Throughout this project, you are supposed to design a GSM-900 receiver.

1. Study the GSM-900 standard and mention the following specifications: Receive frequency band, channel bandwidth, BER_{min}/SNR_{min}, sensitivity, …

2. Based on the extracted requirements, calculate the following specifications of the receiver chain: NF_{max}, $IIP3_{min}$, gain, SFDR (and any other specifications that might help you within the upcoming phases of the project)

3. Choose an architecture for the receiver that can fulfill the requirements. Then sketch a block diagram of the RF front-end (mention the baseband amplifiers/filters as a BB block).

4. Calculate the Gain, NF, and IIP3 of each block (including the BB block).

5. Assume that the LO signal is not a pure sine wave and contains another frequency component at an offset frequency of Δf (from the center frequency) with a relative power of X dBc.

a) How can this spur deteriorate the EVM of the received signal?

b) Calculate the maximum tolerable relative power of the aforementioned frequency component at the frequency offsets of 600 kHz, 1.6 MHz, and 3 MHz.

c) If you normalize this power to the bandwidth, what would you obtain?

d) Plot this requirement vs the offset frequency, ranging from 100 kHz to 100 MHz.

NOTE 1: In case required, assume that the system operates under the QPSK modulation (not GMSK), however, the other required specifications remain unchanged (This assumption is to simplify further circuit-level simulations).

NOTE 2: For linearity requirements, only consider the blocking and intermodulation tests.

NOTE 3: This phase of the project deals with the system design, only. You don't need to do circuit-level design/simulations.

NOTE 4: Explicitly mention any reasonable assumptions you make.