83702 Communication Circuits &Modules

Problem	Max. Points	Result
1	8	
2	8	
3	14	
4	12	
5	8	
Total:	50	

Family Name:	
Given Name:	
Student Number:	
E-mail Address:	@ .tut.fi

Final Mark:	

Problem 1:

What is the Definition and the Explanation of the following VCO Parameters:
Use figures and equations always when possible. (8 pts.)
- Phase Noise (3p)
- Pulling Figure (1p)
- Pushing Figure (1p)
- Tuning Range (1p)
- Output Power Variations (1p)
- Linearity (1p)

Problem 2:

a) Draw a simple block diagram of a PLL structure. (3 points)
b) Explain the main PLL terminology, at mostly the three different locking ranges. (5 points)

Problem 3:

Explain the circuit topologies of the four basic LNA architectures.
What are their advantages and disadvantages ? (14 pts)

Problem 4:

Draw simplified block diagram of a Spectrum Analyzer and explain briefly the main theory of operation. What you can use the Spectrum Analyzer for (list the different applications and explain them) ? What are the main differences between the Spectrum and Network Analyzers? (12 points)

Problem 5:

a) Differential signals versus Single-ended signals. (2 pts)
b) List the non-idealities of Differential Transistor Pair and explain the reasons. (3 pts)
c) What is an emitter degeneration, how it is implemented (draw a circuit!),
what are its advantages and disadvantages (3pts)