| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 1 | 1 | What is the primary goal of AI?<br>(a) Replicate human brain structure<br>(b) Enable machines to solve tasks that require intelligence<br>(c) Replace human labor<br>(d) Build faster computers<br>**Ans:Enable machines to solve tasks that require intelligence** |
| 1 | 2 | Which of the following is NOT a traditional AI problem-solving task?<br>(a) Playing chess<br>(b) Doing arithmetic by hand<br>(c) Language translation<br>(d) Image recognition<br>**Ans:Doing arithmetic by hand** |
| 1 | 3 | A task is considered "intelligent" if it involves<br>(a) Human emotions<br>(b) Complex pattern recognition, reasoning, learning, or adaptation<br>(c) Physical labor<br>(d) Simple arithmetic only<br>**Ans:Complex pattern recognition, reasoning, learning, or adaptation** |
| 1 | 4 | The Turing Test evaluates<br>(a) A machine's speed<br>(b) Machine intelligence via indistinguishability<br>(c) Human IQ<br>(d) Computational complexity<br>**Ans:Machine intelligence via indistinguishability** |
| 1 | 5 | Which statement is true about AI's "weak" vs "strong" definitions?<br>(a) Both involve human-like emotions<br>(b) Weak AI simulates intelligence; strong AI means real understanding<br>(c) Strong AI cannot ever be built<br>(d) Weak AI is rule-based only<br>**Ans:Weak AI simulates intelligence; strong AI means real understanding** |
| 1 | 6 | All of the following are fields that intersect with AI EXCEPT<br>(a) Philosophy<br>(b) Neuroscience<br>(c) Astrology<br>(d) Linguistics<br>**Ans:Astrology** |
| 1 | 7 | Which AI approach uses large data to learn statistical patterns?<br>(a) Logic-based<br>(b) Rule-based<br>(c) Machine learning<br>(d) Planning<br>**Ans:Machine learning** |
| 1 | 8 | "Rational agent" refers to<br>(a) Any software program<br>(b) An entity that maximizes expected performance measure<br>(c) An agent that acts randomly<br>(d) A human being<br>**Ans:An entity that maximizes expected performance measure** |
| 1 | 9 | What is a "performance measure"?<br>(a) How humans judge machine output<br>(b) A numerical reward function defining success<br>(c) The agent's CPU speed<br>(d) A debugging tool<br>**Ans:A numerical reward function defining success** |
| 1 | 10 | One main challenge for building AI systems is<br>(a) Lack of hardware<br>(b) Difficulty in specifying the environment<br>(c) Absence of problems<br>(d) Too much automation<br>**Ans:Difficulty in specifying the environment** |

| UNIT | Q NO | QUESTIONS |
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| 1 | 11 | Which of these is NOT a typical AI subfield?<br>(a) Planning (b) Signal processing<br>(c) Knowledge representation (d) Natural language processing<br>**Ans:Signal processing** |
| 1 | 12 | Agent design must consider all EXCEPT<br>(a) The agent's sensors (b) The agent's actuators<br>(c) The agent's feelings (d) The agent's environment<br>**Ans:The agent's feelings** |
| 1 | 13 | Which of these criteria is NOT part of the AI definition in code-based thinking?<br>(a) Thinks like humans (b) Acts like humans<br>(c) Thinks rationally (d) Uses emotions<br>**Ans:Uses emotions** |
| 1 | 14 | The term "knowledge engineering" refers to<br>(a) Building logic circuits (b) Acquiring and encoding domain knowledge<br>(c) Data mining (d) GPU design<br>**Ans:Acquiring and encoding domain knowledge** |
| 1 | 15 | Which of these systems is most associated with expert systems?<br>(a) Siri (b) Mycin<br>(c) AlphaGo (d) Tesla autopilot<br>**Ans:Mycin** |
| 1 | 16 | The AI field that focuses on how to represent information about the world is<br>(a) Planning (b) Perception<br>(c) Knowledge representation (d) Search<br>**Ans:Knowledge representation** |
| 1 | 17 | Which architecture uses production rules and an inference engine?<br>(a) Blackboard system (b) Expert system<br>(c) Neural network (d) Planner<br>**Ans:Expert system** |
| 1 | 18 | The AI subfield dealing with pattern recognition focuses on<br>(a) Logic (b) Statistics<br>(c) Heuristics (d) Planning<br>**Ans:Statistics** |
| 1 | 19 | AI goals include all EXCEPT<br>(a) Understanding perception (b) Natural dialogue<br>(c) Physical agility (d) Generating electricity<br>**Ans:Generating electricity** |
| 1 | 20 | "General AI" means<br>(a) AI that is good at gaming (b) AI that can perform any intellectual task like a human<br>(c) AI specialized in one domain (d) Military AI<br>**Ans:AI that can perform any intellectual task like a human** |

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| 1 | 21 | An agent's "utility function" represents<br>(a) Its hard-coded goals (b) Preferences over states of the world<br>(c) Only terminal rewards (d) CPU utility<br>**Ans:Preferences over states of the world** |
| 1 | 22 | Which is a historical symbolic AI programming language?<br>(a) Python (b) LISP<br>(c) Java (d) C++<br>**Ans:LISP** |
| 1 | 23 | An "agent function" maps<br>(a) Observations to actions (b) States to rewards<br>(c) Goals to plans (d) Data to parameters<br>**Ans:Observations to actions** |
| 1 | 24 | The PEAS framework includes all EXCEPT:<br>(a) Performance (b) Environment<br>(c) Actuators (d) Sensors<br>**Ans:Performance** |
| 1 | 25 | Which is part of agent architecture?<br>(a) Utility functions (b) Neural net library<br>(c) Hardware + software (d) Utility theory<br>**Ans:Hardware + software** |
| 1 | 26 | A purely reactive agent<br>(a) Uses planning (b) Responds only to current percepts<br>(c) Keeps track of the world model (d) Is learning-based<br>**Ans:Responds only to current percepts** |
| 1 | 27 | Model-based agents require<br>(a) No memory (b) A model of how the world evolves<br>(c) No sensors (d) Only reflex rules<br>**Ans:A model of how the world evolves** |
| 1 | 28 | A goal-based agent adds<br>(a) Goals and planning capabilities (b) Sensors<br>(c) Reflex actions only (d) A utility function<br>**Ans:Goals and planning capabilities** |
| 1 | 29 | Utility-based agents enhance goal agents by<br>(a) Seeking multiple goals only (b) Measuring desirability via utility<br>(c) Being purely reactive (d) Using no models<br>**Ans:Measuring desirability via utility** |
| 1 | 30 | What does the "simple reflex agent" rely on?<br>(a) Utility function (b) Condition–action rules<br>(c) Full search (d) Utility maximization<br>**Ans:Condition–action rules** |

