(i) Which type of agent operates using “if-then” rules without utilizing any internal state?

a) Goal-based agent

b) Simple reflex agent (ans)

c) Utility-based agent

d) Learning agent

(ii) Identify the type of agent that uses performance feedback to improve its actions.

a) Model-based agent

b) Learning agent (ans)

c) Goal-based agent

d) Reflex agent

(iii) Recall which of the following is not a property used to describe environments.

a) Fully/Partially Observable

b) Deterministic/Stochastic

c) Sequential/Parallel (ans)

d) Static/Dynamic

(iv) Select the term for all possible sequences of actions and resulting states in a problem.

a) Knowledge base

b) Production system

c) State space (ans)

d) Transition model

(v) Identify the component name in a production system that contains rules.

a) Working memory

b) Conflict resolver

c) Rule base (ans)

d) Environment

(vi) Identify the type of agent that evaluates its success using a utility function.

a) Utility-based agent (ans)

b) Reflex agent

c) Model-based agent

d) Learning agent

(vii) Choose the correct pair that describes a complex

real-world environment.

a) Fully observable, single-agent

b) Static, deterministic

c) Partially observable, dynamic (ans)

d) Deterministic, accessible

(viii) Define a “goal” in the context of problem solving.

a) A condition to avoid

b) A start state

c) A target state that satisfies desired conditions (ans)

d) An intermediate step

(ix) Identify the component that decides which rule to apply

in a production system.

a) Rule base

b) Inference engine

c) Conflict resolution strategy (ans)

d) State base

(x) Select the agent that uses internal models to maintain

world knowledge.

a) Utility-based agent

b) Model-based reflex agent (ans)

c) Goal-based agent

d) Simple reflex agent

(xi) Interpret the reason why a partially observable

environment increases complexity for an intelligent agent.

a) The agent has access to all environmental details

c) The agent must deduce the actual state from incomplete percepts (ans)

b) The agent must act randomly due to unknown rules

d) The environment never changes over time

(xii) Select the correct interpretation of the following

rule in a production system: IF "light is red" THEN "stop".

a) It is a procedural instruction

c) It is a condition-action pair (ans)

b) It is a goal state

d) It represents a utility function

(xiii) Choose the correct sequence of solving a state-space

search problem.

a) Goal test → Define actions → Define state → Apply rules

b) Define state → Define actions → Apply goal test → Search (ans)

c) Define actions → Define state → Apply utility → Search

d) Define states → Define action → Apply utility → Apply Search

(xiv) Interpret the reason why a single-agent environment is

easier to model.

a) All other agents cooperate

b) No competition or unpredictable behavior (ans)

c) Agents have partial access to other agents' state

d) It allows for utility maximization

(xv) Relate the state-space representation to AI search

problems.

a) It defines a performance function

c) It organizes all possible states and transitions (ans)

b) It restricts agent communication

d) It is used only in robotics

(xvi) Interpret the function of a performance measure.

a) It senses the environment

c) It evaluates how well the agent is doing (ans)

b) It acts like a controller

d) It modifies the rule base

(xvii) Identify how a state-space tree differs from a

state-space graph.

a) A tree allows cycles

c) A tree ensures unique paths for state (ans)

b) A graph stores duplicate nodes

d) Graphs are only used in learning agents

(xviii) Differentiate between a reflex agent and a

model-based reflex agent.

a) Model-based agent ignores sensors

c) Model-based agent uses internal world model for decision making (ans)

b) Reflex agent uses memory

d) Reflex agent learns from feedback

(xix) Differentiate the advantage of utility-based agents

over goal-based agents.

a) Better in adversarial settings

c) Can evaluate degree of success, not just goal achievement (ans)

b) More memory-intensive

d) Simpler to design

(xx) Choose the correct order in a typical agent function

cycle.

a) Perceive → Actuator → Environment → Sensor

c) Sense → Decide → Act (ans)

b) Act → Sense → Learn → Environment

d) Think → Feel → Respond

(xxi) Apply production system logic: If the initial state is

A, and rules are: A → B, B → C, C → D, what is the final state after 3

applications?

a) A

b) B

c) C

d) D (ans)

(xxii) Given a binary state-space tree of depth 3, how many

leaf nodes will there be?

a) 4

b) 6

c) 8 (ans)

d) 16

(xxiii) Evaluate: A problem has 4 possible actions per

state, and depth limit is 3. Total number of nodes in the state-space tree = ?

