

## Module 1: Prompt Engineering

### Aim:

To understand the concept of **Prompt Engineering**, its types, working mechanism, evaluation, validation, and benefits in Generative AI systems

### Objectives:

- ✓ To learn what a **prompt** is and how it is used to communicate with AI models.
- ✓ To identify and differentiate various **types of prompts**.
- ✓ To understand **how prompt engineering works**.
- ✓ To learn methods for **evaluating and validating prompts**.
- ✓ To recognize the **benefits** of effective prompt engineering.

### Theory:

#### a. Introduction to Prompt Engineering:

Prompt Engineering is the process of designing and refining **inputs (prompts)** given to AI models (like ChatGPT or GPT-based systems) to obtain the most accurate, relevant, and useful responses.

It involves understanding how the model interprets language and structuring prompts to guide it effectively.

#### b. What is a Prompt?

A **prompt** is the text or instruction given to an AI model to generate a response. It acts as a **bridge** between human intention and AI output.

#### Example:

- Prompt: *"Explain the water cycle in simple terms."*
- AI Output: *"The water cycle is the process where water evaporates, forms clouds, and falls back as rain."*

#### c. Types of Prompts:

##### 1. Instruction-based Prompt:

Gives a clear command.

*Example:* "Summarize this paragraph in one line."

##### 2. Question-based Prompt:

Asks a question to get specific information.

*Example:* "What are the advantages of renewable energy?"

### 3. **Example-based Prompt (Few-shot):**

Provides examples to guide the model's output.

*Example:*

- Input: "Dog - Animal, Rose - ?"
- Expected Output: "Flower"

### 4. **Contextual Prompt:**

Adds background information for better understanding.

*Example:* "You are a teacher explaining gravity to a 10-year-old. Explain it simply."

### 5. **Zero-shot Prompt:**

No examples given; model must infer from instruction alone.

*Example:* "Translate this sentence into French."

### 6. **Chain-of-Thought Prompt:**

Encourages step-by-step reasoning.

*Example:* "Explain how you arrived at the answer."

## **d. How Does Prompt Engineering Work?**

1. **Design:** Creating a clear and specific prompt.
2. **Testing:** Running the prompt through an AI model.
3. **Evaluation:** Checking if the response is accurate and relevant.
4. **Refinement:** Improving the wording or structure of the prompt.
5. **Validation:** Confirming that the prompt consistently gives desired results.

## **e. Evaluating and Validating Prompts:**

### ➤ **Evaluation Metrics:**

- Accuracy of the output
- Relevance to the question
- Clarity and coherence
- Creativity and depth of response

### ➤ **Validation Process:**

- Test prompts on different AI models or contexts.
- Measure consistency and repeatability.
- Gather human feedback for improvement.

**f. Benefits of Prompt Engineering:**

- Improves **accuracy and relevance** of AI outputs.
- Saves **time and effort** by reducing trial and error.
- Enhances **creativity** and **customization** in outputs.
- Enables **fine-tuning** of model behavior without retraining.
- Essential for **real-world AI applications** (chatbots, automation, education, etc.).

**Practical Example:**

Prompt	AI Output
“Explain photosynthesis in one line.”	“Photosynthesis is the process by which green plants use sunlight to make food.”
“List three uses of AI in education.”	“1. Personalized learning 2. Automated grading 3. Virtual tutoring.”
“You are an interviewer. Ask me three questions about Python.”	“1. What are Python data types? 2. Explain OOP in Python. 3. What is a lambda function?”

**Result:**

Successfully understood the concept of prompt engineering, types of prompts, and learned how to evaluate and validate effective prompts for better AI responses.

**Inference:**

The objectives of prompt engineering were achieved successfully. The knowledge gained is clear, relevant, and helps in understanding prompts, their types, working, evaluation, validation, and benefits for AI models.

## Module 2: Prompt Engineering – Practical Prompts

### Aim:

To practice and understand various **Prompt Engineering techniques** using different types of prompts in **LM Studio**, and analyze their responses from a local LLM model.

