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Study on Cryptography with Blockchain

Dr. B. Anuja Beatrice[1], Devabinav M[2], Rasvanth A[3]
Head and Associate Professor[1]
BCA Students[2,3]
Sri Krishna Arts and Science College Coimbatore[1,2,3]
anujabeatriceb@skasc.ac.in, devabinavm23bca015@skasc.ac.in, rasvantha23bca047@skasc.ac.in3

Abstract: *Blockchain is a decentralized and tamper-proof technology that allows for secure, transparent, and verifiable transactions without relying on a central authority [9]. Cryptography plays a central role in this system, ensuring the security, integrity, and privacy of data throughout the network [2]. This paper examines the key role of cryptographic methods such as hash functions, asymmetric and symmetric key encryption, and digital signatures in supporting the fundamental operations of blockchain systems.*

It also discusses how cryptography addresses trust, identity, consensus, and data protection in both public and private blockchain environments. Advanced techniques such as zero-knowledge proofs and elliptic curve cryptography are also examined to showcase the evolving role of cryptography in enhancing blockchain's efficiency and privacy. This study aims to provide a comprehensive understanding of how cryptographic methods form the backbone of modern blockchain applications.

Keywords: *Blockchain*