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|---|---|---|
| 1 | 31 | Which agent type makes decisions by weighing trade-offs?<br>(a) Reflex (b) Model-based<br>(c) Utility-based (d) Goal-based<br>**Ans:Utility-based** |
| 1 | 32 | A learning agent has all EXCEPT:<br>(a) Learning element (b) Performance element<br>(c) Genetic algorithm (d) Critic<br>**Ans:Genetic algorithm** |
| 1 | 33 | Which is a utility-based agent example?<br>(a) Basic thermostat (b) Chess program evaluating positions<br>(c) Rule-based spam filter (d) Doorbell camera<br>**Ans:Chess program evaluating positions** |
| 1 | 34 | Which scenario suggests partially observable environment?<br>(a) Tic-Tac-Toe (b) Chess<br>(c) Driving in fog (d) Solving Sudoku<br>**Ans:Driving in fog** |
| 1 | 35 | Stochastic environments involve<br>(a) No randomness (b) Random outcomes in actions or percepts<br>(c) One fixed outcome (d) Fully observable sensors<br>**Ans:Random outcomes in actions or percepts** |
| 1 | 36 | What is a multi-agent environment?<br>(a) Only one agent exists (b) Other agents work concurrently<br>(c) No environment exists (d) Deterministic setting<br>**Ans:Other agents work concurrently** |
| 1 | 37 | Which is NOT a property of environments?<br>(a) Observable vs partially observable (b) Discrete vs continuous<br>(c) Safe vs dangerous (d) Single vs multi-agent<br>**Ans:Safe vs dangerous** |
| 1 | 38 | Utility is necessary when<br>(a) Goals suffice (b) Trade-offs are needed<br>(c) Only reflex reactions (d) No goals exist<br>**Ans:Trade-offs are needed** |
| 1 | 39 | Which architecture is least flexible?<br>(a) Simple reflex (b) Goal-based<br>(c) Model-based (d) Learning agent<br>**Ans:Simple reflex** |
| 1 | 40 | A fully observable, deterministic, static environment means<br>(a) Stochastic outcome (b) No hidden information, unchanging environment<br>(c) Changing during planning (d) Random percepts each time<br>**Ans:No hidden information, unchanging environment** |

| UNIT | Q NO | QUESTIONS |
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| 1 | 41 | A “learning element” in an agent does<br>(a) Store actuators (b) Improve agent based on feedback<br>(c) Plan goals (d) Execute reflexes<br>**Ans:Improve agent based on feedback** |
| 1 | 42 | Which example demands learning?<br>(a) Vacuum agent in known layout (b) Chatbot improving through feedback<br>(c) Chess engine with fixed eval function (d) Rule-based thermostat<br>**Ans:Chatbot improving through feedback** |
| 1 | 43 | “Observability” refers to<br>(a) Sensing entire world or not (b) Agent’s self-concept<br>(c) Utility measurement (d) Hardware visibility<br>**Ans:Sensing entire world or not** |
| 1 | 44 | In model-based reflex agents, “model” is used to<br>(a) Store training data (b) Track unobserved aspects<br>(c) Compute utility (d) Execute actions<br>**Ans:Track unobserved aspects** |
| 1 | 45 | Sequence: Observe–Think–Act is used by<br>(a) Reflex only (b) Goal-based agents<br>(c) Stochastic agents only (d) Learning only<br>**Ans:Goal-based agents** |
| 1 | 46 | Which environment permits partial control?<br>(a) Deterministic (b) Stochastic<br>(c) Episodic (d) Single agent<br>**Ans:Stochastic** |
| 1 | 47 | Which is an example of an episodic environment?<br>(a) Chess (b) Email spam filter<br>(c) Driving (d) Crossword puzzle<br>**Ans:Email spam filter** |
| 1 | 48 | Which is NOT a measure of success in AI agent design?<br>(a) Task performance (b) Speed<br>(c) Rationality (d) Physical appearance<br>**Ans:Physical appearance** |
| 1 | 49 | “Intelligent behavior” is best described as<br>(a) Random actions (b) Goal-achieving actions under uncertainty<br>(c) Magic (d) Strictly rule-following<br>**Ans:Goal-achieving actions under uncertainty** |
| 1 | 50 | The phrase “AI winter” refers to<br>(a) Cold labs (b) Periods of reduced funding/interest<br>(c) The winter solstice (d) Robots malfunctioning in winter<br>**Ans:Periods of reduced funding/interest** |

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| 2 | 1 | Which search explores nodes level by level?<br>(a) Path cost (b) Node depth<br>(c) Heuristic value (d) Random<br>**Ans:Node depth** |
| 2 | 2 | Time complexity of BFS with branching factor b and depth d is:<br>(a) O(b + d) (b) O(b^d)<br>(c) O(d^b) (d) O(b·d)<br>**Ans:O(b^d)** |
| 2 | 3 | BFS requires which data structure?<br>(a) Stack (b) Queue<br>(c) Priority queue (d) Deque<br>**Ans:Queue** |
| 2 | 4 | BFS uses exponential memory because it stores:<br>(a) Current frontier (b) All nodes at current depth<br>(c) Only visited nodes (d) Heuristic values<br>**Ans:All nodes at current depth** |
| 2 | 5 | BFS is optimal only when:<br>(a) Edge costs differ (b) Costs are uniform<br>(c) Heuristic is zero (d) Graph is acyclic<br>**Ans:Costs are uniform** |
| 2 | 6 | BFS is considered a:<br>(a) Depth-first search (b) Best-first search<br>(c) Uninformed search (d) Informed search<br>**Ans:Uninformed search** |
| 2 | 7 | DFS uses which data structure?<br>(a) Priority queue (b) Queue<br>(c) Stack (d) Hash table<br>**Ans:Stack** |
| 2 | 8 | DFS may get stuck in cycles if:<br>(a) Graph is disconnected (b) No mechanism to avoid revisits<br>(c) Step costs vary (d) Heuristic is misleading<br>**Ans:No mechanism to avoid revisits** |
| 2 | 9 | Worst-case time complexity of DFS is:<br>(a) O(b·d) (b) O(b^d)<br>(c) O(d!) (d) O(b log d)<br>**Ans:O(b^d)** |
| 2 | 10 | DFS is memory efficient compared to BFS because it uses:<br>(a) No memory (b) Linear memory in depth<br>(c) Exponential memory (d) The optimal path only<br>**Ans:Linear memory in depth** |

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| 2 | 11 | DFS is not complete in infinite-depth spaces unless:<br>(a) Graph is finite (b) Cycles are absent or cut<br>(c) Step costs are uniform (d) Heuristic is admissible<br>**Ans:Cycles are absent or cut** |
| 2 | 12 | To avoid infinite loops in DFS, use:<br>(a) Heuristic (b) Cycle detection<br>(c) Larger memory (d) Shorter paths<br>**Ans:Cycle detection** |
| 2 | 13 | UCS expands nodes based on:<br>(a) Depth (b) Cost-so-far<br>(c) Heuristic (d) Random<br>**Ans:Cost-so-far** |
| 2 | 14 | UCS is optimal if all costs are:<br>(a) Negative (b) Non-negative<br>(c) Random (d) Unbounded<br>**Ans:Non-negative** |
| 2 | 15 | UCS time complexity is roughly O(b^C), where C is:**<br>(a) Branching factor (b) Maximum cost<br>(c) Optimal path cost (d) Depth<br>**Ans:Optimal path cost** |
| 2 | 16 | UCS requires which queue type?<br>(a) LIFO (b) FIFO<br>(c) Priority queue (d) Random access<br>**Ans:Priority queue** |
| 2 | 17 | UCS behaves like BFS when step costs are:<br>(a) Uniform (b) Nonuniform<br>(c) Zero (d) Increasing<br>**Ans:Uniform** |
| 2 | 18 | UCS is a form of:<br>(a) Depth-first search (b) Best-first search<br>(c) Greedy search (d) Heuristic search<br>**Ans:Best-first search** |
| 2 | 19 | UCS is complete when:<br>(a) Step cost $\geq \varepsilon > 0$ (b) Depth is finite<br>(c) Heuristic is admissible (d) Heuristic is consistent<br>**Ans:Step cost $\geq \varepsilon > 0$** |
| 2 | 20 | Best-first search is:<br>(a) Complete (b) Optimal<br>(c) Fast but not optimal (d) Memory efficient<br>**Ans:Fast but not optimal** |

