Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 11 – 12- 2025 **Time:** 01:00pm – 04:00pm

School: SOCSE	**Program:** B. Tech	
Course Code : CAI3407	**Course Name:** Agentic AI	
Semester: VII	**Max Marks**:100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**26**	**26**	**24**	**24**	

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	List two ways AI agents can collaborate to complete a complex task.	**2 Marks**	**L1**	**CO1**
2.	Explain the process of communication between multiple agents using messages.	**2 Marks**	**L2**	**CO1**
3.	Show an example of how an agent invokes an external tool to accomplish a task in a multi-step workflow.	**2 Marks**	**L3**	**CO1**
4.	Describe a use case where CrewAI can automate a web search task efficiently.	**2 Marks**	**L1**	**CO2**
5.	Demonstrate how message passing can coordinate decision-making in a multi-agent system for financial analysis.	**2 Marks**	**L3**	**CO2**
6.	What does dynamic memory mean in the context of Pydantic AI, and why is it useful?	**2 Marks**	**L2**	**CO2**
7.	In LangGraph, how does a reducer control the flow of states within a workflow?	**2 Marks**	**L2**	**CO3**

8.	Describe the structure of LangGraph and mention its core components.	**2 Marks**	**L1**	**CO3**
9.	Define what an AutoGen agent is and summarize its primary function.	**2 Marks**	**L1**	**CO4**
10.	Why is message passing crucial in multi-agent systems using AutoGen?	**2 Marks**	**L2**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Describe why multi-step workflows result in better performance than single-prompt outputs.	**3 Marks**	**L2**	**CO1**
	b.	Explain why proper environment setup (OS configuration, Git, IDE, API keys) is critical for building agentic systems, and discuss potential issues if any step is skipped.	**3 Marks**	**L2**	**CO1**
	c.	Demonstrate how asynchronous Python can fetch data from multiple APIs in parallel using pseudo-code, and explain how this improves efficiency.	**4 Marks**	**L3**	**CO1**
Or					
12.	**a.**	Describe why multi-step workflows result in better performance than single-prompt outputs.	**3 Marks**	**L2**	**CO1**
	b.	Explain how prompt engineering supports tool-based autonomy and why structured prompts reduce errors in multi-step reasoning.	**3 Marks**	**L2**	**CO1**
	c.	Apply function calling in an LLM to perform a calculation task (e.g., sum of numbers from multiple sources). Provide step-by-step instructions.	**4 Marks**	**L3**	**CO1**

13.	**a.**	Compare agent patterns and workflow patterns in LLM automation, highlighting their impact on modularity and scalability.	**3 Marks**	**L4**	**CO1**
	b.	Evaluate the use of asynchronous Python in multi-step workflows with an example of simultaneous data extraction from different websites.	**3 Marks**	**L5**	**CO1**
	c.	Apply your understanding of multi-step workflows to describe a practical scenario where they outperform a single-step LLM output	**4 Marks**	**L3**	**CO1**
Or					

14.	**a.**	Discuss the importance of structured prompt design in ensuring accurate tool execution by an LLM agent.	**3 Marks**	**L2**	**CO1**
	b.	Apply async Python to run two independent LLM tool calls simultaneously (e.g., one for web scraping, one for calculation).	**3 Marks**	**L3**	**CO1**
	c.	Analyze situations where sequential processing is preferable to parallel processing in agentic workflows, giving an example.	**4 Marks**	**L4**	**CO1**

15.	**a.**	Apply your understanding of multi-step workflows to describe a practical scenario where they outperform a single-step LLM output.	**3 Marks**	**L3**	**CO2**
	b.	Explain how hierarchical collaboration among multiple agents improves workflow efficiency, giving a suitable example.	**3 Marks**	**L2**	**CO2**
	c.	Demonstrate how a CrewAI workflow can coordinate a Data Collection Agent and a Report Generation Agent, detailing task assignments and tool integration.	**4 Marks**	**L3**	**CO2**
Or					
16.	**a.**	Explain how multi-step LLM workflows differ from single-step LLM responses in terms of structure and reasoning.	**3 Marks**	**L2**	**CO2**
	b.	Analyze how the sender, receiver, and message context affect agent decision-making in a multi-agent system.	**3 Marks**	**L4**	**CO2**
	c.	Design a Pydantic AI agent with a persona of a "Smart City Traffic Manager".	**4 Marks**	**L6**	**CO2**