$(1 + 4 + 4^2 + 4^3 = 85)$

a) 12

b) 64

c) 21

d) 85 (ans)

(xxiv) Calculate: A state-space graph has 6 states and 7

transitions. How many paths are there from the initial state if each state

connects to exactly one new node?

a) 6

b) 7

c) 1 (ans)

(xxv) Match: Agent type ↔ Capability I. Reflex Agent – a)

Uses model II. Model-Based Agent – b) Uses feedback III. Learning Agent – c)

Reacts instantly

a) I-a, II-b, III-c

b) I-c, II-a, III-b (ans)

c) I-b, II-c, III-a

d) I-a, II-c, III-b

(xxvi) Apply goal test: Problem: You are in state S0. Goal

is to reach S3. Transitions: S0 → S1, S1 → S2, S2 → S3. How many rule

applications are needed?

a) 1

b) 2

c) 3 (ans)

d) 4

(xxvii) Simulate an agent's action selection in a partially

observable environment. Agent has incomplete information. What should it use?

a) Reflex rules

c) Internal state model (ans)

b) Utility functions only

d) Goal satisfaction

(xxviii) Determine if the environment is stochastic: You press a switch, and a light turns on 70% of the time.

a) Fully observable

c) Stochastic (ans)

b) Static

d) Deterministic

(xxix) Evaluate a conflict resolution strategy: Rules: R1: If A then B; R2: If A then C. How should the system decide?

a) Execute both

b) Prioritize most recent

c) Use specificity or priority hierarchy (ans)

d) Use goal state

(xxx) Apply: An agent must choose between two paths: Path A has cost 5, utility 80 Path B has cost 2, utility 50 Which path should a utility-based agent choose (maximize utility/cost ratio)?

(Path A ratio = 80/5 = 16; Path B ratio = 50/2 = 25 → Path B better)

a) Path A

b) Path B (ans)

c) Both Path A and Path B

d) Neither Path A nor Path B

(xxxi) Define declarative knowledge.

a) Knowledge stored as actions

b) Knowledge about "what is" (ans)

c) Control over hardware

d) Learned behavior

(xxxii) Identify the type of knowledge that includes heuristic rules.

a) Declarative

c) Procedural (ans)

b) Meta-knowledge

d) Heuristic

(xxxiii) Recognize the structure used in knowledge

representation that consists of slots and fillers.

a) Script

b) Semantic Net

c) Frame (ans)

d) Conceptual Dependency

(xxxiv) Recall what a predicate in FOL represents.

a) A constant

b) A variable

c) A function

d) A property or relation (ans)

(xxxv) Define semantic network.

a) A neural-based learning system

b) A rule-based system

c) A graphical representation of concepts and their relationships (ans)

d) A decision-making matrix

(xxxvi) Identify the main component of a frame.

a) Rule

b) Slot (ans)

c) Node

d) Terminal

(xxxvii) Name the inference mechanism used in Bayesian

networks.

a) Deduction

b) Probabilistic Inference (ans)

c) Induction

d) Monotonic Reasoning

(xxxviii) Select the type of reasoning used when conclusions

can be withdrawn.

a) Monotonic

c) Non-monotonic (ans)

b) Deductive

d) Rule-based

(xxxix) Identify the core component of a case-based reasoning system.

a) Model parameters

b) Semantic structure

c) Knowledge base

d) Past cases (ans)

(xl) Define fuzzy logic.

a) Binary logic

b) Logic with absolute truth values

c) Logic based on degrees of truth (ans)

d) Rule-less logic

(xli) Recognize what the unification algorithm is used for.

a) Normalizing semantic networks

b) Rewriting frames

c) Matching predicates in FOL (ans)

d) Drawing conceptual maps

(xlii) Recall the function of inference engine.

a) Manage memory

c) Control user interface

b) Apply rules to known facts (ans)

(xliii) Identify the knowledge type which includes facts and relationships.