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| 2 | 21 | Best-first search may get stuck if: | |
| | | (a) Heuristic is admissible | (b) Heuristic is perfect |
| | | (c) Heuristic misleads | (d) Heuristic is zero |
| | | **Ans:Heuristic misleads** | |
| 2 | 22 | Best-first is like breadth-first if: | |
| | | (a) h = 0 | (b) g = 0 |
| | | (c) Graph is balanced | (d) Step costs vary |
| | | **Ans:h = 0** | |
| 2 | 23 | The main limitation of Best-first search is: | |
| | | (a) High memory | (b) Slow speed |
| | | (c) Poor optimality | (d) Too deep |
| | | **Ans:Poor optimality** | |
| 2 | 24 | A* heuristic is admissible if it never: | |
| | | (a) Underestimates | (b) Overestimates |
| | | (c) Equals | (d) Exceeds the true cost |
| | | **Ans:Exceeds the true cost** | |
| 2 | 25 | A* heuristic overestimating the cost is: | |
| | | (a) Admissible | (b) Inadmissible |
| | | (c) Consistent | (d) Useful |
| | | **Ans:Inadmissible** | |
| 2 | 26 | Inconsistent admissible heuristics may cause A* to: | |
| | | (a) Stop early | (b) Re-expand nodes |
| | | (c) Ignore g(n) | (d) Fail to find paths |
| | | **Ans:Re-expand nodes** | |
| 2 | 27 | A* uses which evaluation function? | |
| | | (a) g(n) | (b) h(n) |
| | | (c) g(n) + h(n) | (d) max(g,h) |
| | | **Ans:g(n) + h(n)** | |
| 2 | 28 | With admissible h, A* is: | |
| | | (a) Complete and optimal | (b) Complete only |
| | | (c) Optimal only | (d) Neither |
| | | **Ans:Complete and optimal** | |
| 2 | 29 | With consistent h, A* with graph search: | |
| | | (a) May fail | (b) Is optimally efficient |
| | | (c) Is slower than BFS | (d) Loses optimality |
| | | **Ans:Is optimally efficient** | |
| 2 | 30 | A* must keep all generated nodes in memory to: | |
| | | (a) Track visited only | (b) Backtrack optimal path |
| | | (c) Use DFS | (d) Use greedy jumps |
| | | **Ans:Backtrack optimal path** | |

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| 2 | 31 | A* halts when the goal is:<br>(a) Generated (b) Popped from priority queue<br>(c) In frontier (d) At highest depth<br>**Ans:Popped from priority queue** |
| 2 | 32 | Worst-case time complexity of A* is:<br>(a) Polynomial (b) Exponential<br>(c) Constant (d) Logarithmic<br>**Ans:Exponential** |
| 2 | 33 | Among these, which minimizes f(n)?<br>(a) CIF (b) Greedy<br>(c) A* (d) DFS<br>**Ans:A*** |
| 2 | 34 | UCS reduces to BFS when step costs are:<br>(a) Nonuniform (b) Zero<br>(c) Uniform (d) Infinite<br>**Ans:Uniform** |
| 2 | 35 | Which search can handle inconsistent heuristics with proper duplicate checking?<br>(a) Greedy (b) UCS<br>(c) A* with graph search (d) BFS<br>**Ans:A* with graph search** |
| 2 | 36 | A heuristic that overestimates is:<br>(a) Admissible (b) Inadmissible<br>(c) Consistent (d) Safe<br>**Ans:Inadmissible** |
| 2 | 37 | A consistent heuristic guarantees no:<br>(a) Re-expansion (b) Optimal path<br>(c) Completeness (d) Memory usage<br>**Ans:Re-expansion** |
| 2 | 38 | The quality of a heuristic improves when it is:<br>(a) Closer to zero (b) Closer to true cost<br>(c) Always admissible only (d) Random<br>**Ans:Closer to true cost** |
| 2 | 39 | Best-first can be thought of as a special case of:<br>(a) A* with g(n) = 0 (b) A* with h(n) = 0<br>(c) UCS with g(n) only (d) DFS<br>**Ans:A* with g(n) = 0** |
| 2 | 40 | A heuristic of zero reduces A* to:<br>(a) Greedy (b) UCS<br>(c) DFS (d) BFS<br>**Ans:UCS** |

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| 2 | 41 | Best-first search works when:<br>(a) f(n) = g(n) + h(n) (b) f(n) = h(n)<br>(c) f(n) = g(n) (d) f(n) = 0<br>**Ans:f(n) = h(n)** |
| 2 | 42 | Complete search algorithms do not guarantee optimality unless:<br>(a) Heuristic is zero (b) Heuristic is negative<br>(c) Costs are uniform (d) Graph is finite<br>**Ans:Costs are uniform** |
| 2 | 43 | Which search uses exponential memory?<br>(a) DFS (b) IDS<br>(c) A* (d) Greedy<br>**Ans:A*** |
| 2 | 44 | If h(n) is the perfect heuristic (true cost to goal), A* will:<br>(a) Expand all nodes (b) Only along the optimal path<br>(c) Act like UCS (d) Fail<br>**Ans:Only along the optimal path** |
| 2 | 45 | In A* tree search, inconsistent heuristics cause:<br>(a) Termination failure (b) Node re-expansions<br>(c) Immediate optimality (d) Lower memory usage<br>**Ans:Node re-expansions** |
| 2 | 46 | Fringe (frontier) consists of:<br>(a) Visited nodes (b) Generated but not expanded nodes<br>(c) Goal nodes only (d) Root node only<br>**Ans:Generated but not expanded nodes** |
| 2 | 47 | For a graph with unit costs and consistent heuristic, A* and BFS/UCS will:<br>(a) Behave identically (b) Expand fewer nodes<br>(c) Expand more nodes (d) Fail<br>**Ans:Behave identically** |
| 2 | 48 | Bidirectional search works by:<br>(a) Searching from root to leaf (b) Searching from goal to start<br>(c) Searching simultaneously from both start and goal (d) Searching randomly<br>**Ans:Searching simultaneously from both start and goal** |
| 2 | 49 | BFS is applied to a tree where the goal is at depth 5. If the branching factor is 3, how many nodes are generated in the worst case before the goal?<br>(a) 121 (b) 243<br>(c) 364 (d) 728<br>**Ans:364** |
| 2 | 50 | BFS guarantees finding the shallowest solution. But it fails when:<br>(a) The branching factor is infinite (b) The cost is uniform<br>(c) The search space is finite (d) The graph has no cycles<br>**Ans:The branching factor is infinite** |

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| 3 | 1 | Which component of a knowledge-based agent is responsible for reasoning?<br>(a) Actuator (b) Knowledge base<br>(c) Inference system (d) Sensor<br>**Ans:Inference system** |
| 3 | 2 | The main function of a knowledge base in AI is to:<br>(a) Perform arithmetic operations (b) Store and retrieve facts and rules<br>(c) Generate random actions (d) Execute code<br>**Ans:Store and retrieve facts and rules** |
| 3 | 3 | In propositional logic, facts are represented as:<br>(a) True or false (b) Quantified variables<br>(c) Fuzzy values (d) Strings<br>**Ans:True or false** |
| 3 | 4 | What does a model in propositional logic represent?<br>(a) Diagram of a system (b) Truth assignment to variables<br>(c) Neural network weights (d) Flowchart<br>**Ans:Truth assignment to variables** |
| 3 | 5 | Ontological engineering is mainly concerned with:<br>(a) Creating structured representations of concepts and relationships (b) Designing microchips<br>(c) Debugging algorithms (d) Installing operating systems<br>**Ans:Creating structured representations of concepts and relationships** |
| 3 | 6 | Categories and objects in AI help in:<br>(a) Sorting data only (b) Reducing processing speed<br>(c) Efficient reasoning and inheritance of properties (d) Eliminating logic gates<br>**Ans:Efficient reasoning and inheritance of properties** |
| 3 | 7 | Events in AI knowledge representation are used to:<br>(a) Represent changes over time (b) Store constants<br>(c) Manage hardware (d) Detect user presence<br>**Ans:Represent changes over time** |
| 3 | 8 | Mental events in AI refer to:<br>(a) Database transactions (b) Internal states like beliefs, goals, and desires<br>(c) Hardware failures (d) File operations<br>**Ans:Internal states like beliefs, goals, and desires** |
| 3 | 9 | Reasoning systems for categories often use:<br>(a) Logical deduction and inheritance (b) Random number generation<br>(c) Neural backpropagation (d) Binary search<br>**Ans:Logical deduction and inheritance** |
| 3 | 10 | The main idea of the Hill Climbing algorithm is to:<br>(a) Explore all possible states (b) Move towards states with higher value<br>(c) Randomly select a state (d) Wait for a signal<br>**Ans:Move towards states with higher value** |

