Department of Nuclear Engineering
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NE 175/275   **Midterm Exam**   **Due: October 13, 2020**
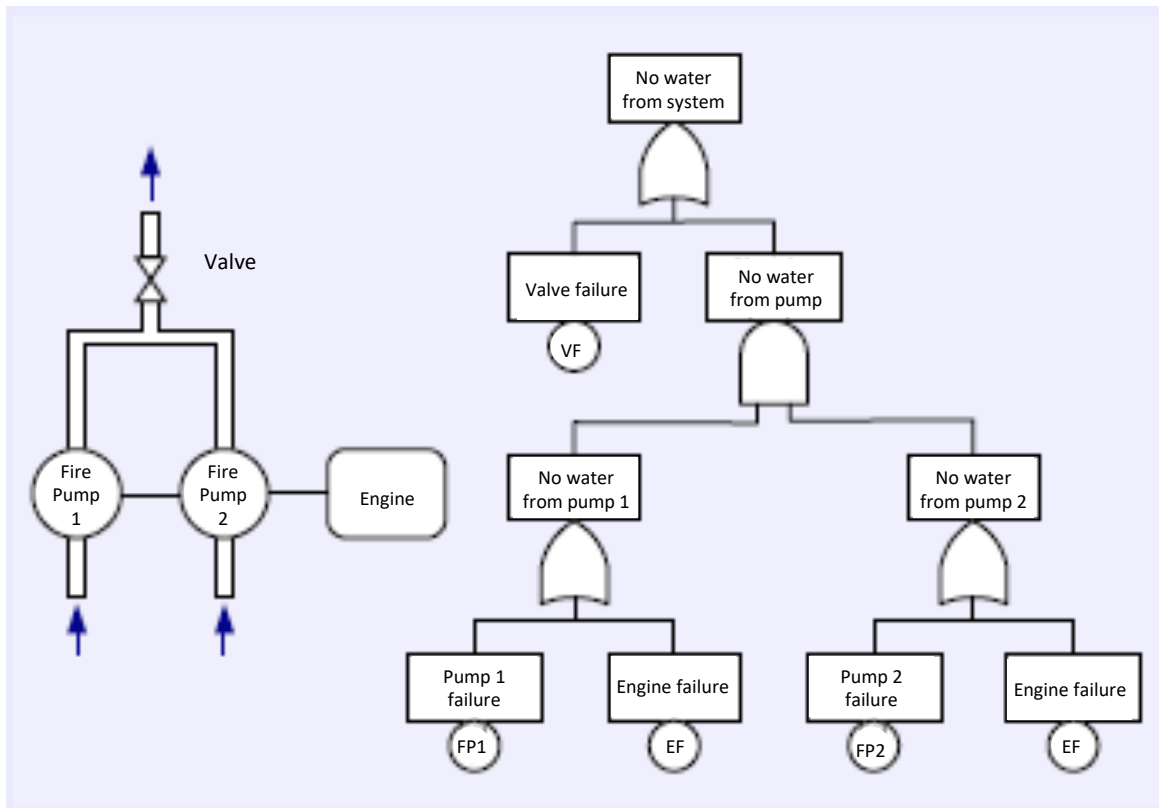   **Take Home**

1.   (20 Points)

Consider the fault tree shown below. Find the following:

a) Minimal cut sets

b) Probability of the top event if the following probabilities apply:

$Pr(VF) = 0.02$ $Pr(FP1) = Pr(FP2) = 0.15$ $Pr(EF) = 0.30$

2.   (20 Points)

        Sol Levy (1999) describes the development of a Phenomena Identification
and Ranking Table (PIRT) for large-break loss of coolant accidents (LBLOCA) in
pressurized water reactors.

a) List the 12 components that are included in a LBLOCA PIRT.
b) List the 3 major time phases of the LBLOCA PIRT.
c) Select 3 top ranked ("9") phenomena for a LBLOCA, discuss the component
    and time phase involved, and provide a brief (few sentence) qualitative
    description of the phenomena.

3.   (30 Points)

The United States consumes almost 2 billion liters of motor gasoline per day!
Gasoline is a refined product of petroleum consisting of a mixture of
hydrocarbons, additives, and blending agents. The composition of gasoline varies
widely, depending on the crude oils used, the refinery processes available, the
overall balance of product demand, and the product specifications.

From a toxicological perspective gasoline is a complex mixture consisting of
thousands of chemical compounds--mostly volatile organic compounds (VOCs).

a) Make a list of the major chemical compounds (the top 10 by either volume or
    weight fraction) of gasoline. (This requires a few minutes with Google)—
    given the variation in gasoline grades/blends there is no one correct answer

b) Select ONE of these chemical compounds making use California Office of
    Health Hazard Assessments online chemical hazard data,
    https://oehha.ca.gov/chemicals

c) Describe one of its health effects including vulnerable populations.

d) Identify one potential exposure pathway for this chemical.

Summarize this information on one page or less of text.

4.   (30 Points)

Klinke and Renn (2002) discuss reasons why people and society may view risks from chronic sources (that harm individuals) differently from catastrophic risks.

Identify four contextual variables of risk that affect the perceived seriousness of the risk, and provide a short discussion about how the variable affects risk perceptions (no more than 1/3 page per contextual variable).