Department of Electrical and Computer Engineering
University of Massachusetts Dartmouth

ECE544 Fault-Tolerant Computing
& Reliability Engineering

Fall 2022

Homework #7

Name: _____

Instructor: Prof. Liudong Xing

Assigned: November 14, Monday
Due: November 21, Monday

Instructions:

1. Please type your answers or write your answers clearly (illegible writing will NOT be graded).
2. Show all steps of your solution. Answers without justification would subject to a big penalty.
3. Please organize all pages of your answers into one file, name your file using **"HW7-your last name.pdf or doc"** (e.g., HW7-Xing.pdf), and submit it to lxing@umassd.edu electronically or submit a hard copy by the due date
4. Relevant lectures: **L#14, L#15**

Problems:

1. Consider the three dynamic fault trees in the following figure. Assume each component i has an exponential time-to-failure distribution with parameter λ_i, where i = P, S1, S2, A, B, C. For example, component A has failure rate of λ_A. Generate the Markov chain model (i.e., the state transition diagram) of each fault tree.
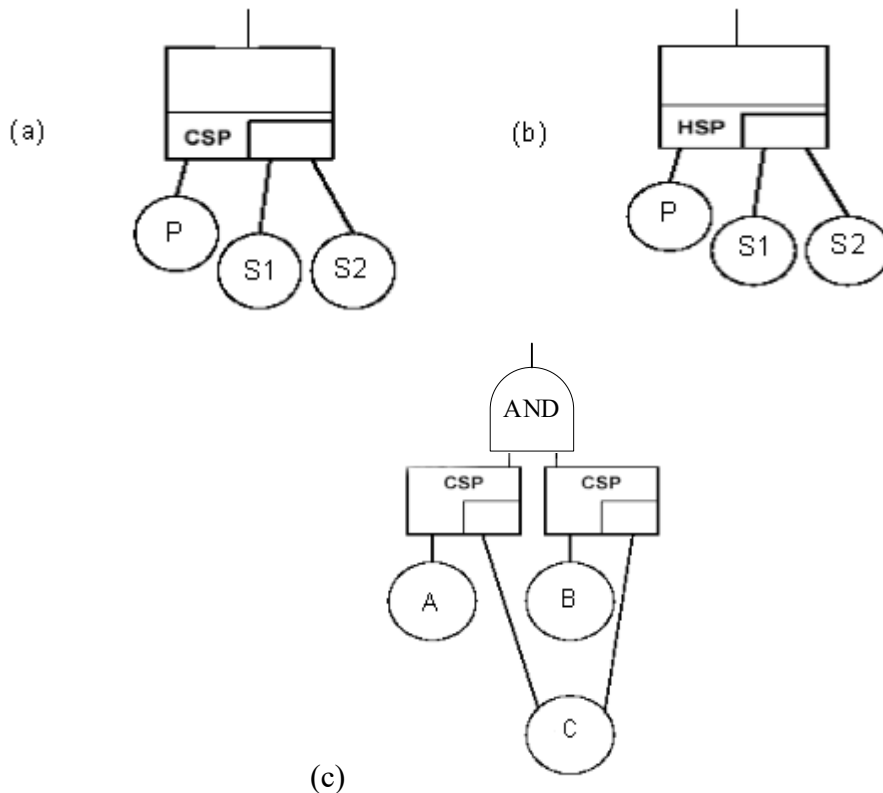
2. For the fault tree model below, assume components A and B have the failure rate of λ_A and λ_B, respectively. Component C has the failure rate of λ_C after being activated to replace a failed primary component.

a) find the state transition diagram of the Markov chain
b) find the state equations for the **time-dependent** solution
c) find the state equations of the **asymptotic** solution
d) find the system unreliability in the **steady-state** by solving the state equations in part c)