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| 3 | 11 | Hill climbing often suffers from:<br>(a) Global maxima (b) Local maxima<br>(c) Syntax errors (d) Data redundancy<br>**Ans:Local maxima** |
| 3 | 12 | Local Beam Search improves on hill climbing by:<br>(a) Tracking multiple states simultaneously (b) Ignoring evaluation functions<br>(c) Avoiding memory usage (d) Using only random moves<br>**Ans:Tracking multiple states simultaneously** |
| 3 | 13 | The selection step in Genetic Algorithms is inspired by:<br>(a) Random chance (b) Natural selection<br>(c) Binary search (d) Game theory<br>**Ans:Natural selection** |
| 3 | 14 | The main operators in Genetic Algorithms are:<br>(a) Addition and subtraction (b) Crossover and mutation<br>(c) Sorting and merging (d) Insertion and deletion<br>**Ans:Crossover and mutation** |
| 3 | 15 | In Genetic Algorithms, a fitness function measures:<br>(a) Speed of execution (b) Memory usage<br>(c) How well a solution solves the problem (d) Number of genes<br>**Ans:How well a solution solves the problem** |
| 3 | 16 | Which search algorithm keeps track of the top k states at each step?<br>(a) Depth-first search (b) Local beam search<br>(c) Random Walk (d) Breadth-first search<br>**Ans:Local beam search** |
| 3 | 17 | Which of the following is a disadvantage of hill climbing?<br>(a) Requires too much memory (b) Can get stuck at local maxima<br>(c) Needs no evaluation function (d) Explores all paths in parallel<br>**Ans:Can get stuck at local maxima** |
| 3 | 18 | The first step in a genetic algorithm is to:<br>(a) Create an initial population (b) Apply mutation<br>(c) Perform crossover (d) Select parents<br>**Ans:Create an initial population** |
| 3 | 19 | Which AI search method selects neighbours based on highest score until the goal is found?<br>(a) Random search (b) Hill climbing<br>(c) Local beam search (d) Genetic algorithm<br>**Ans:Hill climbing** |
| 3 | 20 | Mutation in Genetic Algorithms is used to:<br>(a) Remove weak solutions (b) Introduce diversity<br>(c) Speed up execution (d) Avoid evaluation<br>**Ans:Introduce diversity** |

