School of Computer Science and Artificial Intelligence

Lab Assignment # 3.5

Program : B. Tech (CSE)

Specialization : AIML

Course Title : AI Assisted Coding

Course Code : 23CS002PC304

Semester : VI

Academic Session : 2025-2026

Name of Student : P. Sricharan Goud

Enrollment No. : 2303A52100

Batch No. : 33

Date : 10/01/26

Task 1

Conceptual Understanding in Physics

Topic Overview

Physics is a foundational science that explains natural phenomena using concepts, laws, and mathematical relationships. For introductory learners, clarity of explanation and real-life relevance are critical. Large Language Models (LLMs) like ChatGPT are increasingly used by students to understand physics concepts. However, the quality of responses depends heavily on how the question (prompt) is framed. This task focuses on understanding how prompt refinement improves conceptual clarity, accuracy, and depth in physics-related explanations.

1. Baseline Prompt Testing – Detailed Explanation

In baseline testing, simple and vague prompts such as *"Explain Newton's First Law"* or *"What is Force?"* were given to the AI. These prompts lacked context, target audience, and structure. As a result, the AI responses were short, generic, and mostly textbook-oriented, often missing examples and deeper reasoning.

Baseline Prompt Table (Physics)

No	Baseline Prompt	Nature of AI Response
1	Explain Newton's First Law	Basic definition only
2	What is Force?	Definition without example
3	Define Acceleration	Formula-based answer
4	Why do objects fall?	Brief gravity mention
5	What is Energy?	Broad explanation

2. Prompt Refinement – Detailed Explanation

Each baseline prompt was refined by adding learning context, explicit instructions, and breaking the task into subtasks.

Refined Prompt Table (Physics)

No	Refined Prompt	Context Added
1	Define Newton's First Law, explain it, and give one real-life example	School-level
2	Explain force with definition, formula, and example	Conceptual + Math
3	Define acceleration and explain using daily-life example	Real-life
4	Explain gravity with reasons and examples	Conceptual
5	Define energy, list types, and give examples	Exam-oriented

3. Evaluation Comparison Table (Physics)

Criteria	Baseline Score (1–5)	Refined Score (1–5)
Completeness	2	5
Accuracy	3	5
Relevance	3	5
Clarity	2	5

4. Reflection

The comparison clearly shows that refined prompts lead to more complete and learner-friendly explanations. Context and structure help the AI behave like a subject expert rather than a dictionary.

Task 2

Programming Fundamentals (Python)

Topic Overview

Python is a beginner-friendly programming language widely used in education. Students often struggle with understanding syntax, logic flow, and real-world applications. This task evaluates how prompt structuring improves AI responses in programming education.

1. Baseline Prompt Testing – Detailed Explanation

Baseline prompts were vague and resulted in partial explanations without code or use cases.

Baseline Prompt Table (Python)

No	Baseline Prompt	AI Response Quality
1	What is a loop?	Definition only
2	Explain list	No syntax
3	How to use if	Missing example
4	What is function	Very brief
5	Difference list and tuple	Partial

2. Prompt Refinement – Detailed Explanation

Refined prompts explicitly requested syntax, examples, and use cases.

Refined Prompt Table (Python)

No	Refined Prompt	Context
1	Define loop, show for and while examples	Beginner
2	Explain list with syntax and example	Syntax-focused
3	Explain if statement with example	Beginner
4	Define function and give example	Exam-oriented
5	Compare list and tuple with examples	Interview

3. Evaluation Comparison Table (Python)

Criteria	Baseline	Refined
Completeness	2	5
Accuracy	3	5
Relevance	3	5
Clarity	2	5

4. Reflection

Explicit subtasks ensured correct syntax, examples, and practical clarity.

Task 3

Data Science and Machine Learning Concepts

Topic Overview

DS/ML concepts are abstract and require contextual explanation. This task studies how prompt context improves conceptual depth.

1. Baseline Prompt Testing

Baseline Prompt Table (DS/ML)

No	Baseline Prompt	Response Quality
1	What is supervised learning?	High-level
2	Explain clustering	No example
3	What is regression?	Definition only
4	Define overfitting	Brief
5	What is classification?	Partial

2. Prompt Refinement

Refined Prompt Table (DS/ML)

No	Refined Prompt	Context
1	Define supervised learning with example and limitation	Academic
2	Explain clustering with real-world use	Industry
3	Explain regression mathematically	Mathematical
4	Define overfitting with example	Beginner
5	Explain classification for interviews	Interview

3. Evaluation Comparison Table (DS/ML)

Criteria	Baseline	Refined
Completeness	2	5
Accuracy	4	5
Relevance	3	5
Clarity	3	5

4. Reflection

Context-aware prompts significantly improve technical clarity.

