University of M'sila,

Faculty of Mathematics & Computer Science (CS),

Department of CS.

Course: Diagnostic Methods for Master1 (AI) **Date: 08/06/2022**

Duration: 1:30

Final Exam (NS)

Q1. (5 points)

-Define The automatic diagnosis……(1 pt)

Diagnosis is the identification of the probable cause of the failure (s) using logical reasoning based on a set of information from an inspection, control or a test.

OR

The automatic diagnosis is the ability to identify the symptoms automatically and map them to their causes as well as, eventually, to prescribe solutions for repairing/restoring the good functionality of the device or machine.

-Explain the two methods of diagnosis……(2 pt)

Two possible classifications for diagnostic methods:

- Model based methods are based on the availability of a model describing the cause and effect relationships.
- Non model methods are based on the reasoning method used to trace the cause of the failure. This includes machine learning algorithms.

-Give an example of each approach……(1 pt)

- Model based methods like Fault Tree and Structured Analysis and Design Technique (SADT).
- Non model methods like Artificial Neural Networks (ANN) and K-Nearest-Neighbor (KNN).

Q2. (7 points)

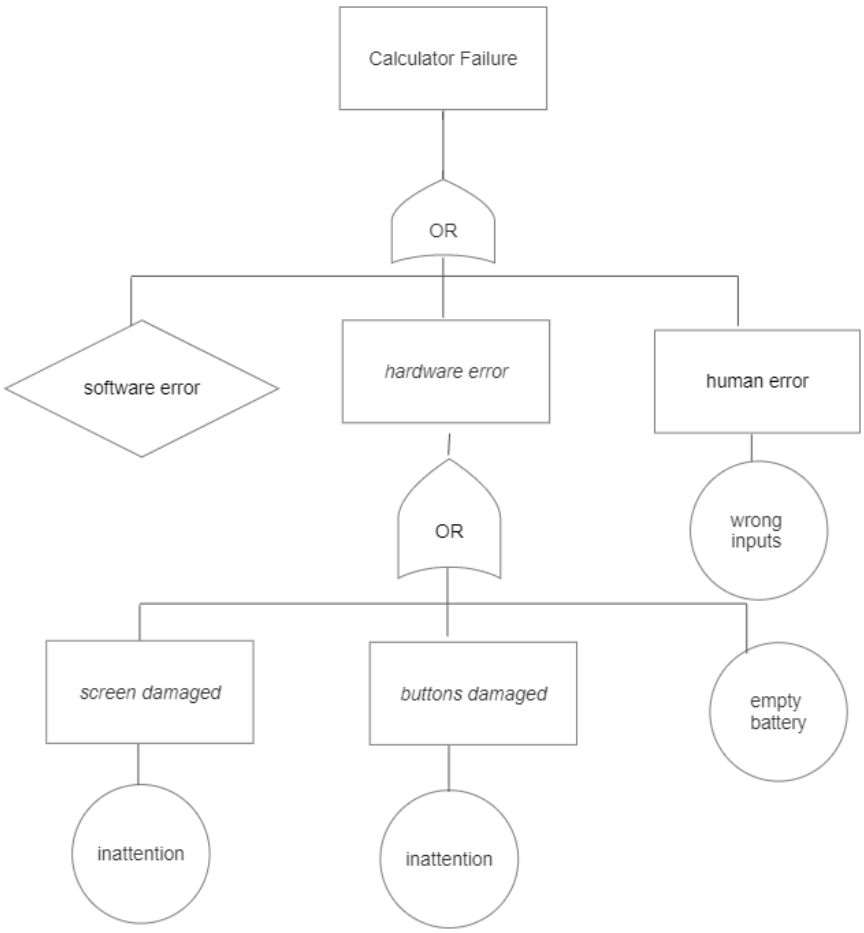
Select one choice from the following:

1. It is the final interpretation of the diagnostic system delivered to the user:
    a. Decision space
    b. Testing phase
    c. Class space
    d. None of the mentioned

2. A permanent interruption of a system's ability to perform a require function under specified operating conditions:
    a. Malfunction
    b. Fault
    c. Neuron
    d. Failure
3. It computes the weighted sum of its inputs:
    a. Artificial neuron
    b. Activation functions
    c. Learning Algorithms
    d. All of the mentioned
4. Approaches that use an analytic or physical model of the system:
    a. ANN
    b. External fault
    c. Networking
    d. SADT
5. In diagnostic systems, performance should degrade step by step and not suddenly fail in the event of anomalies. This is called:
    a. Separability
    b. Robustness
    c. Adaptability
    d. None of the mentioned
6. In SADT, things that control the activities such as laws and regulations are represented by:
    a. Upper arrow
    b. Lower arrow
    c. AND gate
    d. All
7. It is called a lazy learning algorithm since the processing of the training examples is postponed until making predictions This is called:
    a. ANN
    b. SADT
    c. KNN
    d. None of the mentioned

