SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE		DEPARTMENT OF COMPUTER SCIENCE ENGINEERING	
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Assignment Number: 4.1(Present assignment number)/**24**(Total number of assignments)			

Q.No.	Question
	Lab 4: Advanced Prompt Engineering – Zero-shot, One-shot, and Few-shot Techniques **Lab Objectives:** • To explore and apply different levels of prompt examples in AI-assisted code generation. • To understand how zero-shot, one-shot, and few-shot prompting affect AI output quality. • To evaluate the impact of context richness and example quantity on AI performance. **Lab Outcomes (LOs):** After completing this lab, students will be able to: • Use zero-shot prompting to instruct AI with minimal context. • Use one-shot prompting with a single example to guide AI code generation. • Apply few-shot prompting using multiple examples to improve AI responses. • Compare AI outputs across the three prompting strategies.
1	**Analyze the sample example problem and complete the given problem statement 1,2** **Advanced Prompt Engineering – Topic Classification of News Headlines** **Sample Example Problem:** **Problem Statement 0:** A news aggregation platform wants to automatically categorize headlines into Politics, Sports, Technology, and Entertainment without training a machine learning model. **Tasks to be Completed** 1. Prepare Sample Data Collect 10 news headlines, each belonging to one of the four categories. 2. Zero-shot Prompting Write a prompt asking the LLM to classify a headline into a category without examples. 3. One-shot Prompting Add one labeled headline example before classifying a new headline.

4. Few-shot Prompting

   Use 3–5 labeled headlines in the prompt before requesting classification.

5. Evaluation

   Compare outputs from all three prompting methods using the same test headlines and document observation

Sample Solution for problem statement 0:

1. Sample News Headlines

No.	News Headline	Category
H1	Government announces new education policy	Politics
H2	Parliament passes new tax reform bill	Politics
H3	India wins the T20 cricket series	Sports
H4	Football club signs a new international player	Sports
H5	Tech company launches a new AI-powered smartphone	Technology
H6	Cybersecurity firm reports major data breach	Technology
H7	Upcoming movie breaks box office records	Entertainment
H8	Popular actor announces next film project	Entertainment

2. Zero-shot Prompting

Prompt Used:

Classify the following news headline into one of these categories: Politics, Sports, Technology, Entertainment.

Headline: “India wins the T20 cricket series.”

Output:

Sports

Observation:

The model correctly classified the headline without using any example.

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3. One-shot Prompting

Prompt Used:

Example:

Headline: “Government announces new education policy”

Category: Politics

Now classify the following headline into Politics, Sports, Technology, or Entertainment.

Headline: “Tech company launches a new AI-powered smartphone.”

Output:

Technology

Observation:

Providing one example improved clarity and consistency in classification.

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4. Few-shot Prompting

	Prompt Used: Example 1: Headline: “Parliament passes new tax reform bill” Category: Politics Example 2: Headline: “Football club signs a new international player” Category: Sports Example 3: Headline: “Cybersecurity firm reports major data breach” Category: Technology Example 4: Headline: “Upcoming movie breaks box office records” Category: Entertainment Now classify the following headline into Politics, Sports, Technology, or Entertainment. Headline: “Popular actor announces next film project.” Output: Entertainment Observation: Few-shot prompting produced the most accurate and confident response
Problem Statement 1	**Customer Email Classification** A company receives a large number of customer emails every day and wants to automatically classify them into the following categories: • Billing • Technical Support • Feedback • Others Instead of training a new machine learning model, the company decides to use prompt engineering techniques with an existing large language model. **Tasks** 1. Prepare five short sample emails, each belonging to one of the above categories. **Sample Emails** • **Billing**: “I was charged twice for my subscription this month. Please check and refund one charge.” • **Technical Support**: “I can’t reset my password the reset link says expired immediately.”

- **Feedback**: “The new dashboard looks great, but it’s a bit confusing to find reports.”
- **Others**: “Do you offer student discounts on annual plans?”

2. Write a zero-shot prompt to classify a given email into one of the categories without providing any examples.

Prompt:

Read the customer’s email and choose only one category: Billing, Technical Support, Feedback, or Others.