Task 4

Database and SQL Queries – Very Detailed Brief

Topic Overview

SQL concepts require both theory and practice. This task evaluates AI explanations with refined prompts.

1. Baseline Prompt Testing

Baseline Prompt Table (SQL)

No	Baseline Prompt	AI Response
1	Explain JOIN	Partial
2	What is WHERE	Definition
3	Difference WHERE and HAVING	Incomplete
4	How to use GROUP BY	No example
5	Explain index	Brief

2. Prompt Refinement

Refined Prompt Table (SQL)

No	Refined Prompt	Context
1	Explain JOIN types with syntax and examples	Interview
2	Explain WHERE with example	Lab
3	Compare WHERE and HAVING	Theory
4	Explain GROUP BY with example	Practical
5	Explain indexing and optimization	Performance

3. Evaluation Comparison Table (SQL)

Criteria	Baseline	Refined
Completeness	2	5
Accuracy	3	5
Relevance	3	5
Clarity	2	5

4. Reflection

Refined prompts ensure structured and accurate SQL explanations.

Task 5

General Aptitude and Logical Reasoning – Very Detailed Brief

Topic Overview

Aptitude problems require step-by-step reasoning. This task evaluates how prompt structuring improves solution clarity.

1. Baseline Prompt Testing

Baseline Prompt Table (Aptitude)

No	Baseline Prompt	Response Type
1	What is probability?	Definition
2	Explain ratio	Brief
3	Difference speed and velocity	Partial
4	How to solve time and work	No steps
5	Explain average	Short

2. Prompt Refinement

Refined Prompt Table (Aptitude)

No	Refined Prompt	Context
1	Define probability with formula and example	Exam
2	Explain ratio with example	School
3	Compare speed and velocity	Conceptual
4	Solve time and work step-by-step	Competitive
5	Explain average with common mistakes	Practice

3. Evaluation Comparison Table (Aptitude)

Criteria	Baseline	Refined
Completeness	2	5
Accuracy	3	5
Relevance	4	5
Clarity	2	5

4. Reflection

Structured prompts improve reasoning transparency and learner confidence.

Conclusion

This laboratory assignment on Prompt Engineering: Improving Prompt and Context Management provides a detailed and practical exploration of how the formulation of prompts significantly influences the quality, depth, and usefulness of responses generated by large language models such as ChatGPT. The experiment was conducted across five diverse academic and problem-solving domains—Physics, Programming Fundamentals (Python), Data Science and Machine Learning, Database and SQL, and General Aptitude and Logical Reasoning—making the study comprehensive and multidisciplinary.

The baseline prompt analysis clearly demonstrated that vague and unstructured prompts generally result in shallow, incomplete, or overly generic responses. Although the AI model often produced factually correct answers, the lack of explicit instructions and contextual clarity limited the educational value of those responses. This highlights an important insight: without proper prompt design, even advanced AI systems may fail to meet the learning expectations of students, particularly in technical and exam-oriented subjects.

The refined prompts, which incorporated contextual information, explicit task instructions, and logical subtask breakdowns, produced significantly improved outputs. By specifying the intended audience (such as beginner-level students, competitive exam aspirants, or interview candidates) and clearly outlining what was expected (definition, explanation, examples, formulas, use cases, and limitations), the AI was able to generate more structured, accurate, and learner-friendly responses. This approach transformed the AI from a simple answer-generating tool into an effective educational assistant.

The comparative evaluation tables further reinforced these findings. Across all tasks and subjects, refined prompts consistently scored higher in completeness, accuracy, relevance, and clarity when compared to baseline prompts. This quantitative evaluation validates the importance of prompt engineering in reducing ambiguity, improving conceptual flow, and enhancing understanding, especially in domains that require step-by-step reasoning or technical precision.

Another key takeaway from this assignment is the importance of context management. Context-aware prompts enabled the AI to adapt its explanations based on different learning objectives, such as theoretical understanding, practical application, exam preparation, or interview readiness. This adaptability is crucial for modern AI-assisted education platforms, where learners have diverse needs and backgrounds.

Overall, this lab assignment successfully demonstrates that prompt engineering is a critical skill in AI-assisted coding and learning environments. As AI tools become increasingly integrated into education and software development, the ability to design clear, structured, and context-rich prompts will play a vital role in maximizing their effectiveness. This experiment not only deepened the understanding of AI behavior but also provided valuable practical experience in interacting with intelligent systems.

In conclusion, well-designed prompts significantly enhance the performance and reliability of AI-generated responses.