### Objectives:

- ✓ To learn how to design and use various prompt types for real-world use cases.
- ✓ To test the effectiveness of prompts using LM Studio.
- ✓ To observe how AI responds to structured instructions.
- ✓ To gain hands-on experience with applied prompt engineering tasks.

### Tools Used:

- **LM Studio** (Local LLM environment)
- **GPT-based local model (e.g., Mistral, Llama, Gemma, etc.)**
- **System configuration:** Laptop/Desktop with sufficient GPU/CPU support

### Procedure:

1. Open LM Studio and load a preferred local LLM model.
2. Enter each of the given prompt types in the prompt box.
3. Observe and record the model's response.
4. Evaluate clarity, creativity, and correctness of each output.
5. Refine prompts if needed to achieve better responses.

### Prompts and Observations

S.No	Prompt Type	Example Prompt (Tested in LM Studio)	Sample Output	Observation
1	ACTLIKE Prompt	“Act like a software engineer and explain version control to a beginner.”	Version control is a system that records changes to files over time, allowing developers to collaborate, track revisions, and revert to previous versions using tools like Git.	Output is clear, detailed, and suitable for beginners.

S.No	Prompt Type	Example Prompt (Tested in LM Studio)	Sample Output	Observation
2	FIND Prompt	“Find 3 key advantages of using cloud computing for startups.”	1. Scalability 2. Cost efficiency 3. Remote accessibility	Correct and concise listing of advantages.
3	TRANSLATE Prompt	“Translate the following English sentence into Tamil: ‘Knowledge is power.’”	அறிவே சக்தி.	Accurate translation.
4	CALCULATE Prompt	“Calculate the simple interest for P=2000, R=5%, T=3 years.”	Simple Interest = $(2000 \times 5 \times 3) / 100 = 300$	Correct calculation.
5	GENERATING IDEAS Prompt	“Generate five innovative project ideas using AI in education.”	1. AI Tutor Assistant 2. Exam Analyzer 3. Personalized Learning App 4. AI Essay Grader 5. Smart Attendance System	Ideas are relevant and creative.
6	RECOMMEND SOLUTIONS Prompt	“Recommend solutions for reducing plastic pollution in cities.”	1. Promote recycling programs 2. Ban single-use plastics 3. Encourage biodegradable packaging 4. Organize cleanup drives	Practical and actionable solutions.
7	OUTLINE STEPS Prompt	“Outline steps to create a new YouTube channel and start earning.”	1. Create Google Account 2. Set up YouTube Channel 3. Upload Videos 4. Grow Subscribers 5. Enable Monetization	Steps are logical and sequential.

S.No	Prompt Type	Example Prompt (Tested in LM Studio)	Sample Output	Observation
8	CREATIVE SURVEY Prompt	“Create a short survey to collect feedback on mobile app usability.”	1. How easy is it to navigate the app? 2. Are features working as expected? 3. How would you rate performance? 4. What improvements do you suggest?	Survey is concise and relevant to usability.
9	DEVELOP SALES STRATEGY Prompt	“Develop a sales strategy for a new eco-friendly water bottle brand.”	1. Target eco-conscious customers 2. Partner with gyms & schools 3. Offer social media discounts 4. Promote through sustainability campaigns	Strategy is feasible and well-structured.
10	DESIGN FEEDBACK PROCESS Prompt	“Design a customer feedback process for an online food delivery service.”	1. Send feedback form post-delivery 2. Enable star rating system 3. Collect issue details 4. Analyze responses weekly	Feedback process is practical and clear.
11	CREATE PROJECT PLAN Prompt	“Create a project plan for developing an e-commerce website.”	1. Requirement Analysis 2. UI/UX Design 3. Backend Development 4. Testing 5. Launch 6. Maintenance	Project plan is comprehensive and structured.
12	ANALYSE CUSTOMER BEHAVIOUR Prompt	“Analyze how customers decide to buy products online.”	Customers evaluate product reviews, prices, brand reputation, discounts, and delivery speed before making a purchase.	Analysis is detailed and accurate.