a) Heuristic knowledge

c) Declarative knowledge (ans)

b) Structural knowledge

d) Meta-knowledge

(xliv) Define conceptual dependency.

a) Grammar-based language parser

c) Temporal sequencing in a script

b) Language-independent representation of meaning (ans)

d) Truth table generator

(xlv) Recognize the meaning of prior probability in Bayes' rule.

a) Probability after evidence

c) The evidence probability

b) Probability before considering current evidence (ans)

d) Maximum posterior

(xlvi) Interpret the benefit of frame-based representation.

a) Fixed rule ordering

b) Supports natural language processing

c) Enables procedural learning

d) Facilitates modular and hierarchical knowledge storage (ans)

(xlvii) Interpret the reason why non-monotonic reasoning is important in AI.

a) It simplifies proof trees

c) It requires no inference engine

b) Real-world knowledge often changes over time (ans)

d) It avoids probabilistic methods

(xlviii) Differentiate between script and frame.

a) Scripts are static, frames dynamic

b) Scripts capture sequences of events; frames represent objects (ans)

c) Frames are probabilistic; scripts are rule-based

d) Scripts represent slot values

(xlix) Choose which FOL expression represents "All dogs are animals".

a) $\exists x\ Dog(x) \rightarrow Animal(x)$

b) $\forall x\ Dog(x) \rightarrow Animal(x)$ (ans)

c) $Dog(x) \leftrightarrow Animal(x)$

d) $\forall x\ Animal(x) \rightarrow Dog(x)$

(l) Illustrate the limitation of semantic networks.

a) Can't handle hierarchy

b) Can't model probability

c) Can't represent procedural rules (ans)

d) Can't handle ambiguity

(li) Interpret the fuzzy set membership function $\mu(x) = x/10$

for $x \in [0, 10]$. What is $\mu(7)$?

a) 0.5

b) 0.7 (ans)

c) 1

d) 0.3

(lii) Identify the best example of case-based reasoning.

a) Rule lookup

c) Solving a new problem by adapting a past similar case (ans)

b) Decision trees

d) Frame filling

(liii) Interpret how Bayes' theorem helps in reasoning under

uncertainty.

a) Adds noise to the inference

c) Updates probability of hypothesis based on evidence (ans)

b) Gives deterministic outcomes

d) Avoids prior information

(liv) Differentiate rule-based from case-based reasoning.

a) Rule-based uses fixed data; case-based uses frames

b) Case-based adapts from past cases; rule-based uses pre-defined rules (ans)

c) Both rule-based and case-based reasoning use frames

d) Rule-based systems always fail in NLP

(lv) Interpret the need for unification in automated

reasoning.

a) Verifies prior probabilities

b) Matches and substitutes variables in predicates (ans)

c) Simplifies Bayes nets

d) Optimizes rules

(lvi) Classify a probabilistic belief network.

a) Bayesian Network (ans)

b) Semantic Net

c) Frame

d) Case Model

(lvii) Determine the output of unifying knows(John, X) with

knows(Y, AI).

a) Fail

b) {X/AI, Y/John} (ans)

c) {John/Y}

d) {X/Y}

(lviii) Compare model-based and rule-based reasoning.

a) Both depend on specific rules

b) Model-based uses structure of system; rule-based applies condition-action pairs (ans)

c) Rule-based lacks inference

d) Model-based ignores history

(lix) Choose the main advantage of using Bayesian networks.

a) Deterministic inference

b) Clear structure for uncertain knowledge (ans)

c) Pure logic-based reasoning

d) Eliminates need for learning

(lx) Interpret the reason how conceptual dependency helps in

NLP.

a) Enables machine vision

b) Translates text to language-independent structures (ans)

c) Maps predicates to logic

d) Parses SQL

(lxi) Apply unification: unify likes(X, icecream) with

likes(john, Y).

a) {X/john, Y/icecream} (ans)

b) {X/Y}

c) {Y/X}

d) No unification possible

(lxii) Calculate posterior probability using Bayes' Rule:

P(A|B) = [P(B|A)*P(A)]/P(B)

If P(B|A)=0.7, P(A)=0.3, P(B)=0.6, find P(A|B).

a) 0.28

b) 0.35 (ans)

c) 0.27

d) 0.36

(lxiii) Design a frame for a “Car” with 2 slots.

