Semester: I/II			
Course Title	Introduction to AI and Applications	**CIE Marks**	50
Course Code	BFYETC213	**SEE Marks**	50
Course Type	ESC	**Total Marks**	100
Course Category	ESC	**SEE Duration**	03 hrs
Hours Per Week	2L:2T:0	**SEE Type**	Written
Total Hours	40 hrs	**Credits**	03

Course Learning Objectives: This course will enable the students to	
1	Describe Artificial Intelligence, techniques of AI, trends in AI and applications of AI.
2	Interpret prompt engineering techniques to interact with generative AI tools.
3	Identify real-world applications across various disciplines.

Module 1	**8 hrs**
Introduction to Artificial Intelligence: Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Is Artificial Intelligence Same as Augmented Intelligence and Cognitive Computing, Machine Learning and Deep Learning. **Artificial Intelligence Technologies:** Techniques in AI, Machine Learning Model, Regression Analysis in Machine Learning, Classification Techniques, Clustering Techniques. **Textbook 1: Chapter 1: 1.1-1.5, Chapter 2: 2.1-2.5**	
Module 2	**8 hrs**
Introduction to Prompt Engineering: Introduction to Prompt Engineering, The Evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Works, Comprehending Prompt Engineering's Function in Communication, The Advantages of Prompt Engineering, The Future of LLM Communication. **Prompt Engineering Techniques for ChatGPT**: Introduction to Prompt Engineering Techniques, Instructions Prompt Technique, Zero, One, and Few Shot Prompting, Self-Consistency Prompt. **Prompts for Creative Thinking:** Introduction, Unlocking Imagination and Innovation. **Prompts for Effective Writing:** Introduction, Igniting the Writing Process with Prompts. **Textbook 2: Chapters: 1, 3, 4 & 5**	
Module 3	**8 hrs**
Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment, Search, Uninformed Search Algorithms, Informed Search Algorithms: Pure Heuristic Search, Best-First Search Algorithm (Greedy Search). **Textbook 1: Chapter 3:3.1-3.7.2**	
Module 4	**8 hrs**
Current Trends in Artificial Intelligence: AI and Ethical Concerns, AI as a Service (AIaaS), Recent trends in AI, Internet of Things, Artificial Intelligence of Things (AIoT). **Textbook 1: Chapter 8:8.1, 8.2, 8.4, Chapter 9:9.2, 9.3**	
Module 5	**8 hrs**
Robotics-an Application of AI, Drones Using AI, No Code AI,Low Code AI **Industrial Applications of AI:** Application of AI in Healthcare, Application of AI in Finance, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation, AI in Experimentation and Multi-disciplinary research. **Textbook 1: Chapter 1:1.7, 1.8,1.10,1.11, Textbook 3: Chapter 3, Chapter 5:5.1**	

