EX.NO.5 ADVANCED ENCRYPTION STANDARD (AES)

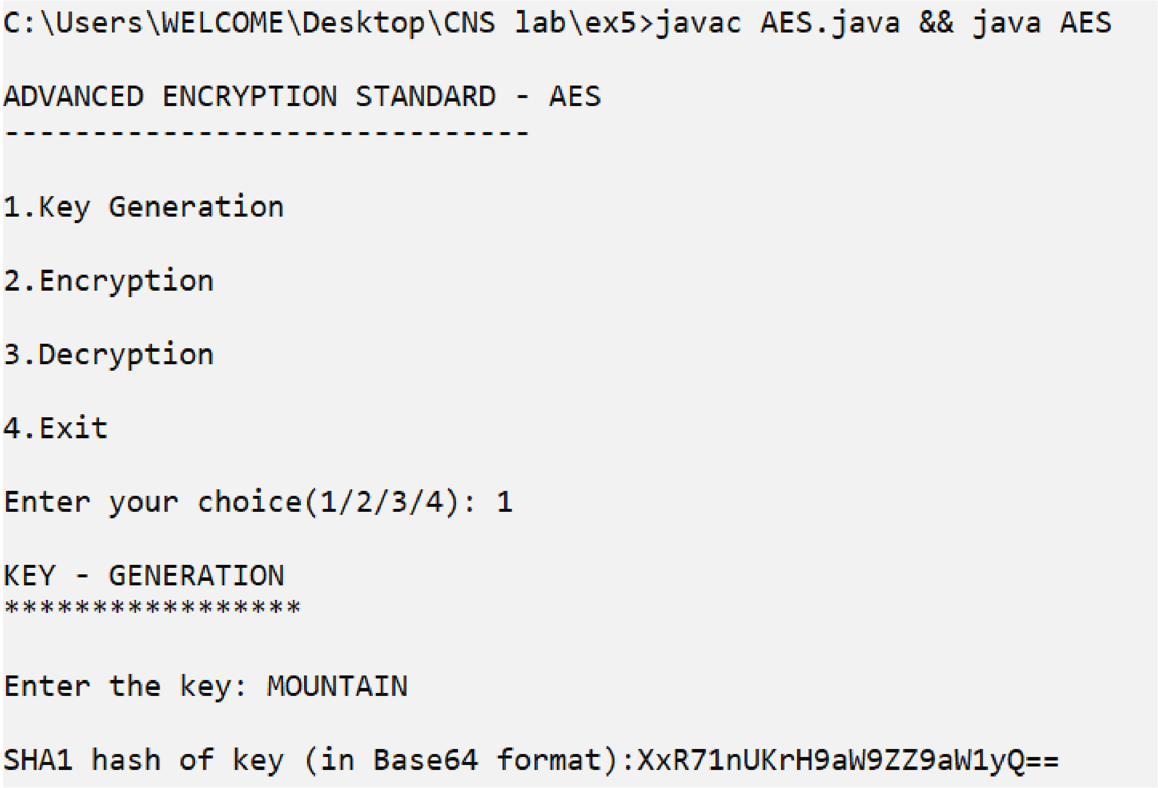
Code:

```
import java.util.*;
import javax.crypto.Cipher;
import javax.crypto.spec.SecretKeySpec;
import java.security.MessageDigest;
import java.io.UnsupportedEncodingException;
import java.security.NoSuchAlgorithmException;

public class AES {
  SecretKeySpec secretKey;
  byte[] keyArray;

  public void generateKey(String key) {
    MessageDigest sha = null;
    try {
      keyArray = key.getBytes("UTF-8");
      sha = MessageDigest.getInstance("SHA-1");
      keyArray = sha.digest(keyArray);
      keyArray = Arrays.copyOf(keyArray, 16);
      secretKey = new SecretKeySpec(keyArray, "AES"); //
    } catch (NoSuchAlgorithmException e) {
      e.printStackTrace();
    } catch (UnsupportedEncodingException e) {
      e.printStackTrace();
    }
  }

  String encrypt(String strToEncrypt, String secret) {
    try {
      generateKey(secret);
      Cipher cipher = Cipher.getInstance("AES/ECB/PKCS5Padding"); //
      cipher.init(Cipher.ENCRYPT_MODE, secretKey);
      return Base64
        .getEncoder()
        .encodeToString(cipher.doFinal(strToEncrypt.getBytes("UTF-8")));
    } catch (Exception e) {
      System.out.println("Error while encrypting: " + e.toString());
  }
  return null;
}

String decrypt(String strToDecrypt, String secret) {
  try {
    generateKey(secret);
    Cipher cipher = Cipher.getInstance("AES/ECB/PKCS5PADDING");
    cipher.init(Cipher.DECRYPT_MODE, secretKey);
    return new String(
      cipher.doFinal(Base64.getDecoder().decode(strToDecrypt))
    );
  } catch (Exception e) {
    System.out.println("Error while decrypting: " + e.toString());
  }
  return null;
}

public static void main(String[] args) {
  Scanner sc = new Scanner(System.in);
  String key, plainText, cipherText;
  int choice = 0;

  AES aes = new AES();

  while (true) {
    System.out.println("\nADVANCED ENCRYPTION STANDARD - AES");
    System.out.println("------------------------------");
    System.out.println("\n1.Key Generation");
    System.out.println("\n2.Encryption");
    System.out.println("\n3.Decryption");
    System.out.println("\n4.Exit");
    System.out.print("\nEnter your choice(1/2/3/4): ");
    choice = sc.nextInt();
    sc.nextLine();

    if (choice == 1) {
      System.out.println("\nKEY - GENERATION");
      System.out.println("*****************");
```

```
        System.out.print("\nEnter the key: ");
        key = sc.nextLine();
        aes.generateKey(key);
        System.out.println(
          "\nSHA1 hash of key (in Base64 format):" +
          Base64.getEncoder().encodeToString(aes.keyArray)
        );
      } else if (choice == 2) {
        System.out.println("\nENCRYPTION");
        System.out.println("***********");
        System.out.print("\nEnter plaintext: ");
        plainText = sc.nextLine();
        System.out.print("\nEnter the key: ");
        key = sc.nextLine();
        aes.generateKey(key);
        cipherText = aes.encrypt(plainText, key);
        System.out.println("\nThe ciphertext (in Base64 format): " + cipherText);
      } else if (choice == 3) {
        System.out.println("\nDECRYPTION");
        System.out.println("***********");
        System.out.print("\nEnter ciphertext (in Base64 format): ");
        cipherText = sc.nextLine();
        System.out.print("\nEnter the key: ");
        key = sc.nextLine();
        aes.generateKey(key);
        plainText = aes.decrypt(cipherText, key);
        System.out.println("\nThe plaintext is: " + plainText);
      } else {
        break;
      }
    }
    sc.close();
  }
}
```

