Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR/MAY 2025

INFORMATION TECHNOLOGY
VI Semester
IT5037 – COGNITIVE COMPUTING
(Regulation 2019)

Time: 3hrs

Max.Marks: 100

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No	Questions	Marks
1	Define materialism in the context of mind.	2
2	What is the difference between declarative and procedural memory?	2
3	What is decision-making under uncertainty?	2
4	Define the following using FOL. "If someone is a programmer, they know at least one programming language."	2
5	What are continuations? Give an example	2
6	Define prior and posterior distributions.	2
7	Define a generative model.	2
8	Define inference in probabilistic models.	2
9	What are mixture models?	2
10	Mention an application of deep learning in cognition.	2

PART- B (5 x 13 = 65 Marks)
(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks
11 (a) (i)	How does the study of cognitive neuroscience enhance our understanding of language comprehension and processing?	13
	(OR)	
11 (b) (i)	Discuss the influence of memory and decision-making processes in human cognition. Explain with reference to cognitive neuroscience and psychological theories.	13
12 (a) (i)	Explain the architecture of cognitive computing systems	7
(ii)	Design a knowledge base for a robotic chef that prepares meals based on dietary preferences and available ingredients.	6
	(OR)	
12 (b) (i)	With examples, explain how decision making under uncertainty is handled by intelligent systems.	7
(ii)	Translate the following sentences into first-order predicate logic: • All birds can fly. • Penguins are birds. • Tweety is a penguin. • Penguins cannot fly. • Tweety cannot fly.	6
13 (a) (i)	Describe how to use WebPPL to model a medical diagnosis scenario where the presence of symptoms depends on multiple diseases. Explain the probabilistic relationships and how inference helps in diagnosis.	13

	(OR)	
13 (b) (i)	Write and explain a WebPPL program that demonstrates how to perform Bayesian parameter estimation using observed data from a dice-rolling experiment. Include code and inference details.	13
14 (a) (i)	Explain with examples how conditional independence simplifies probabilistic models. Why is it crucial in Bayesian networks?	7
(ii)	Implement a WebPPL model where the likelihood of a student attending class depends on the weather and their health condition.	6
	(OR)	
14 (b) (i)	Compare and contrast the working principles of MCMC and Rejection Sampling in probabilistic programming. When is each preferred?	7
(ii)	Create a WebPPL program modeling the following dependencies: "Weekend" increases the probability of "Picnic" and also affects "Park Crowd Level."	6
15 (a) (i)	Explain the principle of Occam's Razor and its role in cognitive learning models.	13
	(OR)	
15 (b) (i)	Explain in detail how hierarchical models support cognitive learning and reasoning. Support your answer with examples and relevant diagrams.	13

PART- C (1 x 15 = 15 Marks)

(Q.No. 16 is Compulsory)

Q. No	Questions	Marks
16 (i)	A student guesses answers on a multiple-choice quiz with 4 options per question. • Probability of guessing the correct answer = 0.25 • The student attempts 5 questions. Write a WebPPL program to compute the probability of getting at least 3 answers correct by guessing. Explain the distribution used and visualize the result.	7
(ii)	Design a WebPPL program for a disease testing scenario: • 1% of the population has the disease. • The test is 99% accurate for those with the disease. • The test gives a false positive 5% of the time. Use inference to calculate: a) The probability that a person has the disease given a positive test result. b) Discuss how Bayes' theorem is reflected in your code and inference.	8