a) [Car: wheels, windows] (ans)

b) Car → Transport

c) Car: IF engine THEN start

d) Car = “fast vehicle”

(lxiv) Simulate fuzzy logic: μ(tall) = (height − 150)/50,

for height in [150, 200]. What is μ(175)?

a) 0.25

b) 0.5 (ans)

c) 0.75

d) 1

(lxv) Choose best reasoning type for a medical diagnosis

system.

a) Monotonic reasoning

b) Fuzzy reasoning (ans)

c) Conceptual dependency

d) Rule-based only

(lxvi) Apply Bayes rule to email classification: If 60%

emails are spam and P(word=“lottery”|spam)=0.8, P(word=“lottery”|not spam)=0.1,

classify an email with “lottery”.

a) Spam (ans)

b) Not spam

c) Can’t classify

d) Needs more data

(lxvii) Select reasoning type when a robot updates knowledge

after learning object behavior.

a) Rule-based

c) Model-based (ans)

b) Case-based

d) Fuzzy logic

(lxviii) Determine if semantic net can represent "John

is father of Mary".

a) No

c) Yes, as a directed edge from John to Mary labeled 'father' (ans)

b) Only in FOL

d) Only through scripts

(lxix) Apply reasoning: Premise: All humans are mortal.

Socrates is a human. Deduce conclusion.

b) Socrates is mortal (ans)

a) Socrates is not human

c) Socrates is logical

d) Unknown

(lxx) Implement fuzzy logic rule: IF temperature is “high”

THEN fan speed is “fast”. Temperature = 80, μ(high)=0.6. What is μ(fast)?

c) 0.6 (ans)

a) 0.2

b) 0.4

d) 1

(lxxi) Apply probabilistic inference to determine most

probable cause of fever given probabilities of flu and malaria.

a) Choose one with highest prior

c) Compute posterior using Bayes (ans)

b) Choose one with highest P(fever|disease)

d) Skip evidence

(lxxii) Choose most effective representation for legal rules

in law domain.

a) Frame

b) Rule-based (ans)

c) Case-based

d) Semantic Net

(lxxiii) Simulate FOL: Express "Every student studies hard".

a) $\forall x$ (Student(x) → Studies(x)) (ans)

b) $\exists x$ (Student(x) → Studies(x))

c) Studies(x) ∧ Student(x)

d) $\forall x$ (Studies(x) → Student(x))

(lxxiv) Use conceptual dependency for sentence: “John gave Mary a book.” What is the main action primitive?

c) ATRANS (ans)

a) INGEST

b) PTRANS

d) MOVE

(lxxv) Apply reasoning when the agent uses both rules and probabilities to make decisions.

a) Hybrid reasoning (ans)

b) Monotonic logic

c) Conceptual dependency

d) Deduction only

(lxxvi) Identify the number of nodes evaluated in a full binary tree of depth 3 using the Minimax algorithm without pruning.

a) 7

c) 15 (ans)

b) 8

d) 16

(lxxvii) Recall the time complexity of Minimax in a game tree of branching factor b and depth d.

c) O(b^d) (ans)

a) O(b^2)

b) O(d^b)

d) O(b + d)

(lxxviii) Recognize the depth at which Iterative Deepening

Search completes its last iteration if solution is found at level 3.

a) 1

c) 3 (ans)

b) 2

d) 4

(lxxix) State the best-case scenario for alpha-beta pruning

in terms of node ordering.

a) Worst-to-best

c) Best-to-worst (ans)

b) Random

d) Best-first

(lxxx) Calculate the number of leaf nodes in a ternary game

tree (each node has 3 children) of depth 2.

a) 9 (ans)

b) 6

c) 27

d) 12

(lxxxi) Estimate the effective branching factor for a game

tree where alpha-beta pruning skips 60% of nodes in a binary tree of depth 4.

a) 2

b) 1.6 (ans)

c) 1.2

d) 0.8

(lxxxii) Interpret the improvement in node evaluation if

alpha-beta pruning is applied to a tree of b=3 and depth d=4. What's the ideal

node count?

a) 81

b) 40 (ans)

c) 27

d) 9

(lxxxiii) Analyze the number of times the root node is

revisited during Iterative Deepening Search when search depth increases from 0

to 2.

a) 1

c) 3 (ans)

b) 2

d) 4

(lxxxiv) Evaluate the game tree given values [4, 7, 6, 5]

using Minimax with alpha-beta pruning. What is the returned value at the root?

a) 5 (ans)

b) 6

c) 7

d) 4

(lxxxv) Compare the number of nodes explored by Minimax vs.

