Karadeniz Technical University
Faculty of Engineering
Dept. of Comp. Engineering
BIL 5120 Midterm Take-home Exam

1. Sometimes, it is better to use another metric Mission Time MT[r] instead of MTTF to compare the reliabilities of two systems over a certain period of time. Define mission time and explain the reason why it is a better metric than MTTF for some applications?

2. Calculate the mission time improvement of a TMR over a simplex for $r = 0.9$. Failure rate λ of a single unit is 0.005 [1/h].

3. The analysis of NMR systems indicates improved reliability for most of the applications. Are there any cases where the reliability of the NMR do not deteriorate even if the analysis indicate it should.

4. Design a voter circuit for a TMR where each unit outputs a single bit. Draw the logic diagram of the voter circuit.

5. What kind of redundancy do the SSD disks have since the wear of storage cells destroys them after a certain number of writes. Hint: research capacities of commercially available SSD disks for business and consumer users.

6. Draw the Markov model of a passenger car with one spare tire. Write the differential equations for the states. Is there a chance for correlated failures of tires of a running car.

7. Explain the reason why adding an extra parity bit of all data and parity bits of SEC codes to make them DED codes is not considered as a good solution?