

**Title:** Hash function and Message Authentication Code (MAC)

**Aims:**

- Creating Message Digest using Hash function.
- Encrypting messages with MAC.

**Tasks:**

- Encrypt the message using hash function by creating MessageDigest object.
- Create key and encrypt messages with Mac.

**Activities:**

1. Encrypt the message using hash function by creating MessageDigest object.

```
import java.security.MessageDigest;
import java.util.Scanner;

public class Message_Digest {

    public static void main(String[] args) throws Exception{
        Scanner scan = new Scanner(System.in);
        System.out.println("Enter the message: ");
        String message = scan.nextLine();

        MessageDigest md = MessageDigest.getInstance("SHA-256");
        md.update(message.getBytes());

        byte[] digest = md.digest();

        System.out.println(digest);

        StringBuffer hexString = new StringBuffer();

        for (int i=0; i<digest.length; i++) {
            hexString.append(Integer.toHexString(digest[i] & 0xFF));
        }

        System.out.println("Hexadecimal format: "+ hexString.toString());
    }
}
```

**2. Create key and encrypt messages with Mac.**

```
package macode;

import java.util.Scanner;

import java.security.Key;
import java.security.SecureRandom;

import javax.crypto.KeyGenerator;
import javax.crypto.Mac;

public class MACEncryption {

    public static void main(String[] args) throws Exception {
        KeyGenerator KeyGen = KeyGenerator.getInstance("DES");

        SecureRandom secRandom = new SecureRandom();

        KeyGen.init(secRandom);

        Key key = KeyGen.generateKey();

        Mac mac = Mac.getInstance("HmacSHA256");

        mac.init(key);

        Scanner sc = new Scanner(System.in);
        String message = new String();
        System.out.println("Enter the message to encrypt: ");
        message = sc.nextLine();

        byte[] bytes = message.getBytes();
        byte[] macResult = mac.doFinal(bytes);

        System.out.println("MAC result is: " + new String(macResult));
    }
}
```