| UNIT | Q NO | QUESTIONS |
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| 3 | 21 | In knowledge representation, categories help by:<br>(a) Increasing redundancy (b) Grouping similar objects for reasoning<br>(c) Preventing data access (d) Reducing storage size only<br>**Ans:Grouping similar objects for reasoning** |
| 3 | 22 | Which AI search algorithm is faster than random search but may still get stuck?<br>(a) Depth-first search (b) Hill climbing<br>(c) Local beam search (d) Breadth-first search<br>**Ans:Local beam search** |
| 3 | 23 | In Genetic Algorithms, chromosomes usually represent:<br>(a) Binary strings or arrays (b) Flowcharts<br>(c) Truth tables (d) Decision trees<br>**Ans:Binary strings or arrays** |
| 3 | 24 | A disadvantage of Genetic Algorithms is that they:<br>(a) Work only for small problems (b) May take longer to converge<br>(c) Can't be parallelized (d) Are fixed to one domain<br>**Ans:May take longer to converge** |
| 3 | 25 | Which process in Genetic Algorithms combines parts of two parent solutions?<br>(a) Mutation (b) Selection<br>(c) Crossover (d) Elimination<br>**Ans:Crossover** |
| 3 | 26 | What is the main purpose of the fitness function in Genetic Algorithms?<br>(a) To generate random values (b) To measure the quality of a solution<br>(c) To store genetic data (d) To determine mutation rate<br>**Ans:To measure the quality of a solution** |
| 3 | 27 | Which step in Genetic Algorithms helps avoid getting stuck in local optima?<br>(a) Mutation (b) Selection<br>(c) Encoding (d) Evaluation<br>**Ans:Mutation** |
| 3 | 28 | In Local Beam Search, how are neighbours selected?<br>(a) Randomly (b) Based on the best k scores<br>(c) By following a fixed sequence (d) Through mutation<br>**Ans:Based on the best k scores** |
| 3 | 29 | Which of the following is a real-world application of Genetic Algorithms?<br>(a) Text editing (b) Stock portfolio optimization<br>(c) Video playback (d) Basic arithmetic operations<br>**Ans:Stock portfolio optimization** |
| 3 | 30 | What is the stopping condition in Hill Climbing?<br>(a) When a local maximum is found (b) When no better neighbours are available<br>(c) When evaluation stops (d) When random steps fail<br>**Ans:When no better neighbours are available** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 3 | 31 | Which algorithm is inspired by biological evolution?<br>(a) Depth-first search (b) Breadth-first search<br>(c) Genetic Algorithm (d) Hill climbing<br>**Ans:Genetic Algorithm** |
| 3 | 32 | In Genetic Algorithms, initial solutions are created:<br>(a) From previous best results (b) Randomly<br>(c) From a fixed dataset (d) By manual entry<br>**Ans:Randomly** |
| 3 | 33 | What does “chromosome” represent in Genetic Algorithms?<br>(a) A program variable (b) A possible solution<br>(c) A search node (d) A hardware circuit<br>**Ans:A possible solution** |
| 3 | 34 | Which is NOT an advantage of Genetic Algorithms?<br>(a) Can solve complex problems (b) Flexible for many domains<br>(c) Always finds the global optimum (d) Works with non-linear problems<br>**Ans:Always finds the global optimum** |
| 3 | 35 | In Hill Climbing, the “value” of a state is measured using:<br>(a) Truth tables (b) Objective function<br>(c) Binary search (d) Graph traversal<br>**Ans:Objective function** |
| 3 | 36 | Which search algorithm is often used in pathfinding for games?<br>(a) Hill climbing (b) Local beam search<br>(c) Genetic Algorithm (d) Random Walk<br>**Ans:Local beam search** |
| 3 | 37 | Mutation in Genetic Algorithms occurs:<br>(a) Before selection (b) After crossover<br>(c) Before initialization (d) Only in the first generation<br>**Ans:After crossover** |
| 3 | 38 | What is a disadvantage of Local Beam Search?<br>(a) Can still get stuck in local maxima (b) Requires large memory<br>(c) Cannot work with heuristics (d) Needs no scoring function<br>**Ans:Can still get stuck in local maxima** |
| 3 | 39 | In AI, events are important for:<br>(a) Modelling time-based changes (b) Storing static data<br>(c) Optimizing memory (d) Replacing categories<br>**Ans:Modelling time-based changes** |
| 3 | 40 | Which AI concept involves inheritance of properties?<br>(a) Categories and objects (b) Genetic mutations<br>(c) Truth assignments (d) Beam width<br>**Ans:Categories and objects** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 3 | 41 | In Local Beam Search, increasing k (number of states) generally:<br>(a) Slows down the search and reduces success<br>(b) Speeds up search and increases diversity<br>(c) Prevents memory overflow<br>(d) Reduces solution accuracy<br>**Ans:Speeds up search and increases diversity** |
| 3 | 42 | Which is a key difference between Hill Climbing and Local Beam Search?<br>(a) Hill climbing uses multiple states<br>(b) Local beam search tracks multiple states at once<br>(c) Hill climbing avoids local maxima<br>(d) Local beam search uses no evaluation function<br>**Ans:Local beam search tracks multiple states at once** |
| 3 | 43 | In AI, "mental objects" refer to:<br>(a) Internal data structures like goals and plans<br>(b) Memory units in hardware<br>(c) Categories of physical objects<br>(d) Logic gates in processors<br>**Ans:Internal data structures like goals and plans** |
| 3 | 44 | Which AI approach is faster than random search but still may fail?<br>(a) Depth-first search<br>(b) Hill climbing<br>(c) Genetic Algorithm<br>(d) Breadth-first search<br>**Ans:Hill climbing** |
| 3 | 45 | Which step in Genetic Algorithms maintains population diversity?<br>(a) Selection<br>(b) Mutation<br>(c) Evaluation<br>(d) Encoding<br>**Ans:Mutation** |
| 3 | 46 | A typical application of Hill Climbing is:<br>(a) Solving the Traveling Salesman Problem<br>(b) Hardware fault detection<br>(c) Image compression<br>(d) Code compilation<br>**Ans:Solving the Traveling Salesman Problem** |
| 3 | 47 | The main inspiration for Genetic Algorithms comes from:<br>(a) Graph theory<br>(b) Biological evolution<br>(c) Digital circuits<br>(d) Linear algebra<br>**Ans:Biological evolution** |
| 3 | 48 | What is a gene in Genetic Algorithms?<br>(a) The complete solution<br>(b) A part of the chromosome<br>(c) The evaluation score<br>(d) The mutation process<br>**Ans:A part of the chromosome** |
| 3 | 49 | Which of the following is NOT a step in the Genetic Algorithm process?<br>(a) Crossover<br>(b) Mutation<br>(c) Proof by contradiction<br>(d) Selection<br>**Ans:Proof by contradiction** |
| 3 | 50 | In Local Beam Search, increasing beam width too much can lead to:<br>(a) Higher memory usage<br>(b) Reduced diversity<br>(c) Faster execution<br>(d) Smaller search space<br>**Ans:Higher memory usage** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 4 | 1 | Which algorithm is used to choose the optimal move in a two-player zero-sum game?<br>(a) Hill climbing (b) Minimax<br>(c) A* search (d) Genetic algorithm<br>**Ans:Minimax** |
| 4 | 2 | What is the primary advantage of alpha-beta pruning in game search?<br>(a) Improves accuracy (b) Reduces the number of nodes evaluated<br>(c) Increases branching factor (d) Removes heuristic evaluation<br>**Ans:Reduces the number of nodes evaluated** |
| 4 | 3 | In a game tree, the nodes at even depths represent which player's turn?<br>(a) Maximizing player (b) Minimizing player<br>(c) Random player (d) Chance nodes<br>**Ans:Maximizing player** |
| 4 | 4 | Which term describes a game where both players have complete knowledge of the state?<br>(a) Partially observable (b) Fully observable<br>(c) Stochastic (d) Hidden information<br>**Ans:Fully observable** |
| 4 | 5 | What is the evaluation function in game playing used for?<br>(a) To store game rules (b) To estimate the desirability of a position<br>(c) To record moves made (d) To compute branching factor<br>**Ans:To estimate the desirability of a position** |
| 4 | 6 | In CSPs, what does each variable have?<br>(a) Constraints only (b) A domain of possible values<br>(c) A heuristic function (d) An evaluation score<br>**Ans:A domain of possible values** |
| 4 | 7 | Which technique eliminates inconsistent values from domains in CSPs?<br>(a) Arc consistency (b) Hill climbing<br>(c) Minimax (d) Alpha-beta pruning<br>**Ans:Arc consistency** |
| 4 | 8 | Which term describes a CSP where all constraints involve only two variables?<br>(a) Unary CSP (b) Binary CSP<br>(c) Ternary CSP (d) Global CSP<br>**Ans:Binary CSP** |
| 4 | 9 | Which search method for CSPs uses no backtracking and just selects values randomly?<br>(a) Random restart hill climbing (b) Monte Carlo search<br>(c) Local search (d) Forward checking<br>**Ans:Local search** |
| 4 | 10 | What does alpha-beta pruning never affect?<br>(a) Branching factor (b) Search time<br>(c) Optimality of the result (d) Number of nodes generated<br>**Ans:Optimality of the result** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 4 | 11 | Which is an example of a deterministic game?<br>(a) Chess (b) Poker<br>(c) Backgammon (d) Rock-paper-scissors with hidden choices<br>**Ans:Chess** |
| 4 | 12 | In constraint propagation, which consistency is stronger than arc consistency?<br>(a) Node consistency (b) Path consistency<br>(c) Forward consistency (d) Value consistency<br>**Ans:Path consistency** |
| 4 | 13 | What is the branching factor in a game tree?<br>(a) Number of possible end states (b) Average number of legal moves from a position<br>(c) Depth of the tree (d) Number of pruned branches<br>**Ans:Average number of legal moves from a position** |
| 4 | 14 | Which CSP algorithm assigns values and immediately eliminates inconsistent options for neighboring variables?<br>(a) MRV (b) Forward checking<br>(c) Alpha-beta pruning (d) Simulated annealing<br>**Ans:Forward checking** |
| 4 | 15 | What is the main goal of constraint satisfaction techniques?<br>(a) Maximize score (b) Find a consistent assignment for all variables<br>(c) Reduce branching factor (d) Learn from previous games<br>**Ans:Find a consistent assignment for all variables** |
| 4 | 16 | In alpha-beta pruning, alpha represents:<br>(a) The best score for the maximizing player so far (b) The best score for the minimizing player so far<br>(c) The maximum branching factor (d) The depth limit of the search<br>**Ans:The best score for the maximizing player so far** |
| 4 | 17 | Which CSP property ensures every variable assignment is consistent with all unary constraints?<br>(a) Node consistency (b) Arc consistency<br>(c) Path consistency (d) Global consistency<br>**Ans:Node consistency** |
| 4 | 18 | In alpha-beta pruning, beta represents:<br>(a) The best score for the maximizing player so far (b) The best score for the minimizing player so far<br>(c) The branching factor (d) The average depth limit<br>**Ans:The best score for the minimizing player so far** |
| 4 | 19 | Which CSP approach tries to improve a complete but inconsistent assignment by changing values?<br>(a) Backtracking search (b) Local search<br>(c) Forward checking (d) Arc consistency<br>**Ans:Local search** |
| 4 | 20 | Which CSP-solving method is most efficient when the problem is nearly complete but has few conflicts?<br>(a) Backtracking (b) Local search with min-conflicts<br>(c) Arc consistency (d) Path consistency<br>**Ans:Local search with min-conflicts** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 4 | 21 | In alpha-beta pruning, when is pruning performed?<br>(a) When alpha ≥ beta (b) When alpha < beta<br>(c) At the end of the search (d) Only at the root<br>**Ans:When alpha ≥ beta** |
| 4 | 22 | Which algorithm for CSPs can be seen as depth-first search with constraint checking at each step?<br>(a) Forward checking (b) MRV<br>(c) Minimax (d) Simulated annealing<br>**Ans:Forward checking** |
| 4 | 23 | Which CSP property ensures consistency for every set of three variables?<br>(a) Node consistency (b) Arc consistency<br>(c) Path consistency (d) Global consistency<br>**Ans:Path consistency** |
| 4 | 24 | Which algorithm eliminates unnecessary nodes in minimax trees?<br>(a) Minimax (b) Alpha-beta pruning<br>(c) Hill climbing (d) A* search<br>**Ans:Alpha-beta pruning** |
| 4 | 25 | Which term in game theory refers to the best outcome achievable assuming the opponent also plays optimally?<br>(a) Nash equilibrium (b) Minimax value<br>(c) Pareto optimum (d) Dominant strategy<br>**Ans:Minimax value** |
| 4 | 26 | In CSPs, when each pair of variables connected by a constraint satisfies the constraint, the network is:<br>(a) Node consistent (b) Arc consistent<br>(c) Path consistent (d) Globally consistent<br>**Ans:Arc consistent** |
| 4 | 27 | Which algorithm is an improvement over minimax by eliminating branches that cannot affect the outcome?<br>(a) Forward checking (b) Alpha-beta pruning<br>(c) AC-3 (d) Hill climbing<br>**Ans:Alpha-beta pruning** |
| 4 | 28 | In CSPs, what is backtracking search's primary drawback?<br>(a) It requires too much memory (b) It may revisit the same partial assignments<br>(c) It cannot solve binary constraints (d) It ignores variable ordering<br>**Ans:It may revisit the same partial assignments** |
| 4 | 29 | What is a game tree?<br>(a) A representation of all possible moves and states in a game (b) A tree of CSP variable assignments<br>(c) A search tree with only winning states (d) A binary tree for alpha-beta pruning<br>**Ans:A representation of all possible moves and states in a game** |
| 4 | 30 | In game playing, the evaluation function is used to:<br>(a) Compute exact game outcomes (b) Estimate the value of a game state<br>(c) Determine the branching factor (d) Reduce the depth limit<br>**Ans:Estimate the value of a game state** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 4 | 31 | In alpha-beta pruning, which order of node expansion gives the best pruning performance?<br>(a) Random order (b) Worst-case order<br>(c) Best moves first (d) Deepest nodes first<br>**Ans:Best moves first** |
| 4 | 32 | Which CSP property ensures that the problem remains consistent when considering sequences of variables longer than three?<br>(a) Arc consistency (b) Path consistency<br>(c) Global consistency (d) Node consistency<br>**Ans:Global consistency** |
| 4 | 33 | Which CSP solving method tries all possible assignments until a solution is found?<br>(a) Backtracking search (b) Min-conflicts<br>(c) AC-3 (d) Alpha-beta pruning<br>**Ans:Backtracking search** |
| 4 | 34 | Which type of games involve hidden information for at least one player?<br>(a) Perfect information games (b) Imperfect information games<br>(c) Zero-sum games (d) Stochastic games<br>**Ans:Imperfect information games** |
| 4 | 35 | What is the main advantage of constraint propagation in CSPs?<br>(a) Reduces the domain of variables early (b) Guarantees optimal solution<br>(c) Works only for binary constraints (d) Avoids variable ordering<br>**Ans:Reduces the domain of variables early** |
| 4 | 36 | In minimax search, the maximizing player tries to:<br>(a) Minimize the opponent's score (b) Maximize their own score<br>(c) Minimize branching factor (d) Avoid alpha-beta pruning<br>**Ans:Maximize their own score** |
| 4 | 37 | In CSPs, path consistency means:<br>(a) All variables satisfy unary constraints (b) All pairs of variables satisfy binary constraints<br>(c) All triples of variables are consistent with each other (d) The problem is solved without backtracking<br>**Ans:All triples of variables are consistent with each other** |
| 4 | 38 | Which CSP technique can detect dead ends earlier by checking neighbors after each assignment?<br>(a) Forward checking (b) AC-3<br>(c) Iterative deepening (d) Min-conflicts<br>**Ans:Forward checking** |
| 4 | 39 | In CSP solving, when each variable's domain has exactly one value consistent with all constraints, the problem is:<br>(a) Node consistent (b) Solved<br>(c) Path consistent (d) Over-constrained<br>**Ans:Solved** |
| 4 | 40 | In CSPs, domain reduction is primarily achieved through:<br>(a) Constraint propagation (b) Iterative deepening<br>(c) Minimax (d) Monte Carlo sampling<br>**Ans:Constraint propagation** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 4 | 41 | Which type of games are deterministic with perfect information?<br>(a) Chess and Checkers (b) Poker and Bridge<br>(c) Go Fish and Battleship (d) Rock-Paper-Scissors<br>**Ans:Chess and Checkers** |
| 4 | 42 | What does pruning do in search algorithms?<br>(a) Increases branching factor (b) Removes unpromising branches<br>(c) Guarantees optimal solution (d) Randomizes search<br>**Ans:Removes unpromising branches** |
| 4 | 43 | Which algorithm is a local search method for CSPs that minimizes the number of constraint violations?<br>(a) AC-3 (b) Min-conflicts<br>(c) Forward checking (d) Backtracking<br>**Ans:Min-conflicts** |
| 4 | 44 | Which CSP algorithm can detect inconsistencies between variable pairs before search begins?<br>(a) Arc consistency checking (b) Forward checking<br>(c) Min-conflicts (d) Iterative deepening<br>**Ans:Arc consistency checking** |
| 4 | 45 | Which type of games require strategies that consider future uncertainty?<br>(a) Stochastic games (b) Deterministic games<br>(c) Perfect information games (d) Zero-sum games<br>**Ans:Stochastic games** |
| 4 | 46 | Which game playing search method expands only the most promising moves based on evaluation?<br>(a) Beam search (b) Depth-first search<br>(c) Minimax (d) AC-3<br>**Ans:Beam search** |
| 4 | 47 | Which property of CSPs ensures every variable's domain satisfies unary constraints?<br>(a) Node consistency (b) Arc consistency<br>(c) Path consistency (d) Global consistency<br>**Ans:Node consistency** |
| 4 | 48 | In CSP solving, a problem is over-constrained when:<br>(a) There are more variables than constraints (b) No assignment satisfies all constraints<br>(c) Domains are too large (d) Arc consistency fails<br>**Ans:No assignment satisfies all constraints** |
| 4 | 49 | Which game playing concept measures how good a position is for a player?<br>(a) Utility function (b) Constraint satisfaction<br>(c) Path cost (d) Arc consistency<br>**Ans:Utility function** |
| 4 | 50 | Which term describes a game where all players benefit from cooperation?<br>(a) Cooperative game (b) Zero-sum game<br>(c) Stochastic game (d) Imperfect information game<br>**Ans:Cooperative game** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 5 | 1 | A knowledge-based agent primarily consists of which two key components?<br>(a) Knowledge base and inference engine (b) Sensors and actuators<br>(c) Utility function and environment model (d) Search tree and heuristic<br>**Ans:Knowledge base and inference engine** |
| 5 | 2 | What is the main advantage of a knowledge-based approach?<br>(a) Fast reflex actions without representation (b) Ability to explain decisions using stored knowledge<br>(c) Learning only from raw pixels (d) No need for inference<br>**Ans:Ability to explain decisions using stored knowledge** |
| 5 | 3 | Which representation is MOST typical in early knowledge-based AI systems?<br>(a) Differential equations (b) Symbolic logic (propositional/first-order)<br>(c) Fourier series (d) Neural embeddings only<br>**Ans:Symbolic logic (propositional/first-order)** |
| 5 | 4 | In an agent cycle, which step usually comes immediately after perceiving?<br>(a) Update internal state/KB (b) Actuate<br>(c) Shutdown (d) Reset goals<br>**Ans:Update internal state/KB** |
| 5 | 5 | Which of the following is NOT typical of a knowledge-based agent?<br>(a) Use of entailment/inference (b) Explicit world model<br>(c) Opaque black-box decision making (d) Ability to derive new facts<br>**Ans:Opaque black-box decision making** |
| 5 | 6 | A knowledge base can hold all EXCEPT:<br>(a) Facts (b) Rules<br>(c) Actions taken by actuators in the past (d) Physical sensor hardware<br>**Ans:Physical sensor hardware** |
| 5 | 7 | Which of these best describes the knowledge level vs. symbol level?<br>(a) Hardware vs. software (b) What the agent knows and aims to achieve vs. how it is encoded<br>(c) Input vs. output (d) Supervised vs. unsupervised<br>**Ans:What the agent knows and aims to achieve vs. how it is encoded** |
| 5 | 8 | In KB-agents, which function maps percept history to action?<br>(a) Policy function (b) Agent function<br>(c) Transition model (d) Utility function<br>**Ans:Agent function** |
| 5 | 9 | Procedural knowledge in a KB is best captured by:<br>(a) Production rules (b) Raw images<br>(c) Actuator torque values (d) Filesystem paths<br>**Ans:Production rules** |
| 5 | 10 | Declarative knowledge in a KB refers to:<br>(a) How-to instructions (b) Facts about what is true<br>(c) Hardware schematics (d) Learning parameters<br>**Ans:Facts about what is true** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 5 | 11 | Which is a typical agent program for KB-agents?<br>(a) Simple reflex without state<br>(b) Goal-based with inference over KB<br>(c) Random action selection<br>(d) Always greedy best-first<br>**Ans:Goal-based with inference over KB** |
| 5 | 12 | Which of the following is a proposition?<br>(a) Close the window<br>(b) 2+2=4<br>(c) x>3<br>(d) Who are you?<br>**Ans:2+2=4** |
| 5 | 13 | The connective ∧ represents:<br>(a) Negation<br>(b) Conjunction<br>(c) Disjunction<br>(d) Implication<br>**Ans:Conjunction** |
| 5 | 14 | p ∨ q is false when:<br>(a) p and q are both false<br>(b) p is true and q is false<br>(c) p is false and q is true<br>(d) both are true<br>**Ans:p and q are both false** |
| 5 | 15 | ¬(p ∧ q) is equivalent to:<br>(a) ¬p ∨ ¬q<br>(b) p → q<br>(c) p ↔ q<br>(d) ¬p ∧ ¬q<br>**Ans:¬p ∨ ¬q** |
| 5 | 16 | p → q is logically equivalent to:<br>(a) p ∧ q<br>(b) ¬p ∨ q<br>(c) q → p<br>(d) p ↔ q<br>**Ans:¬p ∨ q** |
| 5 | 17 | The contrapositive of p → q is:<br>(a) q → p<br>(b) ¬p → ¬q<br>(c) ¬q → ¬p<br>(d) p ↔ q<br>**Ans:¬q → ¬p** |
| 5 | 18 | A tautology is:<br>(a) Always false<br>(b) Sometimes true<br>(c) Always true<br>(d) Undetermined<br>**Ans:Always true** |
| 5 | 19 | The biconditional p ↔ q is true when:<br>(a) p and q have different truth values<br>(b) p and q are both true or both false<br>(c) p is true only<br>(d) q is true only<br>**Ans:p and q are both true or both false** |
| 5 | 20 | A contradiction is:<br>(a) A formula with at least one model<br>(b) A formula with no model<br>(c) Equivalent to a tautology<br>(d) Satisfiable but not valid<br>**Ans:A formula with no model** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 5 | 21 | A literal is:<br>(a) Only an atom (b) An atom or its negation<br>(c) Only a negation (d) A clause<br>**Ans:An atom or its negation** |
| 5 | 22 | $p \vdash q$ means:<br>(a) p semantically entails q (b) p syntactically proves q<br>(c) q proves p (d) p and q are equivalent<br>**Ans:p syntactically proves q** |
| 5 | 23 | Soundness of a proof system means:<br>(a) All valid formulas are provable (b) All provable formulas are valid<br>(c) Some invalid formulas are provable (d) Proofs are short<br>**Ans:All provable formulas are valid** |
| 5 | 24 | A clause is a disjunction of:<br>(a) Formulas (b) Literals<br>(c) Clauses (d) Conjunctions<br>**Ans:Literals** |
| 5 | 25 | A valuation that makes a formula true is called a:<br>(a) Conflict (b) Model<br>(c) Clause (d) Unit<br>**Ans:Model** |
| 5 | 26 | A propositional logic agent typically represents the world as:<br>(a) First-order predicates (b) Boolean variables and clauses<br>(c) Probabilistic factors (d) Utility functions only<br>**Ans:Boolean variables and clauses** |
| 5 | 27 | Percepts are incorporated by:<br>(a) Adding corresponding literals to KB (b) Updating weights<br>(c) Adding non-Boolean terms (d) Ignoring them<br>**Ans:Adding corresponding literals to KB** |
| 5 | 28 | The limitation of propositional agents is:<br>(a) Cannot represent categories (b) No uncertainty<br>(c) No quantification/variables (d) No actions<br>**Ans:No quantification/variables** |
| 5 | 29 | Goal tests can be formalized as:<br>(a) A clause set entailing goal literals (b) Only minimizing loss<br>(c) Temporal rewards (d) Markov blankets<br>**Ans:A clause set entailing goal literals** |
| 5 | 30 | Sensing actions affect:<br>(a) Only actuators (b) The knowledge state (what the agent knows)<br>(c) The physical world (d) Utility only<br>**Ans:The knowledge state (what the agent knows)** |

