

GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Automobile Engineering / Mechanical Engineering /
Mechanical Engineering (CAD/CAM)/ Civil Engineering /
Environmental Engineering / Mechatronics Engineering /
Mining Engineering / Fabrication Technology

Subject Code : DI04000161

Subject Name: Artificial Intelligence and Prompt Engineering



w.e.f. Academic Year:	2025-2026
Semester:	4 th
Category of the Course:	MOPEC

Prerequisite:	NIL
Rationale:	Artificial Intelligence (AI) and Prompt Engineering requires an understanding of both fundamental AI concepts and how these can be applied in practical scenarios, particularly with prompt engineering. Given the increasing relevance of AI in various sectors and the growing importance of working effectively with AI systems (especially in areas like natural language processing), a well-rounded curriculum should blend theory, hands-on learning, and real-world applications.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
CO1	Explain core concepts of AI, generative AI and LLMs at a conceptual level.
CO2	Identify appropriate AI tools and modes for engineering workflows without coding.
CO3	Apply foundational and advanced prompt-engineering techniques to real tasks.
CO4	Critically evaluate AI outputs for correctness, bias, and reliability.
CO5	Prepare documentation, governance checks and non-technical AI deployment plans.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial/ Practical	
			ESE(E)		PA(M)	PA(I)	ESE (V)	
3	0	0	3	70	30	0	0	100

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Course Content:

Unit No.	Content	No. of Hours	%of Weightage
1	Introduction to AI & Generative AI 1.1 Definitions: Intelligence, Artificial Intelligence, Machine Learning 1.2 Evolution of AI: From Rule-based systems to Generative AI. 1.3 Types of AI: Narrow AI (ANI) vs. General AI (AGI). 1.4 Concept of Generative AI: How text and image generators work (prediction logic vs. search engine). 1.5 Common AI Tools overview: ChatGPT, Gemini, Copilot, Claude.	7	18
2	Generative Models & Tools: Concepts and Safe Use 2.1 How LLMs behave (tokens, context, instructions—no coding) 2.2 Types of AI tools: chat LLMs, multimodal tools, assistants 2.3 Responsible AI use: privacy, safety, ethics 2.4 Selecting the right AI tool for a task (accuracy, reliability, limitations) 2.5 Understanding bias and fairness in generative models, including strategies to identify, mitigate, and monitor potential biases in AI systems.	08	20
3	Prompt Engineering: Foundations 3.1 What is a prompt? Structure and components <ul style="list-style-type: none">• Instruction• Context• Constraints• Examples• Output format 3.2 Types of prompts <ul style="list-style-type: none">• Role prompts• Instruction prompts• Task prompts• Information extraction prompts	10	25

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	<p>3.3 Core prompting strategies</p> <ul style="list-style-type: none">• Step-by-step prompting• Clarification prompts• Decomposition of complex tasks• Simple few-shot prompting <p>3.4 Building prompt templates</p> <ul style="list-style-type: none">• Report template• Checklist template• SOP template <p>3.5 Evaluating prompt output quality</p> <ul style="list-style-type: none">• Accuracy• Clarity• Completeness• Verifiability		
4	<p>Engineering: Advanced Methods & Practical Applications (Non-Coding)</p> <p>4.1 Advanced prompting techniques</p> <ul style="list-style-type: none">• Scaffolding prompts• Prompt chaining & iterative refinement• Meta-prompts (prompts about prompts)• Constraint-based prompting (format, tables, sections) <p>4.2 Critical evaluation & validation</p> <ul style="list-style-type: none">• Detecting hallucinations• Verification and reverse-prompting• Cross-checking with standards/manuals• Uncertainty prompts (“what info is missing?”, “assumptions?”) <p>4.3 Multimodal prompting (conceptual)</p> <ul style="list-style-type: none">• How to describe an image to an AI• How to ask for analysis (without relying on domain knowledge)• Preparing annotated checklists <p>4.4 Designing workflow-level prompts</p> <ul style="list-style-type: none">• Maintenance workflow prompts	11	28