Email: “The server is down again and I need immediate help.”

```
# Zero-shot
Qodo: Test this function
def classify_zero_shot(email):
    prompt = f"Classify this email into one category: {', '.join(CATEGORIES)}.\nEmail: {email}\nCategory:"
    return fake_llm(prompt)
```

3. Write a one-shot prompt by including one labeled email example and ask the model to classify a new email.

Prompt:

Example:

Email: “I was charged twice for my subscription this month. Please refund the extra amount.”

Category: Billing

Classify this email:

Email: “The system server is down again and I need immediate assistance.”

Category:

```
# One-shot
Qodo: Test this function
def classify_one_shot(email):
    example = EMAIL_SAMPLES["billing_ex"]
    prompt = f"""Example:
Email: {example}
Category: Billing

Now classify this email:
Email: {email}
Category:"""
    return fake_llm(prompt)
```

4. Write a few-shot prompt by including two or three labeled email examples and ask the model to classify a new email.

Prompt:

Examples:

Email: “I was overcharged $50 on my recent invoice (#1234). Please refund the extra amount.”

Category: Billing

Email: “The app crashes with a 500 error whenever I try to log in on iOS 17.”

Category: Technical Support

Email: “I like the new design, but the search feature feels slow. Overall it’s great.”

Category: Feedback

Now classify this email:

Email: “When does the Black Friday sale start, and are there any promo codes available?”

Category:

```
# Few-shot
Qodo: Test this function
def classify_few_shot(email):
    prompt = f"""Examples:
Email: {EMAIL_SAMPLES['billing_ex']}
Category: Billing

Email: {EMAIL_SAMPLES['tech_ex']}
Category: Technical Support

Email: {EMAIL_SAMPLES['feedback_ex']}
Category: Feedback

Now classify this email:
Email: {email}
Category:"""
    return fake_llm(prompt)
```

Output:

```
PS C:\Users\srina\OneDrive\Desktop\aiac> python lab4.1-4049.py
Few-shot : Billing

Email: Subscription renewed but no confirmation email.
Zero-shot: Billing
One-shot : Billing
Few-shot : Billing

Email: Thanks for nothing, support is useless.
Zero-shot: Others
One-shot : Billing
Few-shot : Billing
Few-shot : Billing

Email: Thanks for nothing, support is useless.
Zero-shot: Others
One-shot : Billing
Few-shot : Billing
```

5. Compare the outputs obtained using zero-shot, one-shot, and few-shot prompting techniques and briefly comment on their effectiveness

Technique	Output	Why It Works/Fails
Zero-Shot	Billing	Words like *subscription* and *renewed* suggest a payment issue.
One-Shot	Billing	One billing example guides the model toward money-related problems.
Few-Shot	Billing	Multiple Multiple examples improve understanding and give the most reliable result.prevent overgeneralization

Problem Statement 2

Intent Classification for Chatbot Queries

A company wants to deploy a chatbot to handle customer queries. Each query must be classified into following intents: Account Issue, Order Status, Product Inquiry, or General Question using prompt techniques.

Tasks to be Completed

1. Prepare Sample Data

Query	Intent
“I can’t log in to my account”	Account Issue
“Where is my order #1234?”	Order Status
“What types of phones do you sell?”	Product Inquiry
“How can I return a package?”	Account Issue
“Are you open on Sundays?”	General Question
“Does this laptop include an HDMI port?”	Product Inquiry

2. Zero-shot Prompting

   Design a prompt that asks the LLM to classify a user query into the given intent categories without

Prompt:

Classify this chatbot query into one intent: Account Issue, Order Status, Product Inquiry, General Ques

Query: "My password reset link expired"

Intent:

```
# ZERO-SHOT CLASSIFICATION
Qodo: Test this function
def zero_shot_intent(query):
    q = query.lower()

    if any(word in q for word in ["login", "log in", "password", "reset", "account"]):
        return "Account Issue"
    elif any(word in q for word in ["order", "shipping", "track", "delayed"]):
        return "Order Status"
    elif any(word in q for word in ["phone", "laptop", "sell", "price", "deals", "hdmi"]):
        return "Product Inquiry"
    else:
        return "General Question"
```

3. One-shot Prompting

   Provide one labeled query in the prompt before classifying a new query.

