

CYBER SECURITY INTERNSHIP – TASK 6

Introduction to Cryptography

1. What is Cryptography?

Cryptography is the practice of securing information by converting it into a form that cannot be understood by unauthorized users. It helps protect data confidentiality, integrity, authentication, and non-repudiation in digital communication.

2. What is Encryption?

Encryption is the process of converting readable data (plaintext) into unreadable data (ciphertext) using an algorithm and a key. Only authorized users with the correct key can decrypt the data.

Purpose of Encryption:

- Protect sensitive data
 - Prevent unauthorized access
 - Secure communication
-

3. Symmetric Encryption

Symmetric encryption uses the **same key** for both encryption and decryption.

Characteristics

- Fast and efficient
- Requires secure key sharing
- Used for large data encryption

Example

- **AES (Advanced Encryption Standard)**

Usage:

- File encryption

- Disk encryption
 - VPNs
-

4. Asymmetric Encryption

Asymmetric encryption uses **two keys**:

- Public Key (shared)
- Private Key (kept secret)

Characteristics

- More secure key exchange
- Slower than symmetric encryption
- Used for authentication and secure communication

Example

- **RSA**

Usage:

- HTTPS
 - Digital certificates
 - Secure key exchange
-

5. Difference Between Symmetric and Asymmetric Encryption

Symmetric Encryption	Asymmetric Encryption
One key used	Two keys used
Faster	Slower
Used for data encryption	Used for secure key exchange
Example: AES	Example: RSA

6. What is Hashing?

Hashing is the process of converting data into a fixed-length value called a hash. It is a **one-way process**, meaning the original data cannot be recovered from the hash.

Purpose of Hashing

- Verify data integrity
- Store passwords securely

Example

- SHA-256
-

7. Digital Signatures

A digital signature is a cryptographic technique used to verify the authenticity and integrity of data.

Provides

- Authentication
- Integrity
- Non-repudiation

Used in:

- Secure emails
 - Software downloads
 - Online transactions
-

8. Real-World Applications of Cryptography

- **HTTPS** – Secure web communication
 - **VPN** – Secure network connection
 - **Online Banking** – Secure financial transactions
 - **Cloud Storage** – Data protection
-

9. Importance of Cryptography

Cryptography is important because it:

- Protects sensitive information
- Ensures secure communication
- Prevents data tampering
- Builds trust in digital systems