NOC22-CS44: Blockchain and Its Applications
Assignment 7

Correct choices are highlighted in <mark>Yellow</mark>. Give partial marks for partially correct answers.

1. Which statement(s) are true about Byzantine Dissemination Quorum:
    a. <mark>Any two quorums have at least one correct replica in common</mark>
    b. <mark>There is always a quorum available with no faulty replicas</mark>
    c. Any two quorums have at most one correct replica in common
    d. There is always a quorum available with some faulty replicas

    Detailed Solution:
    Refer to Lecture 31: Byzantine Dissemination Quorum:
    Intersection: Any two quorums have at least one correct replica in common.
    Availability: There is always a quorum available with no faulty replicas

2. If you have f number of faulty nodes, then you need at least how many replicas to reach consensus irrespective of crash fault or byzantine fault.
    a. 2f + 1
    b. <mark>3f + 1</mark>
    c. f +1
    d. 3f

    Detailed Solution:
    Considering byzantine fault, 3f + 1 replicas are required to reach consensus. This is greater than 2f + 1 replicas which is enough to handle crash faults too.

3. What is the correct sequence of operations in PBFT algorithm
    i. Prepare
    ii. Reply
    iii. Commit
    iv. Pre-Prepare

        a. iv, i, ii, iii
        b. <mark>iv, i, iii, i</mark>
        c. i, iv, ii, iii
        d. I, ii,iv, iii

4. PBFT is safe under_____quorum over an asynchronous environment
    a. 2f+1
    b. 3f+1
    c. f+1

d. f

Detailed Solution:
Refer to Lecture 31:
You have f number of faulty nodes – you need at least 2f + 1 quorum in pbft.

5. What are Hyperledger frameworks used for?
   a. Hyperledger frameworks are primarily used for building permissioned blockchains for organizations.
   b. Hyperledger frameworks are primarily used for building public blockchains.
   c. Hyperledger frameworks are used for only building smart contracts for IBM's blockchain.
   d. Hyperledger frameworks are primarily used for building smart contracts for public blockchains

   Detailed Solution:

   Refer to Lecture 34: Fabric is primarily used for building permissioned blockchains for organizations. It is an open source project so anyone can use it to build a permissioned blockchain and deploy smart contracts on it.

6. Which of the following(s) is/are benefits of Blockchain for Business
   a. Reduced transaction time from days to near instantaneous
   b. Removes intermediaries overheads and cost
   c. Enables NewBusiness Models such as IoT Integration into supply chain
   d. All of the above

   Detailed Solution:
   Refer to Lecture 33. The benefits of enterprise blockchains include reduced transaction time, removal of intermediaries, and new business models such as IoT integration in supply chain.

7. Which of the following is an open source, enterprise-grade Permissioned DLT platform
   a. Hyperledger Fabric
   b. Hyperledger Explorer
   c. Hyperledger Burrow
   d. Hyperledger Indy

Detailed Solution:

Only Fabric is an enterprise-grade permissioned DLT Platform.

Explorer is a tooling to inspect blockchains.

Burrow is not an enterprise grade DLT since it uses EVM which has certain limitations in developing smart contracts.

Indy is a specialized DLT for identity management.

8. Which of the following abstractions in Hyperledger Fabric provide confidentiality to individual ledgers ?
    a. Ordering Services
    b. Peers
    c. Channels
    d. Endorsement Policies

    Detailed Solution:

    Refer to Lecture 35: Fabric channels refer to different separate ledgers such that only organizations belonging to a particular channel can read/write to that ledger.

9. Suppose there are 5 channels present in a Hyperledger Fabric network, each of them has access to 3 chaincodes A, B and C. How many containers will run in each peer for running this system?
    a. 5
    b. 1
    c. 3
    d. 15

Detailed Solution:

Per peer 3 containers will be running, that is one for each chaincode.

10. Hyperledger Fabric only allows Proof of Work consensus to be plugged in to ensure a high degree of trustworthiness. True or False
    a. False
    b. True

Detailed Solution:

Hyperledger fabric is modular, and the consensus protocol is a pluggable component. Therefore any other consensus protocol such as PBFT can be plugged in and used.