SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

QUESTION BANK

VI SEMESTER

PCS503 COGNITIVE SCIENCE

Regulation – 2023

Academic Year 2025 – 2026 (EVEN SEMESTER)

Prepared by

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SUBJECT: PCS503 - COGNITIVE SCIENCE
YEAR/SEM: III Year / VI Semester

UNIT- I:	PHILOSOPHY, PSYCHOLOGY AND NEUROSCIENCE		
Philosophy: Mental-physical Relation - From Materialism to Mental Science - Logic and the Sciences of the Mind - Psychology: Place of Psychology within Cognitive Science - Science of Information Processing -Cognitive Neuroscience - Perception - Decision - Learning and Memory - Language Understanding and Processing.			

PART A			
Q.No	Questions	BT Level	Competence
1	What is meant by the mental–physical relation?	BTL-1	Remember
2	Define materialism in the study of mind.	BTL-1	Remember
3	What is the basic idea of mental science?	BTL-1	Remember
4	What is the role of logic in the sciences of the mind?	BTL-1	Remember
5	How does psychology fit within cognitive science?	BTL-2	Understand
6	What is meant by the science of information processing?	BTL-1	Remember
7	Define cognitive neuroscience in simple terms.	BTL-1	Remember
8	What is perception?	BTL-1	Remember
9	What is meant by decision in cognitive science?	BTL-1	Remember
10	Define learning in psychology.	BTL-1	Remember
11	What is memory?	BTL-1	Remember
12	What is language understanding?	BTL-1	Remember
13	What is language processing?	BTL-1	Remember
14	What is the main idea of the shift from materialism to mental science?	BTL-2	Understand
15	How does logic help explain mental activities?	BTL-2	Understand
16	What is the function of the brain in cognitive neuroscience?	BTL-1	Remember
17	What is the difference between learning and memory?	BTL-2	Understand
18	Give an example of perception in daily life.	BTL-1	Remember
19	What influences a decision?	BTL-2	Understand
20	What is the aim of studying language understanding and processing?	BTL-2	Understand
21	What is meant by cognitive science?	BTL-1	Remember
22	Define the term "mental–physical interaction."	BTL-1	Remember
23	What is the role of perception in learning?	BTL-2	Understand

24	How does memory support decision-making?	BTL-2	Understand
PART B			
1	Explain the different views of the mental–physical relation and how each connects the mind and the body.	BTL-3	Apply
2	Describe the move from materialism to mental science and explain its importance.	BTL-4	Analyze
3	Discuss how logic supports the sciences of the mind in studying thinking and reasoning.	BTL-3	Apply
4	Explain the place of psychology within cognitive science and how it works with other mind-related fields.	BTL-3	Apply
5	Describe the science of information processing and how it helps explain mental activities.	BTL-4	Analyze
6	Explain the goals and methods of cognitive neuroscience and how the brain supports mental processes.	BTL-4	Analyze
7	Discuss the steps involved in perception and how the mind interprets sensory information.	BTL-3	Apply
8	Explain how people make a decision and the role of attention, memory, and reasoning.	BTL-4	Analyze
9	Explain the processes involved in learning and memory and how they work together.	BTL-3	Apply
10	Discuss the importance of memory in daily life with examples.	BTL-4	Analyze
11	Describe how the mind performs language understanding and processing with simple examples.	BTL-3	Apply
12	Compare the roles of perception, learning, and memory in shaping human behavior.	BTL-4	Analyze
13	Evaluate how cognitive neuroscience has improved our understanding of perception, decision, and memory.	BTL-5	Evaluate
14	Analyze how the science of information processing explains everyday activities such as reading or problem solving.	BTL-4	Analyze
15	Evaluate the contribution of psychology within cognitive science to understanding language, learning, and thinking.	BTL-5	Evaluate
16	Create a simple model showing the connection between perception, decision, and action, and explain each step.	BTL-6	Create
17	Design a simple classroom activity to teach students about learning and memory, and justify your design.	BTL-6	Create

UNIT- II: COMPUTATIONAL INTELLIGENCE		
Machines and Cognition - Artificial Intelligence - Architectures of Cognition – Knowledge Based Systems - Logical Representation and Reasoning - Logical Decision Making -Learning - Language – Vision.		
PART A		
Q.No	Questions	BT Level	Competence
1	What is meant by machines and cognition?	BTL-1	Remember
2	Define artificial intelligence.	BTL-1	Remember
3	What are the architectures of cognition?	BTL-1	Remember