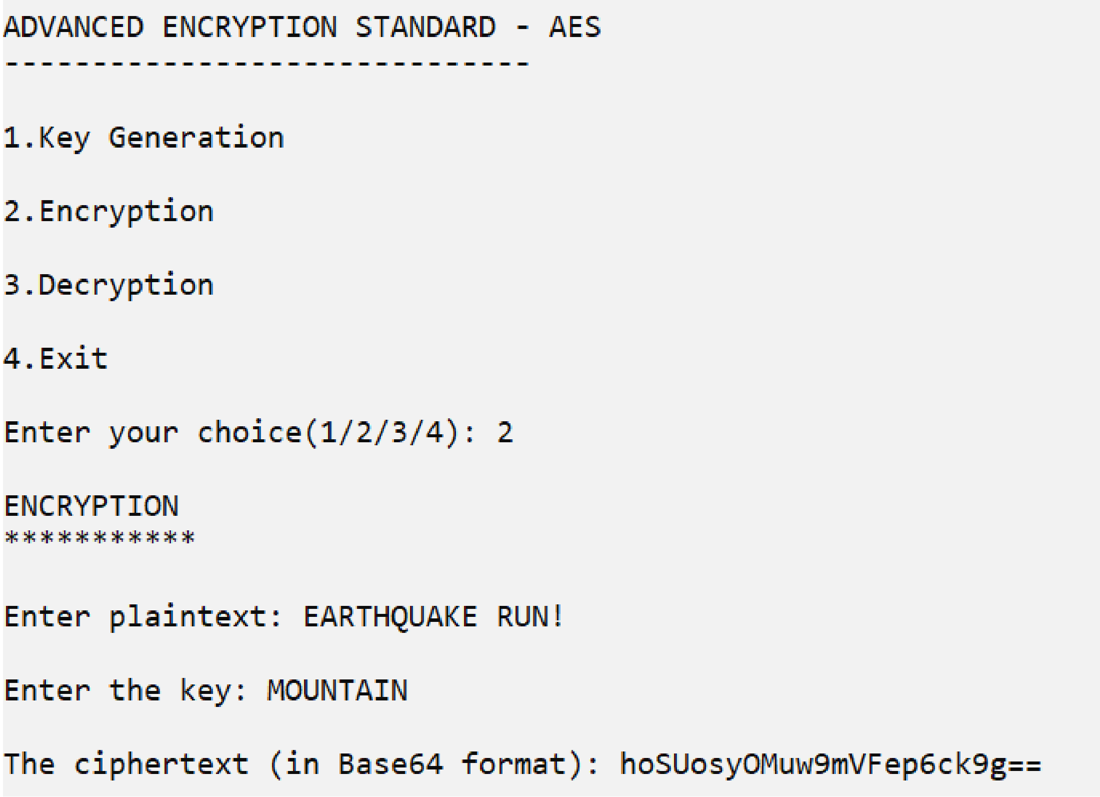
OUTPUT:

Key Generation:



```
C:\Users\WELCOME\Desktop\CNS lab\ex5>javac AES.java && java AES

ADVANCED ENCRYPTION STANDARD - AES
------------------------------

1.Key Generation

2.Encryption

3.Decryption

4.Exit

Enter your choice(1/2/3/4): 1

KEY - GENERATION
*****************

Enter the key: MOUNTAIN

SHA1 hash of key (in Base64 format):XxR71nUKrH9aW9ZZ9aW1yQ==
```

Encryption:



```
ADVANCED ENCRYPTION STANDARD - AES
------------------------------

1.Key Generation

2.Encryption

3.Decryption

4.Exit

Enter your choice(1/2/3/4): 2

ENCRYPTION
***********

Enter plaintext: EARTHQUAKE RUN!

Enter the key: MOUNTAIN

The ciphertext (in Base64 format): hoSUosyOMuw9mVFep6ck9g==
```

Decryption:

```
ADVANCED ENCRYPTION STANDARD - AES
------------------------------

1.Key Generation

2.Encryption

3.Decryption

4.Exit

Enter your choice(1/2/3/4): 3

DECRYPTION
***********

Enter ciphertext (in Base64 format): hoSUosyOMuw9mVFep6ck9g==

Enter the key: MOUNTAIN

The plaintext is: EARTHQUAKE RUN!

ADVANCED ENCRYPTION STANDARD - AES
------------------------------

1.Key Generation

2.Encryption

3.Decryption

4.Exit

Enter your choice(1/2/3/4): 4

C:\Users\WELCOME\Desktop\CNS lab\ex5>
```