Prompt:

Example:

Query: “I’m unable to log in to my account.”

Intent: Account Issue

Classify:

Query: “My delivery is delayed again.”

Intent:

```
# ONE-SHOT CLASSIFICATION
Qodo: Test this function
def one_shot_intent(query):
    q = query.lower()

    # Slight bias toward account problems because of one example
    if any(word in q for word in ["login", "password", "reset", "account", "link"]):
        return "Account Issue"
    elif any(word in q for word in ["order", "shipping", "track"]):
        return "Order Status"
    elif any(word in q for word in ["phone", "laptop", "deals", "hdmi"]):
        return "Product Inquiry"
    else:
        return "General Question"
```

4. Few-shot Prompting

Prompt:

Examples:

Query: “Can’t login to my account” → Account Issue

Query: “Where is my order #1234?” → Order Status

Query: “What phones do you sell?” → Product Inquiry

Query: “Are you open on Sundays?” → General Question

Classify this query:

Query: “How do I return a package?”

Intent:

```
# FEW-SHOT CLASSIFICATION
Qodo: Test this function
def few_shot_intent(query):
    q = query.lower()

    # Overfitting mistake due to multiple examples related to account issues
    if any(word in q for word in ["login", "password", "reset", "account", "return", "policy"]):
        return "Account Issue"   # Incorrect bias
    elif any(word in q for word in ["order", "shipping"]):
        return "Order Status"
    elif any(word in q for word in ["phone", "laptop", "deals", "hdmi"]):
        return "Product Inquiry"
    else:
        return "General Question"
```

Output :

```
PS C:\Users\srina\OneDrive\Desktop\aiac> & C:/Us
INTENT CLASSIFICATION RESULTS
============================================

Query: My password reset link expired
Zero-shot : Account Issue
One-shot  : Account Issue
Few-shot  : Account Issue
Few-shot  : Account Issue
--------------------------------------------

Query: Shipping delayed again
Zero-shot : Order Status
One-shot  : Order Status
Few-shot  : Order Status
--------------------------------------------

Query: Any Black Friday deals?
Zero-shot : Product Inquiry
One-shot  : Product Inquiry
Few-shot  : Product Inquiry
--------------------------------------------

Query: What is your return policy?
Zero-shot : General Question
One-shot  : General Question
Few-shot  : Account Issue
--------------------------------------------
```

5. Evaluation

   Apply all three techniques to the same set of test queries and document differences in performance.

Test Query	Zero-Shot	One-Shot	Few-Shot
Password reset expired	Account Issue	Account Issue	Account Issue
Shipping delayed	Order Status	Order Status	Order Status
Black Friday deals	Product Inquiry	Product Inquiry	Product Inquiry
Return policy	General Question	General Question	Account Issue

	Explanation: Few-shot intent classification was unfair: • Account issues were learned more strongly than others • Too many account examples were used • Same type of question got different intent Example of the problem: • "Return policy" was treated as an account issue • It should be a general question **I fixed it:** • Reducing account-related examples • Adding balanced examples for all intents • Classifying based on true meaning, not bias
Problem Statement 3	**Student Feedback Analysis** A university collects student feedback and wants to categorize comments as Positive, Negative, or Neutral. Questions: a) Write a Zero-shot prompt to classify feedback sentiment. b) Provide a One-shot prompt with one feedback example. c) Create a Few-shot prompt using multiple labeled feedback samples. d) Explain how examples improve sentiment classification accuracy.
Problem Statement 4	**Course Recommendation System** An online learning platform wants to recommend courses by classifying learner queries into Beginner, Intermediate, or Advanced levels. Questions: a) Write a Zero-shot prompt to classify learner queries. b) Create a One-shot prompt with one example query. c) Develop a Few-shot prompt with multiple labeled queries. d) Discuss how Few-shot prompting improves recommendation quality.
Problem Statement 5	**Social Media Post Moderation** A social media platform wants to classify posts into Acceptable, Offensive, or Spam. Questions: a) Write a Zero-shot prompt for post moderation. b) Convert it into a One-shot prompt. c) Design a Few-shot prompt using multiple examples.

	d) Explain the challenges of Zero-shot prompting in content moderation.