4	What is a knowledge-based system?	BTL-1	Remember
5	What is logical representation?	BTL-1	Remember
6	Define logical reasoning.	BTL-1	Remember
7	What is logical decision making?	BTL-1	Remember
8	What is learning in artificial intelligence?	BTL-1	Remember
9	What does language mean in cognitive systems?	BTL-1	Remember
10	What is vision in AI and cognition?	BTL-1	Remember
11	How do machines use cognition to solve tasks?	BTL-2	Understand
12	State one characteristic of artificial intelligence.	BTL-1	Remember
13	What is the purpose of a cognitive architecture?	BTL-2	Understand
14	Mention one component of a knowledge-based system.	BTL-1	Remember
15	What is the role of logic in reasoning?	BTL-2	Understand
16	Give one example of logical decision-making.	BTL-2	Understand
17	What is supervised learning?	BTL-1	Remember
18	How is language used for communication in intelligent systems?	BTL-2	Understand
19	What is the meaning of visual perception in AI?	BTL-2	Understand
20	What is the importance of reasoning in cognition?	BTL-2	Understand
21	What is the purpose of learning in cognitive systems?	BTL-1	Remember
22	Define unsupervised learning in artificial intelligence.	BTL-1	Remember
23	How do knowledge-based systems support decision-making?	BTL-2	Understand
24	What is the role of vision in helping intelligent systems recognize objects?	BTL-2	Understand

PART B

Q.No	Questions	BT Level	Competence
1	Explain the concept of machines and cognition and describe how machines attempt to perform cognitive tasks.	BTL-3	Apply
2	Describe artificial intelligence and discuss its major goals with simple examples.	BTL-3	Apply
3	Explain different architectures of cognition and how they help model intelligent behaviour.	BTL-4	Analyze
4	Discuss the components and working of knowledge-based systems and give simple applications.	BTL-3	Apply
5	Describe logical representation and explain why representation is important in intelligent systems.	BTL-4	Analyze
6	Explain the process of logical reasoning and show how it is used to solve problems.	BTL-3	Apply
7	Discuss logical decision-making and explain how logic helps in choosing the best action.	BTL-4	Analyze
8	Explain different types of learning in AI and give examples of each type.	BTL-3	Apply
9	Describe the role of language in intelligent systems and explain how machines process language.	BTL-3	Apply
10	Explain how machines perform vision tasks such as detection and recognition.	BTL-4	Analyze
11	Compare knowledge-based systems with learning-based systems and explain their differences.	BTL-4	Analyze
12	Analyze how architectures of cognition help in understanding human	BTL-4	Analyze

	thinking and machine intelligence.		
13	Evaluate the importance of logical reasoning in building intelligent systems.	BTL-5	Evaluate
14	Evaluate how learning improves the performance of AI systems over time.	BTL-5	Evaluate
15	Create a simple model that connects perception (vision), language, and reasoning in an intelligent system.	BTL-6	Create
16	Design a basic knowledge-based system for solving a simple real-world problem and describe its working.	BTL-6	Create
17	Propose a simple decision-making framework using logical rules and explain how it operates.	BTL-6	Create

UNIT- III: PROBABILISTIC PROGRAMMING LANGUAGE
WebPPL Language - Syntax - Using JavaScript Libraries - Manipulating probability types and distributions - Finding Inference - Exploring random computation - Coroutines: Functions that receive continuations –Enumeration.

PART A			
Q.No	Questions	BT Level	Competence
1	What is the WebPPL language used for?	BTL-1	Remember
2	What does the syntax mean in WebPPL?	BTL-1	Remember
3	What is the purpose of using JavaScript libraries in WebPPL?	BTL-1	Remember
4	What are probability types in WebPPL?	BTL-1	Remember
5	What is meant by manipulating distributions?	BTL-1	Remember
6	What is inference in probabilistic programming?	BTL-1	Remember
7	What is random computation?	BTL-1	Remember
8	Define a coroutine in WebPPL.	BTL-1	Remember
9	What is a continuation in the context of coroutines?	BTL-2	Understand
10	What is enumeration in WebPPL?	BTL-1	Remember
11	Why is syntax important in WebPPL programs?	BTL-2	Understand
12	How does WebPPL use JavaScript functions?	BTL-2	Understand
13	Give an example of a probability distribution used in WebPPL.	BTL-1	Remember
14	What is the purpose of inference methods?	BTL-2	Understand
15	What does it mean to explore random computation?	BTL-2	Understand
16	Define sampling in probabilistic computation.	BTL-1	Remember
17	What is the role of coroutines in handling computations?	BTL-2	Understand
18	State one use of enumeration in WebPPL.	BTL-1	Remember
19	What does it mean to manipulate a probability type?	BTL-2	Understand
20	How is randomness represented in WebPPL?	BTL-1	Remember
21	What is the role of models in probabilistic programming with WebPPL?	BTL-1	Remember
22	How does WebPPL represent probability distributions?	BTL-2	Understand
23	What is the advantage of using coroutines in WebPPL programs?	BTL-2	Understand
24	What is meant by an inference algorithm in WebPPL?	BTL-1	Remember