| UNIT | Q NO | QUESTIONS |
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| 5 | 31 | Observation literals are often treated as:<br>(a) Always uncertain (b) Hard evidence (asserted truths) for that time step<br>(c) Irrelevant (d) Utility modifiers<br>**Ans:Hard evidence (asserted truths) for that time step** |
| 5 | 32 | Which is NOT a standard agent architecture?<br>(a) Simple reflex (b) Model-based reflex<br>(c) Goal-based (d) Fourier-based<br>**Ans:Fourier-based** |
| 5 | 33 | A model-based agent maintains:<br>(a) No internal state (b) A representation of the worldâ€™s dynamics<br>(c) Only a utility function (d) Only raw percepts<br>**Ans:A representation of the worldâ€™s dynamics** |
| 5 | 34 | A utility-based agent chooses actions to:<br>(a) Satisfy any rule (b) Maximize expected utility<br>(c) Minimize number of rules (d) Avoid search<br>**Ans:Maximize expected utility** |
| 5 | 35 | A layered (hybrid) architecture aims to:<br>(a) Use a single loop (b) Combine reactive and deliberative layers<br>(c) Eliminate planning (d) Ignore sensors<br>**Ans:Combine reactive and deliberative layers** |
| 5 | 36 | In partially observable environments, which architecture helps most?<br>(a) Simple reflex only (b) Model-based<br>(c) No agent can help (d) Random<br>**Ans:Model-based** |
| 5 | 37 | Deliberative agents emphasize:<br>(a) Precomputed reflexes (b) Reasoning and planning with models<br>(c) Random exploration (d) Sensor fusion only<br>**Ans:Reasoning and planning with models** |
| 5 | 38 | A belief-state is:<br>(a) A set/summary of possible world states (b) Only the true state<br>(c) The utility function (d) The action set<br>**Ans:A set/summary of possible world states** |
| 5 | 39 | Real-time constraints often motivate:<br>(a) More deliberation always (b) Reactive layers with time-bounded decisions<br>(c) Ignoring deadlines (d) Removing sensors<br>**Ans:Reactive layers with time-bounded decisions** |
| 5 | 40 | Learning components in an agent primarily:<br>(a) Replace sensors (b) Improve performance by updating models/policies<br>(c) Eliminate planning (d) Remove uncertainty<br>**Ans:Improve performance by updating models/policies** |