Alpha-Beta pruning for depth 4 in a binary tree.

a) Equal

c) Alpha-Beta explores fewer (ans)

b) Alpha-Beta explores more

d) Depends on evaluation function

(lxxxvi) Apply the Minimax algorithm on leaf values [3, 12,

8, 2] for a two-level game tree. What is the minimax value at the root node?

a) 3 (ans)

b) 8

c) 12

d) 2

(lxxxvii) Solve for the number of nodes pruned when

alpha-beta pruning is applied to a perfectly ordered binary tree of depth 4.

(Note: Calculated answer is 9, which is not an option. This is a flawed question.)

a) 8

b) 10

c) 11

d) 12

(lxxxviii) Calculate the number of evaluations saved by

alpha-beta pruning in a game tree of 3 levels (binary) with optimal ordering.

(Note: Calculated answer is 3, which is not an option. Option 5 is the number evaluated.)

a) 4

b) 5

c) 6

d) 7

(lxxxix) Derive the number of nodes expanded in Iterative

Deepening with branching factor 2 and depth 3.

a) 14

b) 15

c) 26 (ans) (1 + 3 + 7 + 15 = 26)

d) 17

(xc) Compute the maximum number of comparisons saved by

alpha-beta pruning in a binary tree of depth 5.

(Note: Calculated answer is 21. $2^5 - (2^3+2^2-1) = 32 - 11 = 21$. This is a flawed question.)

a) 16

b) 24

c) 28

d) 30

(xci) Define the term syntax in Natural Language Processing.

a) Meaning of a sentence

b) Structure and grammatical rules of sentences (ans)

c) Speech recognition process

d) Sentiment attached to words

(xcii) Identify the component that deals with the literal

meaning of a sentence.

a) Pragmatic analysis

c) Semantic analysis (ans)

b) Discourse analysis

d) Syntactic parsing

(xciii) Recall which phase of NLP addresses "contextual meaning" in conversation.

a) Lexical Analysis

b) Pragmatic Processing (ans)

c) Morphological Analysis

d) Named Entity Recognition

(xciv) Recognize the role of discourse processing in NLP.

a) Grammar correction

b) Understanding multi-sentence relationships (ans)

c) Sentence tokenization

d) Speech-to-text conversion

(xcv) Identify the algorithm often used for syntactic parsing.

a) Backpropagation

b) CYK Parser (ans)

c) A* Search

d) ID3

(xcvi) Recall the data structure most commonly used in syntax trees.

a) Queue

b) Heap

c) Graph

d) Tree (ans)

(xcvii) Recognize what Part-of-Speech (POS) tagging assigns to each word.

a) Named entities

b) Sentiment

c) Probability

d) Grammatical category (ans)

(xcviii) Recall which level of language deals with "intent" behind utterances.

a) Syntax

b) Semantics

c) Pragmatics (ans)

d) Morphology

(xcix) Define the task that determines the relationship between sentences.

a) Pragmatic analysis

c) Discourse analysis (ans)

b) Morphological analysis

d) Statistical parsing

(c) Which of the following is a commonly used library for NLP in Python?

a) Pandas

b) NumPy

c) Matplotlib

d) NLTK (ans)

(ci) Interpret the reason why syntactic parsing is essential in NLP.

a) It determines meaning of text

c) It determines grammatical structure (ans)

b) It breaks speech into syllables

d) It helps correct spelling

(cii) Interpret the output of a POS tagging algorithm on the sentence "She can fish."

a) PRONOUN–MODAL–VERB

c) PRONOUN–VERB–NOUN (ans) (This is one of two valid parses, the other being A)

(ciii) Summarize the primary purpose of semantic analysis in NLP.

