Roll Number:_____

Thapar Institute of Engineering & Technology, Patiala

Computer Science & Engineering Department

Mid Semester Test (MST)

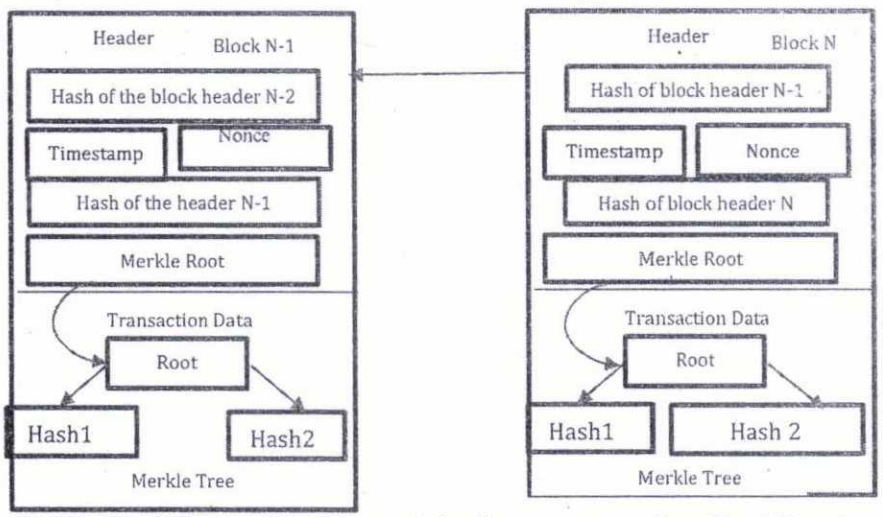
B.E. (Final Year): Semester- VII (2022/23)	Course Code: UCS754 Course Name: Blockchain Technology and applications
September 30, 2022	Friday, 17:30– 19:30 Hrs
Time: 2 Hours, M. Marks: 25	Name Of Faculty: Dr. Neeraj Kumar

Note: Attempt all five questions.

Q1. a) What is the role of nonce for threshold settings for mining in Blockchain network ? (2+3)
b) Differentiate between state, local and global variables declaration in solidity ?

Q2. a) Design a Smart contract using **mapping** for storing key value pair of the final result of students in which a structure named as **Student** with attributes as name, roll number, marks, and subjects is to be created. Then mapping is used to store the result of students at an address from the final computed result? (3+2)
b) Differentiate between Bitcoin and Ethereum with respect to various evaluation metrics?

Q3. a) Consider the blocks represented below with different attributes. *How proof of membership* has been verified for different data items in the Merle hash tree represented below. How Merkle hash tree is different from the hash list for arranging different data items in a block?. How it is impossible to attack or modify the data items represented in the Merkle hash tree. (5)



Q4. a) Explain in detail the working of Proof of stake consensus algorithm? How it can avoid 51% attack launched by the nodes in the Blockchain network.? How it is different from Proof of work. (5)

Q5. a) Design a smart contract with illustration of **Enum** keyword for shipping status of an item from Amazon with following options, {Pending, shipped, accepted, rejected, cancelled}. (3+2)
b) How digital signatures are generated in blockchain? How these are used to prevent non-repudiation attack in the blockchain networks.