S.No	Prompt Type	Example Prompt (Tested in LM Studio)	Sample Output	Observation
13	CREATE CONTENT STRATEGY Prompt	“Create a content strategy for a college tech fest Instagram page.”	Post event teasers, behind- the-scenes clips, student interviews, countdown stories, and daily highlights using tech-related hashtags.	Content strategy is creative and actionable.

**Result:**

All prompts were successfully executed in **LM Studio**, and the responses were observed to be **accurate, contextually relevant, and creative**. Each prompt type helped achieve a specific communication or problem-solving goal.

**Inference:**

The above prompts were executed successfully using **LM Studio**. The outputs generated were accurate, relevant, and matched the intended purpose of each prompt type.

### Module 3: Prompt Engineering – Advanced Prompts

**Aim:**

To practice and understand advanced prompt engineering techniques, including prompts for programmers, marketing, customer care, chain-of-thought reasoning, and perspective-based prompts.

**Objectives:**

- ✓ To explore specialized prompt types for different professional scenarios.
- ✓ To understand how context and perspective affect AI responses.
- ✓ To evaluate AI outputs for relevance, clarity, and effectiveness.
- ✓ To gain hands-on experience designing prompts for problem-solving, marketing, and customer interactions.

**Tools Used:**

- LM Studio (Local LLM environment)
- Local GPT-based model (e.g., Mistral, Llama, Gemma)
- Laptop/Desktop with sufficient CPU/GPU

**Procedure:**

1. Open LM Studio and load a preferred local LLM model.
2. Enter each of the given advanced prompt types into the prompt box.
3. Observe and record the AI model’s responses.
4. Evaluate the clarity, accuracy, and context of each output.
5. Refine prompts if necessary for better responses.

**Prompts and Observations:**

S.No	Prompt Type	Example Prompt (Tested in LM Studio)	Sample Output	Observation
1	PROMPT FOR PROGRAMMERS	“Write a Python function to reverse a string.”	python\ndef reverse_string(s):\nreturn s[::-1]\n	Output is correct and executable.

S.No	Prompt Type	Example Prompt (Tested in LM Studio)	Sample Output	Observation
2	MARKETING BASED PROMPTS	“Create a social media post promoting a new eco-friendly water bottle.”	“Discover our new eco-friendly water bottle! Stay hydrated while saving the planet ☑☑ #EcoBottle #SustainableLiving”	Creative, relevant, and marketing-focused.
3	CUSTOMER CARE BASED PROMPTS	“Respond to a customer complaining about a delayed order politely.”	“We sincerely apologize for the delay in your order. We are working to resolve it and ensure it reaches you as soon as possible. Thank you for your patience.”	Professional, polite, and empathetic response.
4	CHAIN OF THOUGHT PROMPTS	“Explain step-by-step how to calculate compound interest.”	“Step 1: Identify principal, rate, and time. Step 2: Use formula $A = P(1 + r/n)^{nt}$ . Step 3: Substitute values. Step 4: Calculate final amount. Step 5: Subtract principal to get interest.”	Stepwise reasoning is clear and accurate.
5	PERSPECTIVE PROMPTS	“Explain climate change from the perspective of a marine biologist.”	“As a marine biologist, I observe that rising ocean temperatures and acidification are harming marine ecosystems, leading to coral bleaching and declining fish populations.”	Perspective is accurately conveyed and contextually rich.

**Result:**

All advanced prompts were successfully executed in LM Studio, and the responses were observed to be accurate, contextually relevant, and appropriately tailored. Each prompt type helped achieve a specific professional or reasoning task.

**Inference:**

The above prompts were executed successfully using LM Studio. The outputs generated were clear, relevant, and matched the intended purpose of each prompt type.