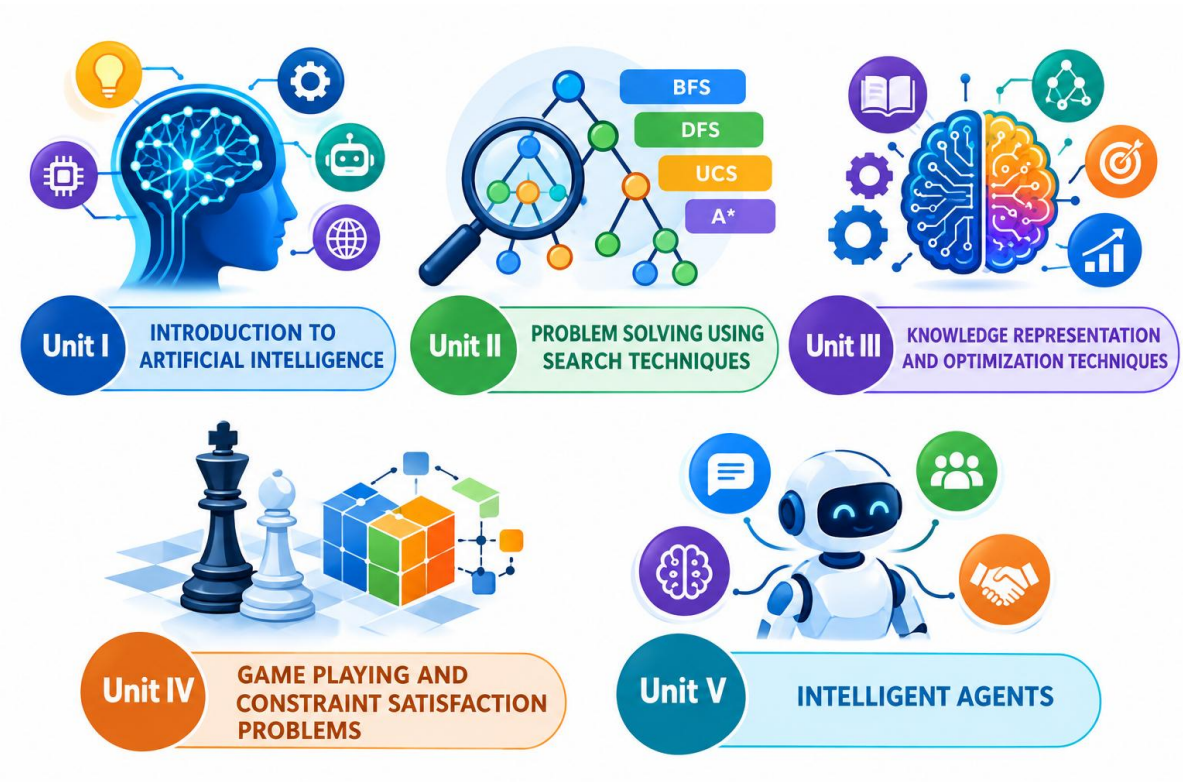
CENTRAL POLYTECHNIC COLLEGE,THARAMANI – 600113.

(An Autonomous Institution)

DEPARTMENT OF COMPUTER ENGINEERING

QUESTION BANK

ECS51025 ARTIFICIAL INTELIGENCE



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

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1	11	Which of these is NOT a typical AI subfield? (a) Planning (b) Signal processing (c) Knowledge representation (d) Natural language processing **Ans:(B Signal processing**
1	12	Agent design must consider all EXCEPT (a) The agent's sensors (b) The agent's actuators (c) The agent's feelings (d) The agent's environment **Ans:(C The agent's feelings**
1	13	Which of these criteria is NOT part of the AI definition in code-based thinking? (a) Thinks like humans (b) Acts like humans (c) Thinks rationally (d) Uses emotions **Ans:(D Uses emotions**
1	14	The term "knowledge engineering" refers to (a) Building logic circuits (b) Acquiring and encoding domain knowledge (c) Data mining (d) GPU design **Ans:(B Acquiring and encoding domain knowledge**
1	15	Which of these systems is most associated with expert systems? (a) Siri (b) Mycin (c) AlphaGo (d) Tesla autopilot **Ans:(B Mycin**
1	16	The AI field that focuses on how to represent information about the world is (a) Planning (b) Perception (c) Knowledge representation (d) Search **Ans:(C Knowledge representation**
1	17	Which architecture uses production rules and an inference engine? (a) Blackboard system (b) Expert system (c) Neural network (d) Planner **Ans:(B Expert system**
1	18	The AI subfield dealing with pattern recognition focuses on (a) Logic (b) Statistics (c) Heuristics (d) Planning **Ans:(B Statistics**
1	19	AI goals include all EXCEPT (a) Understanding perception (b) Natural dialogue (c) Physical agility (d) Generating electricity **Ans:(D Generating electricity**
1	20	"General AI" means (a) AI that is good at gaming (b) AI that can perform any intellectual task like a human (c) AI specialized in one domain (d) Military AI **Ans:(B AI that can perform any intellectual task like a human**

