# NOC23-CS44: Blockchain and Its Applications
# Assignment 6

Correct choices are highlighted in Yellow. Give partial marks for partially correct answers.

1. If there are 24 faulty nodes (crash fault) in asynchronous CFT, at least how many nodes needed to reach consensus
    a. 48
    b. 49
    c. 50
    d. 51

    **Detailed Solution:**
    **2f + 1 = 2*24 + 1 = 48 + 1 = 49**

2. In Paxos, a node can have only one role among the three roles at a time. True or False
    a. False
    b. True

    **Detailed Solution:**
    **In typical paxos implementations, a single processor may play more than one role at the same time.**

3. Can we reach a consensus when there is one commander, one good lieutenant, and one faulty lieutenant in a .Byzantine Generals Problem. Yes or No?
    a. Yes
    b. No

    **Detailed Solution:**
    **One fault.**
    **Total nodes required = 3f + 1 = 3 + 1 = 4 . But we have 3 nodes.**

4. If there are 24 faulty nodes in, at least how many nodes needed to reach consensus in the Byzantine Fault Tolerance (BFT) system.
    a. 72
    b. 73
    c. 48
    d. 49

    **Detailed Solution:**
    **f = 24**
    **Total nodes required = 3f + 1 = 72 + 1 = 73**

5. Which are the examples of the synchronous consensus techniques?
    a. RAFT
    b. PAXOS
    c. Byzantine General Model
    d. Practical Byzantine General Model

    **Detailed Solution:**
    **RAFT, PAXOS, Byzantine General Model and PBFT , all are synchronous consensus techniques.**

6. Which of the following is false for single Paxos
    a. Paxos runs based on state machine replication
    b. Proposers and Acceptors maintain a state of the running epochs
    c. Once a consensus is reached, single Paxos consensus progresses to another consensus of the value.
    d. None of the above

    **Detailed Solution:**

    **c is the answer. For single Paxos once a consensus is reached single Paxos does not progress to another consensus of the value unlike multiple Paxos. Please refer to the week 6 slide for details.**

7. Which are the properties of an asynchronous consensus:
    a. Validity
    b. Agreement
    c. Termination
    d. Integrity

    **Detailed Solution:**
    **All the options are correct.**

    **Validity: If all correct process proposes the same value v, then**

    **any correct process decides v**

    **Agreement: No two correct processes decide differently.**

    **Termination: Every correct process eventually decides.**

    **Integrity: If all the correct processes proposed the same value v, then any correct process must decide v. ( Same as validity )**

8. Which of the following is true for the permissioned model of blockchain?
    a. Participants are pre-authorized
    b. Membership Service providers help to obtain membership of the corresponding network

c. Security and consensus need to be established
d. All of the above

**Detailed Solution:**
**Please refer to the week6 slides. In permissioned blockchain all the above are true.**

9. Which of the following is/are true for smart contracts on a closed network?
    a. Contract is stored  on a blockchain ledger
    b. Once an event is triggered, execute the codes locally on peers
    c. Generate transactions as the output of execution of contract
    d. The peers of the blockchain network validates the transactions and transactions are committed after successful validation.

    **Detailed Solution:**
    **Please refer to the week6 slides. For smart contracts on a closed network all the above are true.**

10. Which of the following is/are true for basic Multi-Paxos
    a. Applications often needs a continuous stream of agreed values
    b. Run Multiple instances of Paxos with different round number
    c. If a value has been accepted for a round process further accept requests for different value in that round
    d. All of the above

**Detailed Solution:**

**Refer to Week6 slides - Paxos. In general for basic Multi Paxos if for a round, a value is accepted, further change requests on that value in that round are rejected.**