.
- Q9. Draw the high frequency equivalent circuit of MOSFET.
- Q10. What is the main difference between a single balanced mixer and a double balanced mixer.

Part B(16x5=80 Marks)

Q11. (i) Explain the different choices of realization of RF inductors and capacitors in CMOS Technology. Why are these different in compared to the conventional lumped component inductors and capacitors. (10)

(ii) Derive Friis formula for the total Noise Figure cascade of two amplifiers with gains A1 and A2 and Noise Factors F1 and F2. (6)

Q12a. Explain the design procedure for carrying out impedance matching using Pi match involving two inductors and one capacitor.

OR

Q12b. Determine the expression for the Noise Figure of a common gate MOSFET circuit.

Q13a. Explain the principle of operation of Gilbert Cell mixer. Give the expression for conversion gain (8+8)

OR

Q13b. Draw the circuit diagram of a diode ring mixer. Give the expression for its conversion gain (8+8).

Q14a. Derive an expression for the P1dB point of a nonlinear amplifier. Why is third order intermodulation considered harmful in amplifiers (8+8).

OR

Q14b. Derive the expressions for the Q of parallel tuned and series tuned circuits.

Q15.a For first order PLL, give the complete block diagram and obtain the expression for the phase transfer function.

OR

Q15.b (i) Draw the circuit diagram of any one VCO. Explain its principle of operation and give the expression for its frequency of operation (8).

(ii) Draw the circuit of any one phase detector and explain its operation (8).