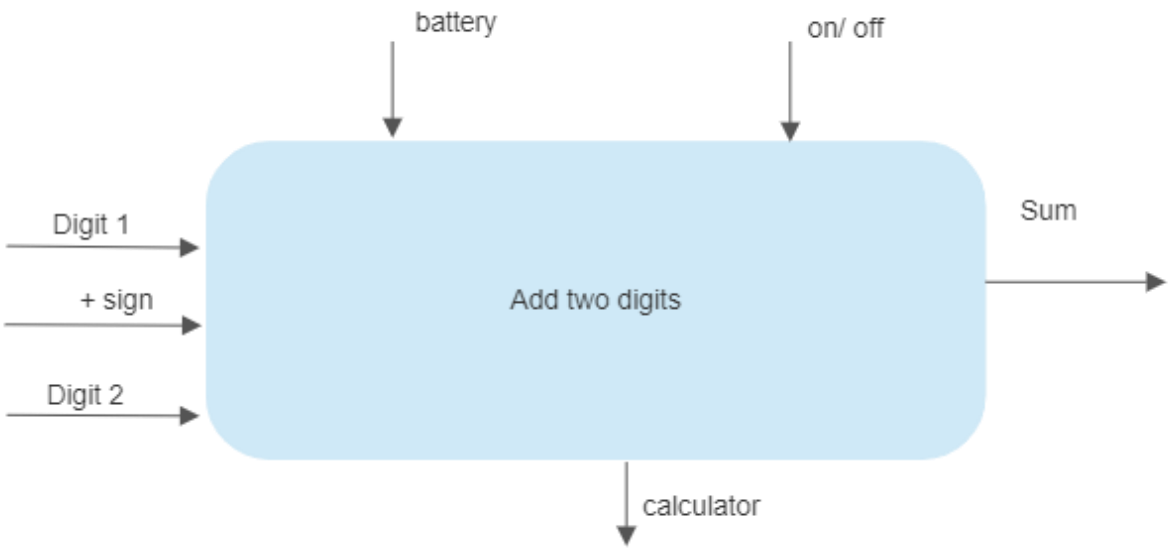
Q3. (5 points; 0.5 pts for undeveloped+ Intermediate events+ OR gates, 0.25 pts for basic event)

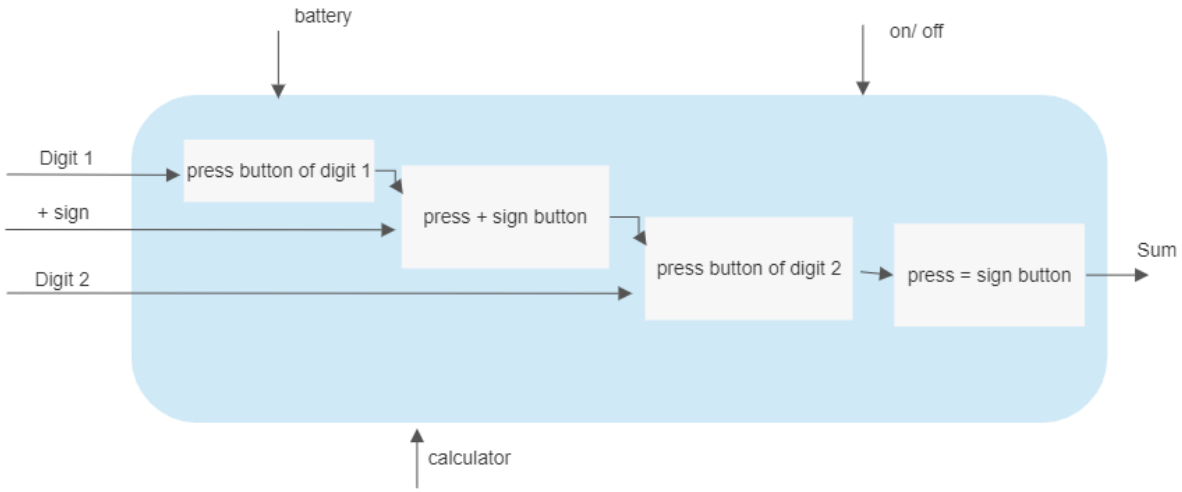
Draw a fault tree (FT) for a calculator failure.



Q4. (3 points; 0.5 pts for each activity, 1 pt for all arrows)

Based on the given figure, construct SADT for **adding** two digits using the calculator. The diagram should display the process and the data.




battery
on/ off
Digit 1
press button of digit 1
+ sign
press + sign button
Digit 2
press button of digit 2
press = sign button
Sum
calculator