Digital Circuits

1. Convert binary to 2's complete and back.
2. Design N-Bit binary down or up synchronous or asynchronous using flip-flops.
3. Using a K-MAP for logic reduction.
4. Setup and Hold time
5. Schematic of CMOS NAND Gate
6. Convert Max Min terms into all Nand structure

Circuits and Systems

1. Frequency response of cables.
2. What are the signs of an underdamped, critically damped, or overdamped system?
3. Thevenin resistance of a standard battery
4. How are inductors used in modern practical circuitry?
5. What is the difference between voltage and current?
6. Purpose of Norton Thevenin equivalent circuits.
7. Purpose of finding Miller Capacitance
8. Purpose of finding step and impulse response
9. Purpose of FFT.
10. Low and High frequency response of R, L and C components.
11. Why/how poles and zeros are used to design/characterize a circuit/system
12. Why use feedback?

Circuits

1. How is CMRR measured and what kind of error is produced by CMRR.
2. How to raise the CMRR of an amplifier?
3. Stability in open loop gain.
4. Basic OPAMP topologies (inverting non-inverting, low pass, high pass filter)
5. Implement arbitrary functions in opamps 10*(A+B), 5*A+10*B, 5*A-10*B for example.
6. Why are opamps used?
7. Affects of changing the compensation capacitor?
8. Why is an active load used?
9. Assigning voltage and current in a mess problem.
10. Regions of operation of MOSFET, BJT
11. Why use differential signals.

Electromagnetic:

1. Charge inside a ball.
2. The electric field intensity in free space at point related to point charge
3. Electric field intensity what is the electric field intensity (V/m) at a distance
4. input impedance Z_{in} to the cascaded lossless transmission lines as shown.
5. Impedance of the load
6. Standing-wave ratio

Solid State Physics

1. IV of Diode, BJT, MOSFET

2. When to use Diode, MOSFET BJT
3. Diode, BJT MOS Capacitance vs. dimensions doping
4. BJT Beta vs dimensions doping.
5. When people say a 1um bipolar transistor what is the 1um referring to?
6. What is the purpose of a buried layer in a Bipolar IC process?
7. Draw a cross-section of an NMOS device.
8. What is MOS MOS VT?
9. MOS VT vs dimensions doping
10. Temp affects on MOSVT?
11. How to measure VT of a transistor
12. When people mention an .8um NMOS process what does the .8um refer to?
13. What is punch through and how do you prevent it?
14. What is “latchup”?
15. What is the propagation delay of light in one meter distance of vacuum?