PART B			
Q.No	Questions	BT Level	Competence
1	Explain the features of the WebPPL language and describe how it supports probabilistic programming.	BTL-3	Apply
2	Discuss the syntax of WebPPL with examples showing how variables, functions, and distributions are written.	BTL-3	Apply
3	Describe how JavaScript libraries are used inside WebPPL and explain why this integration is useful.	BTL-4	Analyze
4	Explain different probability types and distributions in WebPPL and show how they are manipulated.	BTL-3	Apply
5	Describe various inference methods available in WebPPL and explain how inference helps in probabilistic reasoning.	BTL-4	Analyze
6	Discuss the idea of exploring random computation and explain how WebPPL handles randomness.	BTL-4	Analyze
7	Explain what coroutines are and describe how functions receive continuations in WebPPL.	BTL-4	Analyze
8	Describe enumeration as an inference method in WebPPL and explain when it is useful.	BTL-3	Apply
9	Compare sampling-based inference with enumeration-based inference in WebPPL.	BTL-4	Analyze
10	Explain how probability distributions are created, manipulated, and used in WebPPL programs.	BTL-3	Apply
11	Analyze how WebPPL allows random computation and give examples of programs that require randomness.	BTL-4	Analyze
12	Explain the role of continuations in coroutines and describe how they help manage program flow.	BTL-4	Analyze
13	Evaluate the usefulness of JavaScript integration in extending WebPPL's capabilities.	BTL-5	Evaluate
14	Evaluate different inference strategies and explain which approach is suitable for different types of problems.	BTL-5	Evaluate
15	Create a simple WebPPL program using distributions, inference, and random computation. Explain how your program works.	BTL-6	Create
16	Design a flowchart that shows how WebPPL processes syntax, runs random computation, and performs inference.	BTL-6	Create
17	Propose a small knowledge-building exercise where students manipulate probability types and explore enumeration. Justify the activity.	BTL-6	Create

UNIT- IV: INFERENCE MODELS OF COGNITION			
Generative Models - Conditioning - Causal and statistical dependence – Conditional dependence - Data Analysis - Algorithms for Inference.			
PART A			
Q.No	Questions	BT Level	Competence
1	What is meant by generative models?	BTL-1	Remember

2	Define conditioning in probability.	BTL-1	Remember
3	What is causal dependence?	BTL-1	Remember
4	What is statistical dependence?	BTL-1	Remember
5	What is conditional dependence?	BTL-1	Remember
6	Define data analysis.	BTL-1	Remember
7	What are algorithms for inference?	BTL-1	Remember
8	What is the purpose of generative models?	BTL-2	Understand
9	Give an example of conditioning in everyday life.	BTL-2	Understand
10	How do causal and statistical dependence differ?	BTL-2	Understand
11	What is the role of conditional dependence in modelling?	BTL-2	Understand
12	Why is data analysis important?	BTL-2	Understand
13	What is meant by inference in data analysis?	BTL-1	Remember
14	Define prior and posterior in the context of generative models.	BTL-2	Understand
15	What does causal dependence help us understand?	BTL-2	Understand
16	What is the goal of using inference algorithms?	BTL-2	Understand
17	What type of problems use conditioning?	BTL-1	Remember
18	What does statistical dependence indicate?	BTL-2	Understand
19	Give one simple example of data analysis.	BTL-1	Remember
20	What is the use of conditional dependence in prediction?	BTL-2	Understand
21	What is the role of generative models in data prediction?	BTL-2	Understand
22	What does conditioning help us update in probabilistic models?	BTL-1	Remember
23	How does causal dependence support explanation in models?	BTL-2	Understand
24	What is one advantage of using mixture models in data analysis?	BTL-1	Remember

PART B

Q.No	Questions	BT Level	Competence
1	Explain generative models and describe how they produce data based on probability rules.	BTL-3	Apply
2	Describe conditioning and show how it changes probability distributions with simple examples.	BTL-3	Apply
3	Discuss the meaning of causal and statistical dependence and explain how they differ in real-world situations.	BTL-4	Analyze
4	Explain conditional dependence and show how it helps in building better probabilistic models.	BTL-3	Apply
5	Describe the different steps involved in performing data analysis and explain their purpose.	BTL-3	Apply
6	Discuss algorithms for inference and explain how they help compute probabilities in models.	BTL-4	Analyze
7	Explain how generative models use conditioning to update beliefs and make predictions.	BTL-4	Analyze
8	Analyze how causal dependence helps identify cause–effect relations in data analysis.	BTL-4	Analyze
9	Compare conditional dependence with statistical dependence and explain when each is useful.	BTL-4	Analyze
10	Explain how data analysis helps in understanding patterns, relationships, and trends. Give examples.	BTL-3	Apply
11	Analyze common inference algorithms and describe their strengths and limitations.	BTL-4	Analyze
12	Evaluate how generative models improve data prediction compared to simple statistical methods.	BTL-5	Evaluate