17.	**a.**	Interpret the purpose of each major step in a CrewAI process and how they contribute to a multi-agent workflow.	**3 Marks**	**L3**	**CO2**
	b.	Explain how parallel task execution can reduce latency in multi-agent orchestration, giving a relevant example.	**3 Marks**	**L2**	**CO2**
	c.	Using a Planner and Executor agent scenario, illustrate how message passing ensures task synchronization and error handling.	**4 Marks**	**L3**	**CO2**
Or					
18.	**a.**	Illustrate how each layer of the MCP architecture contributes to an end-to-end agent workflow.	**3 Marks**	**L3**	**CO2**
	b.	Evaluate the use of persistent memory in CrewAI agents for long-term decision-making, citing both advantages and limitations.	**3 Marks**	**L5**	**CO2**

	c.	Propose a multi-agent architecture for a warehouse automation system, including agents such as Inventory Manager, Picker, and Loader, and describe their communication flow.	**4 Marks**	**L6**	**CO2**

19.	**a.**	Apply your knowledge of MCP architecture to describe how data flows across its layers during a tool call.	**3 Marks**	**L3**	**CO3**
	b.	Describe how workflow graphs organize nodes and edges to manage both sequential and parallel tasks in an agentic system.	**3 Marks**	**L2**	**CO3**
	c.	Illustrate with an example how LangGraph's super steps coordinate multiple agents working on a shared complex task.	**4 Marks**	**L3**	**CO3**
		Or			
20.	**a.**	Evaluate the effectiveness of four LangGraph features in supporting long-running workflows, and justify which feature you consider most critical.	**3 Marks**	**L5**	**CO3**
	b.	Explain how structured outputs and feedback loops contribute to reliable agent behavior in LangGraph-based systems.	**3 Marks**	**L2**	**CO3**
	c.	Demonstrate checkpoint-based execution in LangGraph to resume a workflow after an unexpected interruption, with a simple example.	**4 Marks**	**L3**	**CO3**

21.	**a.**	Identify the main components of LangGraph with their functions in workflow orchestration.	**3 Marks**	**L4**	**CO3**
	b.	Explain how LangGraph can integrate with external tools like LangChain to extend an agent's capabilities, providing an example.	**3 Marks**	**L2**	**CO3**
	c.	Analyze how super steps manage the parallel execution of nodes to optimize task completion time in complex workflows.	**4 Marks**	**L4**	**CO3**
		Or			
22.	**a.**	Explain how persistent memory in LangGraph allows agents to retain information across multiple workflow executions.	**3 Marks**	**L1**	**CO3**
	b.	Apply the concepts of nodes, edges, and state transitions to map a sample workflow where an agent processes and validates incoming data.	**3 Marks**	**L3**	**CO3**
	c.	Compare automating web tasks using Playwright + LangGraph versus manual execution, emphasizing accuracy and efficiency gains.	**4 Marks**	**L4**	**CO3**

23.	**a.**	Describe an AutoGen agent and describe two main components that enable it to perform autonomous tasks.	**3 Marks**	**L2**	**CO4**
	b.	Explain how message passing improves coordination in a multi-agent AutoGen system, providing an illustrative example.	**3 Marks**	**L2**	**CO4**
	c.	Demonstrate how MCP manages context across multiple LLMs to maintain consistency in a multi-tool workflow.	**4 Marks**	**L3**	**CO4**
		Or			
24.	**a.**	Compare single-agent and multi-agent AutoGen configurations and explain in which scenario a multi-agent setup is more efficient.	**3 Marks**	**L3**	**CO4**
	b.	Analyze the effect of message history in AutoGen's messaging framework on agent decision-making.	**3 Marks**	**L4**	**CO4**
	c.	Illustrate how an MCP client-server interaction retrieves contextual information and discuss its role in reducing model hallucinations.	**4 Marks**	**L3**	**CO4**

25.	**a.**	Analyze how the different layers in the MCP architecture interact to ensure reliable agent-to-tool communication.	**3 Marks**	**L4**	**CO4**
	b.	Evaluate the benefits of context fragmentation in MCP for workflows involving multiple agents and tools.	**3 Marks**	**L5**	**CO4**
	c.	Design a simple AutoGen workflow where a Data Collection Agent sends information to an Analysis Agent, showing the flow of messages.	**4 Marks**	**L6**	**CO4**
		Or			
26.	**a.**	Explain the difference between system agents and user agents in AutoGen and provide one example of each	**3 Marks**	**L2**	**CO4**
	b.	Discuss the challenges of managing large LLM contexts and explain how MCP can optimize context handling across multiple agents and tools.	**3 Marks**	**L4**	**CO4**
	c.	Apply the steps for designing an AutoGen workflow where agents collaboratively analyze.	**4 Marks**	**L3**	**CO4**