a) Translate text

c) Determine the meaning of sentences (ans)

b) Assign grammar rules

d) Determine sentence boundaries

(civ) Distinguish between syntax and semantics in NLP.

a) Syntax is about meaning; semantics is about rules

c) Syntax is grammar; semantics is meaning (ans)

b) Both syntax and semantics in NLP deal with grammar

d) Syntax is harder to analyze than semantics

(cv) Estimate the number of possible syntactic trees for the sentence: "The old man the boats." (Ambiguity exists)

a) 1

b) 2 (ans)

c) 3

d) 4

(cvi) Classify the following sentence type: "Although it was raining, they went out."

a) Simple

b) Compound

c) Complex (ans)

d) Imperative

(cvii) Compare the focus of discourse analysis and pragmatic analysis.

a) Both discourse analysis and pragmatic analysis focus on individual sentence meaning

b) Discourse focuses on context between sentences; pragmatics focuses on speaker intent (ans)

c) Pragmatic is lexical-level only

d) Discourse is limited to word-level analysis

(cviii) Interpret the ambiguity: "He saw the man with the telescope." Which process resolves it?

a) Syntax

b) Semantics

c) Discourse

d) Pragmatics (ans)

(cix) Impact of syntactic ambiguity on NLP models.

a) Reduces accuracy in grammar checking

c) Causes multiple parse trees (ans)

b) Increases word error rate

d) Causes single parse trees

(cx) POS tags in Penn Treebank Tagset.

a) 10

b) 20

c) 36

d) 45 (ans)

(cxi) Dependency of “Mary” in “John gave Mary a book.”

a) Subject

b) Indirect object (ans)

c) Direct object

d) Modifier

(cxii) Ambiguity in: “I saw her duck.” Which word is ambiguous?

a) I

b) Saw

c) Her

d) Duck (ans)

(cxiii) 2-grams (bigrams) in “Natural Language Processing is fun.”

a) 3

b) 4 (ans)

c) 5

d) 6

(cxiv) Semantic role of “a cake” in “Alice baked a cake.”

a) Agent

b) Theme (ans)

c) Source

d) Instrument

(cxv) Token combinations for 4 tokens (order matters, no repetition).

a) 4

c) 24 (ans)

b) 16

d) 256

(cxvi) P(“is fun”)=0.01, P(“fun”)=0.03 →

P(“is”|“fun”)=?

a) 0.33 (ans)

b) 0.01

c) 0.3

d) 0.1

(cxvii) Main verb in: “They might have been singing.”

a) Might

b) Been

c) Singing (ans)

d) Have

(cxviii) Cosine similarity for A=[1,2], B=[2,3].

(Note: Calculated answer is 0.992. None of the options are correct.)

a) 0.983

b) 1

c) 0.75

d) 0.85

(cxix) Dependency of “yesterday” in “She arrived

yesterday.”

a) Root

b) Temporal Modifier (ans)

c) Direct Object

d) Subject

(cxx) Sentiment of: “This film was surprisingly

good.”

a) Positive (ans)

b) Negative

c) Neutral

d) Ambiguous

(cxxi) Role of inference engine in expert system.

a) Data storage

c) Decision-making using knowledge base (ans)

b) Rule application

d) User input handling

(cxxii) Component for knowledge acquisition in expert systems.

a) Inference engine

b) Knowledge engineer (ans)

c) User interface

d) Rule base

(cxxiii) First medical expert system.

a) PROLOG

b) MYCIN (ans)

c) ELIZA

d) DENDRAL

(cxxiv) Knowledge types in expert systems.

a) Declarative, Object-Oriented

b) Declarative, Procedural, Heuristic (ans)

c) Functional, Relational

d) Linear, Fuzzy

(cxxv) Mathematical model for robot kinematics.

a) Bayes Theorem

b) Matrix transformation (ans)

c) Graph theory

d) Neural model

(cxxvi) Line-following robots definition.

a) Robots that follow a predefined path using sensors (ans)

b) Robots that move randomly

c) Robots that use fuzzy logic

d) Robots that use speech recognition

(cxxvii) Component responsible for movement in

robots.

a) Actuators (ans)

b) Sensors

c) Microprocessor

d) Controller

(cxxviii) Application of expert systems.

