Please submit your answers as a word document into D2L in the folder ICAIII before the end of class today. For Q6 you can hand-draw the Fault Tree, take and copy the picture in the word document, or simply conduct the FTA descriptively.

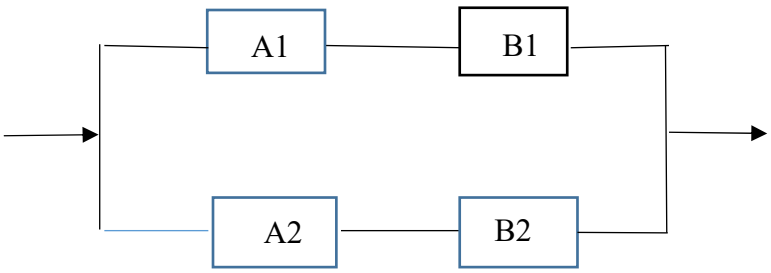
Q1. The reliability testing of a product yielded an exception/error 5, 4, 7, 5, 6, 8, 11, 14, 17, 23 hours since the last error. Compute the reliability that the system will not have any failure for 10 continuous hours after starting correctly. (0.5 mark)

Ans:
MTBF = [5+4+7+5+6+8+11+14+17+23] / 10 = 10.
Probability that the product is still functional after 10 hours since successful start is then $R(10) = e^{-10/10} = e^{-1} = 0.36$

Q2. Fault injection is a common technique for developing reliability growth models. Let's suppose a test manager deliberately injects 20 faults/bugs into the software system. After a period of testing, the testers were able to identify 10 of these injected faults but also discovered 20 of non-injected faults. Assuming that the probability of detecting an injected fault over this test duration is same as that of finding a non-injected fault, estimate the remaining non-injected faults in the system. (0.5 mark)

Ans: 20 non-injected bugs are still potentially there to be discovered.

Q3. Consider a distributed systems architecture depicted below. Determine the overall availability of the system given that the availability of each component is 0.9. (0.5 mark)



Ans: A = [1 – [(1 – (A1*B1)) * (1-(A2*B2))]] = [1 – (0.19)(0.19)] = [1 - .0361] = 0.9639

Q4. Propose an operational profile of the application you are developing for the course. [0.5 mark]

Q5. Propose a stress test for the Photo Gallery app or for the application that you are developing for the course. [0.5 mark]

Q6. Consider a smartphone application that continuously monitors the onboard accelerometer and gyroscope sensor for the purposes of the fall detection in the elderly and notifies the remote staff, via an SMS message, if a fall is detected. Conduct the safety/hazard analysis of this application, or, if applicable, conduct the safety analysis of the application that you are developing for the course, using FTA (Fault Tree Analysis) based deductive approach. [0.5 mark]

Ans:

fall occurred but no help <= [alert didn't arrive OR alert was ignored]

alert didn't arrive <= [fall not detected OR SMS failed]
fall not detected <= [sensor failed OR incorrect sensor readings OR algorithmic error]
SMS Failed <= [no signal OR low battery OR phone off OR SMS infrastructure failure]

alert was ignored <= [too many false alarms OR staff not available]
too many false alarms <= [algorithm not accurate OR duplicates]

Resources: lec2-4.ppt, lec6-3.ppt, lec4-1.ppt, lec4-2.ppt, Reliability.pdf and Availability.pdf in the "lecture notes" subfolder, and FTA_of_Clinical_Alarms-Hyman_Johnson.pdf in "General Papers" sub folder under comp7081 share out full time BTech folder.