13	Evaluate the role of conditioning in improving the accuracy of inference in probabilistic models.	BTL-5	Evaluate
14	Evaluate the importance of distinguishing between causal and statistical dependence in scientific studies.	BTL-5	Evaluate
15	Create a simple generative model and explain how conditioning, dependence, and inference operate in your model.	BTL-6	Create
16	Design a small data analysis project using real or hypothetical data and explain each step clearly.	BTL-6	Create
17	Propose your own algorithmic steps for performing basic inference and justify why your approach works.	BTL-6	Create

UNIT- V:	LEARNING MODELS OF COGNITION		
Learning as Conditional Inference - Learning with a Language of Thought - Hierarchical Models- Learning (Deep) Continuous Functions - Mixture Models.			
PART A			
Q.No	Questions	BT Level	Competence
1	What is meant by learning as conditional inference?	BTL-1	Remember
2	What is the idea behind learning with a language of thought?	BTL-1	Remember
3	What are hierarchical models?	BTL-1	Remember
4	What is meant by learning deep continuous functions?	BTL-1	Remember
5	Define mixture models.	BTL-1	Remember
6	What does conditional inference involve?	BTL-2	Understand
7	What is meant by a language of thought?	BTL-1	Remember
8	Why are hierarchical models useful?	BTL-2	Understand
9	What is a continuous function in the context of learning?	BTL-1	Remember
10	Give one example of a mixture model.	BTL-1	Remember
11	How does learning as conditional inference update beliefs?	BTL-2	Understand
12	What is the role of symbols in a language-of-thought model?	BTL-1	Remember
13	What does "hierarchical" mean in hierarchical models?	BTL-1	Remember
14	What is meant by deep learning of functions?	BTL-2	Understand
15	What is the purpose of using mixture models in learning?	BTL-2	Understand
16	State one advantage of hierarchical models.	BTL-1	Remember
17	How does conditional inference relate to learning?	BTL-2	Understand
18	What type of problems use mixture models?	BTL-1	Remember
19	What does it mean to learn a continuous function?	BTL-2	Understand
20	What is the connection between a language of thought and learning?	BTL-2	Understand
21	What is the main idea of combining hierarchical models with learning?	BTL-2	Understand
22	What does a mixture model represent in a dataset?	BTL-1	Remember
23	Why is conditional inference important in learning systems?	BTL-2	Understand
24	What is the role of structure in a language-of-thought model?	BTL-1	Remember
PART B			
Q.No	Questions	BT Level	Competence
1	Explain learning as conditional inference and describe how a learner updates beliefs based on new information.	BTL-3	Apply

2	Describe the idea of learning with a language of thought and explain how mental representations help learning.	BTL-3	Apply
3	Explain hierarchical models and describe how learning occurs across multiple levels in these models.	BTL-3	Apply
4	Discuss how deep models learn continuous functions and give examples of real-world applications.	BTL-4	Analyze
5	Describe mixture models and explain how they combine multiple components to represent data.	BTL-3	Apply
6	Analyze how conditional inference improves learning compared to simple prediction methods.	BTL-4	Analyze
7	Explain how a language of thought can support complex reasoning and structured learning.	BTL-4	Analyze
8	Compare hierarchical models with non-hierarchical models and explain why hierarchy improves learning.	BTL-4	Analyze
9	Describe how deep learning systems learn continuous functions and why continuity matters.	BTL-3	Apply
10	Analyze the use of mixture models in tasks such as clustering and classification.	BTL-4	Analyze
11	Evaluate the strengths and limitations of learning as conditional inference.	BTL-5	Evaluate
12	Evaluate the language-of-thought approach in learning and explain its usefulness.	BTL-5	Evaluate
13	Evaluate hierarchical models and discuss when they should be used in learning problems.	BTL-5	Evaluate
14	Assess the effectiveness of deep learning methods for learning continuous functions.	BTL-5	Evaluate
15	Create a simple hierarchical model for a learning task and explain its structure.	BTL-6	Create
16	Design a mixture model to represent two or more groups in a dataset and explain how it works.	BTL-6	Create
17	Propose a small learning example that uses conditional inference, and explain each step clearly.	BTL-6	Create

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