



School: ..... Campus: .....  
Academic Year: ..... Subject Name: ..... Subject Code: .....  
Semester: ..... Program: ..... Branch: ..... Specialization: .....  
Date: .....

## Applied and Action Learning

(Learning by Doing and Discovery)

**Name of the Experiment : SHA-256 in Action – Cryptographic Hashing**

### \* Coding Phase: Pseudo Code / Flow Chart / Algorithm

- Open the SHA-256 online tool: <https://emn178.github.io/online-tools/sha256.html>.
- Enter the desired text/message into the input box.
- Keep input encoding as **UTF-8**.
- Select output encoding as **Hex (Lower Case/Upper Case)**.
- The tool automatically generates the **SHA-256 hash (64 hex characters)**.
- Slightly modify the input text and check the new hash value.
- Compare both outputs to observe the **avalanche effect**.

### \* Software used

1. Web Browser – Brave
2. Online Tool – <https://emn178.github.io/online-tools/sha256.html>
3. Word for documentation

## \* Implementation Phase: Final Output (no error)

The image displays two screenshots of the SHA256 Online Tools website, showing the final output of a SHA256 hash calculation.

**Top Screenshot:** The website interface shows the 'SHA256' tool. The 'Input' field contains the text '1024'. The 'Output' field displays the resulting SHA256 hash: `8053f1a0c2f54bd76c1f854e598bdee13ae2f01a224ac3f30c7f6caca2de910`. The 'Settings' panel on the left shows 'Auto Update' and 'Remember Input' are enabled, 'Input Encoding' is set to 'UTF-8', 'Output Encoding' is set to 'Hex (Lower Case)', and 'Enable HMAC' is disabled.

**Bottom Screenshot:** This screenshot shows the same tool with the 'Input' field containing '1024'. The 'Output' field displays the resulting SHA256 hash: `0697328072112011237038108271187088FF3AE9156F42642FA908804E22A57`. The 'Settings' panel on the left shows 'Auto Update' and 'Remember Input' are enabled, 'Input Encoding' is set to 'UTF-8', 'Output Encoding' is set to 'Hex (Upper Case)', and 'Enable HMAC' is disabled.

## \* Implementation Phase: Final Output (no error)

The image displays two screenshots of the SHA256 Online Tools website, showing the final output of a SHA256 hash calculation. The website interface includes a sidebar with various cryptographic tools, a settings panel, and an input/output section.

**Top Screenshot:**

- Settings:**
  - Hash:
  - Auto Update: ☒
  - Remember Input: ☒
  - Input Encoding: UTF-8
  - Output Encoding: Hex (Upper Case)
  - Enable HMAC: ☒
  - HMAC Encoding: UTF-8
  - Key:
- Input:**
- Output:** 2D54220400978C0189DBAE2E6CA02507E90B19F1ED041B7A52BC69B15C00509E
- Share Link:**

**Bottom Screenshot:**

- Settings:**
  - Hash:
  - Auto Update: ☒
  - Remember Input: ☒
  - Input Encoding: UTF-8
  - Output Encoding: Hex (Upper Case)
  - Enable HMAC: ☒
  - HMAC Encoding: UTF-8
  - Key: HGGG
- Input:**
- Output:** 7DE594F3CD0AD442249E752A910C6654A9A9AC9C93037DEC9E1B4ED1264EE417
- Share Link:**

## \* Implementation Phase: Final Output (no error)

Applied and Action Learning

### \*Observations:

- Each input string generates a **unique and fixed-length 256-bit (64-character) hash**.
- A **tiny modification in input** leads to a completely different output (avalanche effect).
- Hashing is **one-way**: original input cannot be retrieved from the hash.
- The tool supports **different encodings** and **HMAC for additional security**.

## ASSESSMENT

Rubrics	Full Mark	Marks Obtained	Remarks
Concept	10		
Planning and Execution/ Practical Simulation/ Programming	10		
Result and Interpretation	10		
Record of Applied and Action Learning	10		
Viva	10		
<b>Total</b>	<b>50</b>		

**Signature of the Student:**

Name :

Regn. No. :

**Signature of the Faculty:**