ELEC-E8712 Design for Reliability (5 cr)

Extra 1st midterm exam 18.12.2018

1. a) Explain shortly, what is so called "stress vs strength" approach in Design for Reliability (DfR). Explain also the difference between threshold stress failure, cumulative stress failure and combined threshold- cumulative stress failure. (3p)
b) Most lifetime models for electronic products contain Arrhenius- type part. Explain the equation (shown below) and discuss on the cautions when using it in relation to lifetime estimations based on accelerated testing. (2p)

$$A = A_o \exp\left(-\frac{E_a}{kT}\right)$$

2. Define MIL-HDBK-217 "Parts Count method" for evaluating the failure rate of an electronic product. Discuss also on the advantages and disadvantages of this kind of "reliability calculation" method in comparison to Physics-of-Failure" (P-o-F) approach (4p)

3. a) Today in automotive electronics "zero defects" goal is emphasized. Explain what it is and what are the methods used to obtain this goal. (1p)
b) Explain the difference in stress state when a multimaterial structure is under thermal cycling vs. thermal shock. (2p)

Essay type answers are NOT required!