| UNIT | Q NO | QUESTIONS |
|---|---|---|
| 5 | 41 | An Agent Communication Language (ACL) commonly specifies:<br>(a) Syntax, semantics, and pragmatics of messages (b) Only byte order<br>(c) Hardware buses (d) Pixel formats<br>**Ans:Syntax, semantics, and pragmatics of messages** |
| 5 | 42 | Which is a standard performative in KQML/FIPA ACL?<br>(a) REQUEST (b) JPEG<br>(c) TCP_SYN (d) SQL_SELECT<br>**Ans:REQUEST** |
| 5 | 43 | The content language in ACL messages carries:<br>(a) Network headers (b) Domain-specific knowledge expressions<br>(c) Binary opcodes only (d) Audio signals<br>**Ans:Domain-specific knowledge expressions** |
| 5 | 44 | A conversation protocol defines:<br>(a) Legal sequences of communicative acts (b) Only message sizes<br>(c) Routing tables (d) Ontology names only<br>**Ans:Legal sequences of communicative acts** |
| 5 | 45 | Ontologies in agent communication provide:<br>(a) A shared vocabulary and meaning (b) Compression<br>(c) Encryption (d) Scheduling<br>**Ans:A shared vocabulary and meaning** |
| 5 | 46 | A broker/mediator agent typically:<br>(a) Blocks communication (b) Matches service requests to providers<br>(c) Only logs messages (d) Encrypts content<br>**Ans:Matches service requests to providers** |
| 5 | 47 | Argumentation semantics help agents to:<br>(a) Only send bytes (b) Resolve conflicts and justify decisions<br>(c) Encrypt data (d) Schedule tasks only<br>**Ans:Resolve conflicts and justify decisions** |
| 5 | 48 | Propostional logic is also known as:<br>(a) First-Order logic (b) Predicate logic<br>(c) Boolean logic (d) Ontological logic<br>**Ans:Boolean logic** |
| 5 | 49 | Which of the following is a valid propositional connective?<br>(a) For all (b) There exists<br>(c) and (d) :-<br>**Ans:and** |
| 5 | 50 | Which method is used in propositional theorem proving?<br>(a) Unification (b) resolution<br>(c) clustering (d) Backpropagation<br>**Ans:resolution** |

