Reg No.

MANIPAL INSTITUTE OF TECHNOLOGY

# II SEMESTER M.TECH. (COMPUTER SCIENCE AND INFORMATION SECURITY) END SEMESTER REGULAR EXAMINATIONS, APRIL/MAY 2024 SUBJECT: BLOCKCHAIN TECHNOLOGY AND APPLICATIONS [CSE 5215] REVISED CREDIT SYSTEM

(30/04/2024)

## TIME : 3 HOURS

#### MAX.MARKS : 50 M

### Instructions to the Candidate

• Answer all **FIVE** full Questions.

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• Missing data can be suitably assumed.

Q. No	Questions	Marks	CLO	Blooms
140				Level
1.A.	How does the structure of a blockchain, characterized by a sequential chain of fixed-length blocks containing variable numbers of transactions ranging from one to N, contribute to its function as a secure and fault-tolerant distributed database system. Illustrate with neat sketch.	4M	CO1	3
1.B.	Know Your Customer (KYC) is the process by which a financial institution gathers information about a customer. The main purpose of this process is to ensure that institutions' services are not misused, and this process takes place when a customer opens an account. The process varies because each financial institution is responsible for being in compliance with the requirements laid out and specified by their local regulatory body. The process typically requires the passing of documents back and forth between the customer and financial institution. There is very little automation; financial institutions dedicate a huge amount of resources to the process, but it is still very time consuming. These delays are frustrating for a customer who wants to use the institution's services immediately. So how does blockchain technology help here?	3M	CO1	3
1.C.	How do the ongoing advancements in Web 3.0 address the fundamental challenge of effective data storage, considering the escalating socio-economic value and scale of information, and what strategies are being implemented to ensure the durability, accessibility, reliability, security, and consistency of digitally stored data in the evolving digital landscape?	3M	CO1	3
2.A.	'The Ethereum blocks contain a copy of both the transaction list and the most recent state'. Justify your answer. How does the Ethereum validation algorithm ensure the integrity of transactions and blocks within the Ethereum blockchain?	4M	CO2	5
2.B.	When evaluating the advantages and risks of smart contracts, what are the security implications of using public visibility for state variables in Solidity, given that public state variables become part of the contract interface and allow for both internal and external access?	3М	CO2	4
2.C.	Develop a smart contract which implements a simple auction system with the following features:	3M	CO2	3

	<ul> <li>The contract owner initializes the auction with a specified bidding time (biddingTime) in seconds.</li> <li>Bidders can place bids by calling the bid function and attaching a value (in ether) to their bid.</li> <li>The highest bidder and their bid amount are stored in the highestBidder and highestBid variables.</li> <li>If a new bid is higher than the current highest bid, the previous highest bidder's bid amount is refunded to them using the withdraw function.</li> <li>Once the auction end time is reached, the auction can be closed by calling the auctionEnd function.</li> <li>The contract owner receives the highest bid amount, and the auction winner is recorded.</li> <li>Bidders can withdraw their refunded bid amounts using the withdraw function.</li> </ul>			
3.A.	How does the classification of virtual currencies as property for tax purposes by the IRS impact the taxation, reporting, and compliance requirements for individuals and businesses involved in virtual currency transactions?	4M	CO3	3
3.B.	How do the sectors and services outlined in ISO 37120 contribute to the overall functionality and development of a city? What specific functionalities are encompassed within each of the three modules used to implement ISO 37120 specification?	4M	CO3	3
3.C.	Write with neat sketch, how might the Open Systems IoT reference model evolve in response to emerging technologies and industry standards?	2M	CO3	3
4.A.	Write the advantages of a private blockchain over a public blockchain.	4M	CO4	3
4.B.	How might the Bitcoin block size debate impact the scalability and decentralization of the Bitcoin network?	3M	CO4	3
4. <i>C</i> .	Outline the steps involved in configuring a development environment specifically for building DApps?	3M	CO4	3
5.A.	What opportunities does blockchain technology offer in the current system, as demonstrated by its diverse applications in areas such as HR records, business transactions, physical assets, and intangibles?	4M	CO5	3
5.B.	How would you describe the distinctions between permissionless and permissioned blockchain networks?	3M	CO5	3
5.C.	Evaluate the synergies between Blockchain and Artificial Intelligence (AI), highlighting how their integration can address challenges and unlock opportunities across various industries.	3M	CO5	5

# -ALL THE BEST-