a) Mechanical assembly

b) Medical diagnosis (ans)

c) Physical simulation

d) Compiler design

(cxxix) Characteristic of expert systems.

a) Domain-specific knowledge (ans)

b) Universal applicability

c) Random behavior

d) Human-free processing

(cxxx) Function of sensors in robotics.

a) Data computation

b) Environment detection (ans)

c) Language translation

d) Memory management

(cxxxi) Why rule-based systems are preferred.

b) Clear logical reasoning and traceability (ans)

a) Easy to implement randomness

c) Supports real-time data mining

d) Minimizes domain specificity

(cxxxii) Relationship between knowledge base &

inference engine.

a) The inference engine derives conclusions from the knowledge base (ans)

b) The inference engine builds the knowledge base

c) The knowledge base executes user inputs

d) Both operate independently

(cxxxiii) Forward vs backward chaining.

b) Forward: Data-driven; Backward: Goal-driven (ans)

a) Forward: Goal-driven; Backward: Data-driven

c) Both random

d) Both linear search

(cxxxiv) Physical vs soft robots.

a) Physical robots perform actions; soft robots are virtual agents (ans)

b) Both are virtual

c) Both use same processors

d) No real distinction

(cxxxv) Robot position via transformation matrices.

a) By summing angles

c) By multiplying rotation and translation matrices (ans)

b) By adding sensor data

d) Using probabilistic tables

(cxxxvi) Role of feedback in motion control.

a) Ensures accurate movement based on sensor data (ans)

b) Enhances fuzzy logic

c) Reduces CPU cycles

d) Simulates randomness

(cxxxvii) Benefit of modular design in expert
systems.

b) Easy updating and scalability (ans)

a) Hard-coded decision flow

c) Prevents user interaction

d) Reduces output generation

(cxxxviii) Need for domain experts in expert systems.

a) Provide domain-specific heuristics and rules (ans)

b) Build inference engine

c) Manage file systems

d) Evaluate user inputs

(cxxxix) Robots used in industry.

a) Static, dynamic

b) Fixed, mobile, autonomous (ans)

c) Manual, robotic

d) Online, offline

(cxl) Why knowledge engineering is a bottleneck.

b) Involves capturing tacit human knowledge (ans)

a) Requires no logic

c) Needs only sensors

d) Uses constant feedback

(cxli) Final position using translation [2,3] &

rotation 90° of (1,1).

(Note: All options appear incorrect based on standard conventions. (3,2) would be correct for clockwise rotation first.)

a) (2,4)

b) (3,2)

c) (1,5)

d) (5,1)

(cxlii) Bayes theorem:

P(Disease)=0.01, P(Pos|Dis)=0.99, P(Pos|NoDis)=0.05

a) ≈ 0.166 (ans)

b) 0.05

c) 0.0099

d) 0.5

(cxliii) Rule: fever & cough → flu; fever &

no cough → viral; input: fever=yes, cough=no

a) viral (ans)

b) flu

c) cold

d) unknown

(cxliv) Robot movement: 15 steps/min, 0.4 m per step.

$15 \times 0.4 = 6$ m/min

a) 6 m/min (ans)

b) 6.5 m/min

c) 7.5 m/min

d) 5.5 m/min

(cxlv) Fuzzy membership (Cold μ=0.2, Hot μ=0.8).

b) Hot (ans)

a) Cold

c) Moderate

d) Uncertain

(cxlvi) If A AND B → C, A=1, B=0 → C=?

b) 0 (ans)

a) 1

c) 2

d) 3

(cxlvii) Robot base (0,0), apply T=[3,0], rotate 90°.

a) (0,3) (ans)

b) (3,0)

c) (-3,0)

d) (0,-3)

(cxlviii) Line-following robot sensors (L=0, C=1, R=0).

a) Move forward (ans)

b) Turn left

c) Stop

d) Turn right

(cxlix) Fuzzy rules: dirty=true, full=false → Rule 2 applies → wait.

a) wait (ans)

b) wash

c) ignore

d) clean

(cl) Robot completes 10 tasks (3 movements/task) in 5 min → (10×3)/5=6 ops/min.

b) 6 (ans)

a) 30

c) 2

d) 10