**NOTE PART B (3 Marks)**

| UNIT NO | Q.NO | QUESTION |
|---|---|---|
| 1 | 1 | Mention the features of Learning Agents. |
| 1 | 2 | Write about Utility-Based Agents. |
| 1 | 3 | Write about Goal-Based Agents. |
| 1 | 4 | What is Model-Based Reflex Agent? |
| 1 | 5 | With neat sketch write about Simple Reflex Agents. |
| 1 | 6 | What is PEAS? Give an example. |
| 1 | 7 | List the types of environments. |
| 1 | 8 | Give examples for any 2 environment types. |
| 1 | 9 | Give differences between Narrow AI and General AI. |
| 1 | 10 | Write about Natural Language Processing (NLP). |
| 2 | 1 | Given branching factor=3 and depth of goal node =4. Calculate time and space complexity for DFS. |
| 2 | 2 | Given branching factor=3 and depth of goal node =4. Calculate time and space complexity for BFS. |
| 2 | 3 | Write about Best First Search. |
| 2 | 4 | Write the differences between uninformed and informed search strategies. |
| 2 | 5 | Write the differences between DFS and BFS. |
| 2 | 6 | What is UCS and what happens when all path cost are equal? |
| 2 | 7 | List the applications of Heuristic search in AI. |
| 2 | 8 | Write about the disadvantages of Best First Search. |
| 2 | 9 | Write the time and space complexity of DFS and BFS. |
| 2 | 10 | Define completeness, optimality, time complexity and space complexiy in a search strategy. |
| 3 | 1 | Mention the advantages of knowledge-based agents. |
| 3 | 2 | List the types of knowledge base. |
| 3 | 3 | Write about the types of logic of AI. |
| 3 | 4 | Give applications of ontological engineering. |
| 3 | 5 | Write about objects in AI. |
| 3 | 6 | Write about events in AI. |
| 3 | 7 | Write about the features of Hill Climbing algorithm. |
| 3 | 8 | Write about advantages of Local Beam Search. |
| 3 | 9 | What is a Genetic Algorithm? |
| 3 | 10 | Write any four differences between Local Beam Search and Genetic Algorithms. |
| 4 | 1 | Define CSP for map coloring. |
| 4 | 2 | Define CSP for soduku solver. |
| 4 | 3 | Define CSP for N-Queens Problem. |
| 4 | 4 | Write about backtracking search for CSP. |
| 4 | 5 | Write about min-conflicts heuristic. |
| 4 | 6 | Give some applications of game theory. |
| 4 | 7 | Write about the working principle of Mini-Max algorithm. |
| 4 | 8 | Define alpha (α) and beta (β). Give the condition for pruing. |
| 4 | 9 | List and explain the components of CSP. |
| 4 | 10 | Write the differences between binary and non-binary constraints. |
| 5 | 1 | Write the truth table for implication (P->Q). |
| 5 | 2 | Write the truth table for Biconditional (P<->Q). |
| 5 | 3 | How to infer rules using Modus Ponens? Give an example. |
| 5 | 4 | How to infer rules using Modus Tollens? Give an example. |
| 5 | 5 | Define Entailment, Validity and Satisfiability. |
| 5 | 6 | What is inference-based agent? |
| 5 | 7 | What is circuit based agent? |
| 5 | 8 | Write about hybrid agent? |
| 5 | 9 | List the types of agent architectures. |
| 5 | 10 | List types of messages in agent communication. |

**NOTE PART C (10 Marks)**

| UNIT NO | Q.NO | QUESTION |
|---|---|---|
| 1 | 1 | Explain AI and state its primary goals. |
| 1 | 2 | Explain major real-world applications of AI. |
| 1 | 3 | Differentiate between Human and Machine intelligence. |
| 1 | 4 | Explain the types of agents and give example. |
| 1 | 5 | Explain the key characteristics like (Deterministic vs. Stochastic) and (Static vs. Dynamic). |
| 2 | 1 | Explain the Breadth First Search (BFS) and Depth First Search (DFS) algorithms with suitable examples. |
| 2 | 2 | Explain the Uniform Cost Search (UCS) algorithm with a neat example. |
| 2 | 3 | Explain the Bidirectional Search algorithm. |
| 2 | 4 | Explain heuristic search techniques with example. |
| 2 | 5 | Explain in detail about A* search algorithm with example. |
| 3 | 1 | Explain Knowledge-Based Agents and their working with a suitable example. |
| 3 | 2 | Explain types of logics used in AI. |
| 3 | 3 | Explain Hill Climbing algorithm. |
| 3 | 4 | Explain Local Beam Search algorithm. |
| 3 | 5 | Explain the Genetic Algorithm with a neat example and its working steps. |
| 4 | 1 | Explain in detail about mini-max algorithm with example. |
| 4 | 2 | Explain Alpha - Beta pruning algorithm in detail with example. |
| 4 | 3 | Explain CSP with N-Queens. |
| 4 | 4 | Explain in detail about CSP with 9x9 sudoku. |
| 4 | 5 | Explain in detail about CSP with map colouring. |
| 5 | 1 | Explain in detail about propositional logic. |
| 5 | 2 | Explain the architecture for intelligent agents. |
| 5 | 3 | Explain about agent communication. |
| 5 | 4 | Explain types of messages in agent communication. |
| 5 | 5 | Explain argumentation among agents. |