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	<ul style="list-style-type: none">• Inspection workflow prompts• Safety workflow prompts 4.5 Building your own Prompt Library <ul style="list-style-type: none">• Categorisation• Version control (simple documentation)• Sharing prompts within departments		
5	Governance, Ethics, Security and Future Trends 5.1 AI Ethics: Bias in data, Deep fakes, and Copyright issues. 5.2 Data Privacy: What not to share with public AI tools (Proprietary designs, Passwords). 5.3 The Future of Work: How AI changes the role of an Engineer (Human-in-the-loop). 5.4 Responsible AI usage in academia and industry. 5.5 Indian cyber regulations overview (non-legal, awareness level) 5.6 Capstone project: prompt-based solution to real engineering task	09	22
Total		45	100 %

References/Suggested Learning Resources:

(a) Books:

1. You Look Like a Thing and I Love You — Janelle Shane
2. The Art of Prompt Engineering for Everyone — (practical prompt-guide; several short guides & e-books exist)
3. AI for Everyone (Andrew Ng) — course/book materials (conceptual)
4. Architects of Intelligence — insights on AI impact (selected chapters relevant to engineering deployment)

Web / MOOCs / Documentation (practical, non-coding):

5. OpenAI / Google / Anthropic user guides (safety & prompt best practices)
6. Coursera: AI for Everyone (Andrew Ng) — conceptual course

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7. Swayam / NPTEL modules on AI foundations (conceptual)
8. Hugging Face space docs — conceptual descriptions of multimodal tools
9. Manufacturer / industry standards websites for domain usage (BIS/IS codes, automotive standards)

Suggested Course Practical List:

(No programming anywhere)

1. Create and refine a step-by-step SOP using simple prompts.
2. Make a prompt template for an inspection checklist.
3. Iteratively improve clarity of a maintenance instruction using prompting.
4. Transform technical notes into a formatted report.
5. Safety instruction generation using role-based prompts.
6. Generate multiple versions of a document and select best output.
7. Identify hallucinations in AI answers and correct them.
8. Compare outputs from different prompting strategies.
9. Write a prompt that asks the AI to verify its own output.
10. Prepare a prompt-library for your department.
11. Produce tables & forms using structured prompts.
12. Multimodal prompt: describe an image and request interpretation.
13. Peer-review prompts: evaluate clarity & effectiveness.
14. Create a workflow prompt for routine tasks (maintenance/inspection).
15. Capstone practical: solve a real problem using prompt engineering.

Suggested Projects (Non-Coding)

- Develop a comprehensive prompt-library for workshop tasks.

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- AI-assisted SOP and checklist creation for a laboratory section.
- Evaluate correctness of AI-generated reports with manual standards.
- Prompt-based tool selection guide for engineering students.
- Ethical-use handbook for AI in engineering environments.

List of Laboratory/Learning Resources Required:

- Computer lab / classroom with internet access (students may use personal phones/laptops)
- Access to at least one major LLM/chat assistant (free tier acceptable for exercises) and a multimodal assistant (if available)
- Projector, whiteboard, printer for report printouts
- Sample domain documents: inspection reports, manufacturer maintenance manuals, tender documents (non-confidential)
- Templates for reports, checklists and rubrics

Suggested Project List:-

- Create a Prompt Library for Daily Tasks
- Convert Raw Notes into a Structured Report Using Prompts
- Prepare an Inspection Checklist Using Prompt Templates
- Generate Safety Instructions Using Role-Based Prompts
- Identify and Correct AI Mistakes (Hallucination Spotting)
- Create a Step-by-Step SOP Using Prompts
- Prepare a Comparison Table Using AI
- Create a One-Page Beginner's Guide Using Prompts
- Generate a Daily Work Routine Checklist
- Develop a Verification Prompt Set

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Suggested Activities for Students (Co-curricular)

- Maintain a “Prompt Journal” recording each prompt iteration and evaluation.
- Present mini case studies of AI failures and propose mitigations.
- Register for relevant MOOCs and prepare short reflection reports.
- Create poster charts: “How to prompt for X” (X = inspection, tender, maintenance etc).
- Organize intra-department prompt challenge competitions.

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