Practical Component	
Sl. No.	**Activity on Creating Effective Prompts**
1	**Basic Prompt writing:** Create two different prompts to ask an AI about the topic "Electricity." The first prompt should be vague, and the second prompt should be clear and specific. Compare the responses you get and describe which prompt gave a better answer and why.
2	**Zero-Shot Prompting:** Create a prompt that asks an AI to explain Ohm's Law without giving any example or background. Evaluate how well the AI explains the concept based on your prompt alone.
3	**One-Shot and Few-Shot Prompting:** Provide the AI with a single example of how to calculate the resistance in a simple circuit. Then write your own prompt asking the AI to solve a similar resistance calculation. After that, add two more examples to your prompt and observe any changes in the AI's response quality.
4	**Chain-of-Thought Prompting:** Develop a prompt that guides the AI step-by-step through calculating current flow in a circuit using Ohm's Law with resistors in series. Then, ask a final question for the AI to solve. Analyze how breaking down the reasoning steps impacts the accuracy of the answer.
5	**Prompt Refinement:** Start with an ambiguous prompt related to the "Water Cycle." Test the AI's response, note the confusion or errors, and then refine your prompt to make it clearer and more specific. Repeat this process twice and record how the AI's responses improve with each refinement. **Role-Based Prompting:** Create three prompts asking the AI to explain "Newton's Laws of Motion," each with a different role instruction: (a) as an expert engineer, (b) as a high school teacher, (c) as a beginner. Compare the tone, detail, and style of the responses.
6	**Creative Engineering Problem Prompts:** Craft a prompt that asks the AI to brainstorm ideas for designing a low-cost water purification system suitable for rural areas. Encourage creativity by adding phrases like "limited resources" and "sustainability".
7	**Ethical Prompt Design Discussion:** Identify a biased prompt related to job descriptions (e.g. language with respect to a gender). Rewrite the prompt to remove bias and create a neutral, inclusive version. Explain why this revision is more ethical.
8	**Simulated Customer Support Chatbot:** Develop a prompt that instructs the AI to play the role of a technical support agent helping a customer troubleshoot a failure in an electronic circuit. Include instructions to keep the tone friendly and professional and to ask diagnostic questions.
9	**Multi-Language Prompting:** Develop a prompt that asks the AI to translate a simple engineering glossary (5 technical terms) from English to your native language. Then modify the prompt to request additional explanations of these terms in the translated language.
10	Review a curated set of different prompt types (e.g., for summarization, information extraction, paraphrasing, question answering) from a "Prompt Gallery." For each prompt type, match it with a real- world task (e.g., summarizing a lecture note, extracting names from a project report). Test at least three prompt templates on an AI tool or by role-play (students simulate being the AI), with varied wording. Record the outcomes and discuss which prompt (or template) was most effective for each task, and explain why you think it worked best. Reflect on how changing small parts of a prompt can alter model

	response quality, completeness, or accuracy.
11	Choose a real engineering challenge or societal problem relevant to your field (e.g., "Reducing plastic waste in campus cafeterias" or "Optimizing solar panel placement on campus rooftops"). Draft an initial prompt that asks an AI to propose practical solutions. Share the AI's (or peer's) answer in small groups and identify aspects that are missing, vague, or not actionable. Refine your prompt based on feedback (e.g., specify constraints, ask for step-by-step solutions, or require a list of pros and cons). Repeat the process one more time, refining again for further clarity or specificity. Document the entire prompt-refinement process and share the best solution generated, along with a brief analysis of how prompt improvements led to better responses.

Text Books:	
1	"Artificial Intelligence: Beyond Classical AI" by Reema Thareja, Pearson Education, 2023.
2	"Prompt Engineering: Empowering Communication" by Ajantha Devi Vairamani and Anand Nayyar,1st Edition, CRC Press, Taylor & Francis Group, 2024. (DOI: https://doi.org/10.1201/9781032692319).
3	"AI for Everyone – A Beginner's Handbook for Artificial Intelligence" by Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti, Pearson, 2024.
Reference Books:	
1	"Artificial Intelligence: A Modern Approach "by Stuart Russell and Peter Norvig, 4th Edition, Pearson Education, 2023.
2	"Artificial Intelligence" by Elaine Rich, Kevin Knight, and Shivashankar B. Nair, McGraw Hill Education
3	"Prompt Engineering for Generative AI: ChatGPT, LLMs, and Beyond "by Tom Taulli, Apress, Springer Nature.
4	"Artificial Intelligence: Making A System Intelligent "by Nilakshi Jain, First Edition, Wiley.

Course Outcome Statements: After the successful completion of the course, students will be able to	
CO1	Describe the concepts of Artificial Intelligence and its technologies.
CO2	Demonstrate the use of prompt engineering strategies to effectively interact with generative AI tools.
CO3	Compare between human and machine intelligence and illustrate various AI search strategies.
CO4	Outline recent trends in artificial intelligence and machine learning.
CO5	Identify real-world applications across different disciplines.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	2	-	-
CO2	1	3	2	-	3	-	-	-	2	-	2	-	-
CO3	3	3	-	2	-	-	-	-	-	-	2	-	-
CO4	2	-	-	-	-	2	-	-	-	-	2	-	-
CO5	2	-	-	-	-	-	-	-	-	-	2	-	-
Avg.	**2.2**	**1.6**	**0.4**	**0.4**	**0.6**	**0.4**	**-**	**-**	**0.4**	**-**	**2.0**	**-**	**-**

3 : High, 2 : Medium, 1 : Low