



GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Bachelor of Computer Applications /
Bachelor of Computer Applications (Honours/Honours with Research) /
Master of Computer Applications (Integrated)**

Level: Under Graduate

Course / Subject Code: BC05001011

Course / Subject Name: Artificial Intelligence

w. e. f. Academic Year:	2026-27
Semester:	5
Category of the Course:	Core Courses

Prerequisite:	Data Structures and Algorithms, File Structures, Mathematical foundations for Computer Science.
Rationale:	• The course intends to introduce the concepts of artificial intelligence and its applications. • The course provides the opportunities for the learner to learn the artificial intelligence based basic methods and algorithms. • This course also covers the knowledge representation and reasoning that help the learners to develop the intelligent systems.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level*
1	Understand the fundamental concepts of Artificial Intelligence including intelligent agents, environments, rationality, and the structure of agents.	RM, UN
2	Explain problem solving techniques and search strategies such as Breadth First Search, Depth First Search, Uniform Cost Search, and heuristic search methods.	RM, UN
3	Apply knowledge representation and reasoning techniques using propositional logic and first-order logic in simple AI problems.	AP
4	Explain different machine learning approaches including supervised learning, decision trees, regression models, and reinforcement learning.	UN
5	Apply AI-assisted development tools and plugins such as GitHub Copilot, Amazon Q Developer, Gemini Code Assist, Codeium, Tabnine, and AI chat assistants for coding and debugging tasks.	AP

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create



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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 / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	Introduction: What is AI? The history of AI, the state of the art: what can AI do today? Intelligent agents and environments, The concept of rationality, The nature of environments, The structure of agents.	5	10
2	Problem Solving: Problem solving agents: Well defined problems and solutions, formulating problems, Example problems: Toy problems, Real world problems, Searching for solutions, Uniformed search strategies: Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bidirectional search, Heuristic search strategies, Hill-climbing search.	11	25
3	Knowledge, Reasoning and Planning Knowledge based agents, Propositional logic – A very simple logic, Syntax, Semantics, A Simple Knowledge Base, Syntax and semantics. Syntax and semantics of first order logic, Propositional vs. first order inference, Forward chaining, Backward chaining, Definition of classical planning, Planning graphs, Classical planning approaches, Analysis of planning approaches, Hierarchical planning, Multiagent planning, Ontological engineering, Categories and objects, Events.	11	25
4	Learning Forms of learning, Supervised Learning, learning decision trees, Regression and classification with linear models, Practical machine learning, A logical formulation of learning, Explanation based learning, statistical learning, learning with complete data, learning with hidden variables, Passive reinforcement learning, Active reinforcement learning, Application of reinforcement learning, Policy search.	9	20



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5	AI Plugins and AI-Assisted Development Tools (Basics Only) AI Coding Assistant Plugins: GitHub Copilot – AI powered code completion tool, Works inside IDEs like VS Code Amazon Q Developer - coding, debugging & AWS cloud development, Provides code suggestions and documentation Gemini Code Assist – AI based code completion and explanation tool AI Code Explanation and Documentation Tools: Codeium - Free AI coding assistant, Provides code suggestions and explanations Tabnine - Uses machine learning to predict and complete code AI Plugins for Development Environments: Popular IDEs that support AI plugins - Visual Studio Code, PyCharm, IntelliJ IDEA AI Chat and Learning Assistants: ChatGPT - Helps explain programming concepts, Generates code examples Claude - Useful for code explanation and debugging	9	20
Total Hours:		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
20	50	30	--	--	--

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

Textbook:

1. Artificial Intelligence A Modern Approach, By: Stuart Russell and Peter Norving, 3rd Edition, Pearson Publication, ISBN: 978-0-13-604259-4 (**For Unit 1-4**)
2. Web Resources / Online Documentation / **Ref. Book No. 6 & 7 (For Unit-5)**
3. Official documentation of **GitHub Copilot**
4. Developer documentation of **Amazon Q Developer**
5. Documentation of **Gemini Code Assist**



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6. Tutorials and guides for **ChatGPT** and **Claude**
7. Official websites of **Codeium** and **Tabnine**

Reference Books:

1. Artificial Intelligence, By Elaine Rich and Kevin Knight, 2nd Edition, Mc Graw Hill, ISBN: 0-07-460081-8
2. Artificial Intelligence: Making a System Intelligent, By: Dr. Nilakshi Jain, As per AICTE, Wiley Publication, ISBN: 978-8126588596
3. Introduction to Artificial Intelligence, By: Eugene Charniak and Drew McDermott, Addison-Wesley Series in Computer Science, ISBN: 978-0201119459
4. Artificial Intelligence: An Engineering Approach, By: Robert J. Schalkoff, Mc Graw Hill, ISBN: 978-0071009324
5. Programming in Prolog: Using the ISO Standard, By: William F. Clocksin, Christopher S. Mellish, 5th Edition, Springer, ISBN: 978-3642554810
6. AI-Assisted Programming: Better Planning, Coding, Testing, and Deployment, By: Tom Taulli, 1st Edition, O'Reilly Media Publication, ISBN: 978-1098164560
7. Coding with AI: Examples in Python, By: Jeremy Morgan, Manning Publications, 1st Edition, ISBN: 978-1633437272

List of Useful websites / MOOCs

1. Learners are advised to opt for NPTEL and SWAYAM courses that are relevant to this course

Suggested Course Practical List:

1	Install GitHub Copilot in VS Code Definition: Generate Python Program using GitHub Copilot <i>Aim:</i> To generate a Python program using GitHub Copilot. <i>Tool Required:</i> Visual Studio Code, GitHub Copilot Extension, Python
2	Generate a Factorial Program using GitHub Copilot Definition: Factorial Program using GitHub Copilot <i>Aim:</i> To generate a factorial program using GitHub Copilot. <i>Tool Required:</i> VS Code, GitHub Copilot, Python
3	Use GitHub Copilot for Code Completion Definition: Even or Odd Program using Gemini Code Assist <i>Aim:</i> To generate an even or odd program using Gemini Code Assist. <i>Tool Required:</i> VS Code, Gemini Code Assist Plugin, Python



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4	Debug Code using Amazon Q Developer Definition: Code Explanation using Codeium <i>Aim:</i> To generate explanation of Python code using Codeium. <i>Tool Required:</i> VS Code, Codeium Extension
5	Generate AWS Code using Amazon Q Developer Definition: Multiplication Table using Codeium <i>Aim:</i> To generate multiplication table program using Codeium suggestions. <i>Tool Required:</i> VS Code, Codeium
6	Use Gemini Code Assist for Code Suggestion Definition: Code Completion using Tabnine <i>Aim:</i> To use Tabnine for automatic code completion. <i>Tool Required:</i> VS Code, Tabnine Plugin
7	Explain Code using Gemini Code Assist Definition: Reverse String using Tabnine <i>Aim:</i> To generate a string reverse program using Tabnine. <i>Tool Required:</i> VS Code, Tabnine
8	Generate Code Explanation using Codeium Definition: Using AI Plugin in PyCharm <i>Aim:</i> To use an AI plugin in PyCharm IDE. <i>Tool Required:</i> PyCharm IDE, AI Plugin
9	Use Codeium for Code Suggestions Definition: Generate Code using ChatGPT <i>Aim:</i> To generate Python code using ChatGPT. <i>Tool Required:</i> ChatGPT, Python
10	Create Documentation using Codeium Definition: Debug Code using Claude <i>Aim:</i> To debug Python code using Claude AI assistant. <i>Tool Required:</i> Claude AI, Python
11	Predict Code using Tabnine Definition: Code Autocomplete using Tabnine <i>Aim:</i> To use Tabnine for automatic code completion in Python. <i>Tools Required:</i> Visual Studio Code, Tabnine Extension, Python
12	Autocomplete Code using Tabnine



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	Definition: Sorting List using AI Code Suggestion <i>Aim:</i> To generate a Python program for sorting a list using AI code suggestions. <i>Tools Required:</i> VS Code, AI Coding Plugin (Copilot/Codeium), Python
13	Use Tabnine to Improve Code Efficiency Definition: Generate Comments using Codeium <i>Aim:</i> To generate code comments automatically using Codeium. <i>Tools Required:</i> VS Code, Codeium Extension
14	Install AI Plugin in Visual Studio Code Definition: Generate Documentation using AI Tool <i>Aim:</i> To generate documentation for a Python function using AI assistant. <i>Tools Required:</i> VS Code, Codeium / Copilot
15	Use AI Plugin in PyCharm Definition: Use Gemini Code Assist for Code Explanation <i>Aim:</i> To explain Python code using Gemini Code Assist. <i>Tools Required:</i> Gemini Code Assist, VS Code
16	Use AI Tools in IntelliJ IDEA Definition: Generate Fibonacci Series using AI Assistant <i>Aim:</i> To generate Fibonacci series using an AI coding assistant. <i>Tools Required:</i> VS Code, Copilot / Codeium
17	Generate Code using ChatGPT Definition: Largest Number in List using AI Tool <i>Aim:</i> To find the largest number in a list using AI code suggestion. <i>Tools Required:</i> VS Code, AI Coding Plugin
18	Explain Programming Concept using ChatGPT Definition: String Length Program using AI Suggestion <i>Aim:</i> To generate a Python program to find the length of a string using AI code completion. <i>Tools Required:</i> VS Code, Tabnine / Copilot
19	Debug Code using Claude Definition: Generate Program using ChatGPT <i>Aim:</i> To generate a Python program using ChatGPT. <i>Tools Required:</i> ChatGPT, Python Interpreter
20	Learn Definition: Programming using AI Chat Assistant Debug Python Program using AI Assistant



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Aim: To debug Python code using AI assistant.

Tools Required: Claude / ChatGPT, Python

CO- PO Mapping:

Semester: 5	Course Name : Artificial Intelligence										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	--	--	--	--	--	--	--	--	--
CO2	3	3	--	--	1	--	--	--	--	--	--
CO3	3	3	2	--	1	--	--	--	--	--	--
CO4	2	2	--	1	--	--	--	--	--	--	--
CO5	1	--	--	--	3	--	2	--	--	--	1

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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