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

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

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1	41	A "learning element" in an agent does (a) Store actuators (b) Improve agent based on feedback (c) Plan goals (d) Execute reflexes **Ans:(B Improve agent based on feedback**
1	42	Which example demands learning? (a) Vacuum agent in known layout (b) Chatbot improving through feedback (c) Chess engine with fixed eval function (d) Rule-based thermostat **Ans:(B Chatbot improving through feedback**
1	43	"Observability" refers to (a) Sensing entire world or not (b) Agent's self-concept (c) Utility measurement (d) Hardware visibility **Ans:(A Sensing entire world or not**
1	44	In model-based reflex agents, "model" is used to (a) Store training data (b) Track unobserved aspects (c) Compute utility (d) Execute actions **Ans:(B Track unobserved aspects**
1	45	Sequence: Observe–Think–Act is used by (a) Reflex only (b) Goal-based agents (c) Stochastic agents only (d) Learning only **Ans:(B Goal-based agents**
1	46	Which environment permits partial control? (a) Deterministic (b) Stochastic (c) Episodic (d) Single agent **Ans:(B Stochastic**
1	47	Which is an example of an episodic environment? (a) Chess (b) Email spam filter (c) Driving (d) Crossword puzzle **Ans:(B Email spam filter**
1	48	Which is NOT a measure of success in AI agent design? (a) Task performance (b) Speed (c) Rationality (d) Physical appearance **Ans:(D Physical appearance**
1	49	"Intelligent behavior" is best described as (a) Random actions (b) Goal-achieving actions under uncertainty (c) Magic (d) Strictly rule-following **Ans:(B Goal-achieving actions under uncertainty**
1	50	The phrase "AI winter" refers to (a) Cold labs (b) Periods of reduced funding/interest (c) The winter solstice (d) Robots malfunctioning in winter **Ans:(B Periods of reduced funding/interest**

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1	51	Which of the following is an actuator for a robotic agent? (a) Camera (b) Microphone (c) Robotic arm (d) Temperature sensor **Ans:(C Robotic arm**
1	52	Who is widely regarded as the person who coined the term Artificial Intelligence? (a) Alan Turing (b) Marvin Minsky (c) John McCarthy (d) Herbert Simon **Ans:(C John McCarthy**
1	53	A self-driving car must decide whether to slow down, stop, or change lanes based on information received from cameras, sensors, and other vehicles. Which AI concept best describes this situation? (a) Simple data processing (b) Intelligent agent interacting with its environment (c) Static rule execution (d) Knowledge storage system **Ans:(B Intelligent agent interacting with its environment**
1	54	Which test was proposed to determine whether a machine can exhibit human-like intelligent behavior? (a) IQ Test (b) CAPTCHA (c) Boolean Test (d) Turing Test **Ans:(D Turing Test**
1	55	Which term refers to an AI system designed to perform a specific task rather than a wide range of intellectual tasks? (a) General AI (b) Narrow AI (c) Strong AI (d) Super AI **Ans:(B Narrow AI**
2	1	Which search explores nodes level by level? (a) Path cost (b) Node depth (c) Heuristic value (d) Random **Ans:(B Node depth**
2	2	Time complexity of BFS with branching factor b and depth d is: (a) O(b + d) (b) O(b^d) (c) O(d^b) (d) O(b·d) **Ans:(B O(b^d)**
2	3	BFS requires which data structure? (a) Stack (b) Queue (c) Priority queue (d) Deque **Ans:(B Queue**
2	4	BFS uses exponential memory because it stores: (a) Current frontier (b) All nodes at current depth (c) Only visited nodes (d) Heuristic values **Ans:(B All nodes at current depth**
2	5	BFS is optimal only when: (a) Edge costs differ (b) Costs are uniform (c) Heuristic is zero (d) Graph is acyclic **Ans:(B Costs are uniform**

U.NO	Q NO	QUESTIONS
2	6	BFS is considered a: (a) Depth-first search (b) Best-first search (c) Uninformed search (d) Informed search **Ans:(C Uninformed search**
2	7	DFS uses which data structure? (a) Priority queue (b) Queue (c) Stack (d) Hash table **Ans:(C Stack**
2	8	DFS may get stuck in cycles if: (a) Graph is disconnected (b) No mechanism to avoid revisits (c) Step costs vary (d) Heuristic is misleading **Ans:(B No mechanism to avoid revisits**
2	9	Worst-case time complexity of DFS is: (a) O(b·d) (b) O(b^d) (c) O(d!) (d) O(b log d) **Ans:(B O(b^d)**
2	10	DFS is memory efficient compared to BFS because it uses: (a) No memory (b) Linear memory in depth (c) Exponential memory (d) The optimal path only **Ans:(B Linear memory in depth**
2	11	DFS is not complete in infinite-depth spaces unless: (a) Graph is finite (b) Cycles are absent or cut (c) Step costs are uniform (d) Heuristic is admissible **Ans:(B Cycles are absent or cut**
2	12	To avoid infinite loops in DFS, use: (a) Heuristic (b) Cycle detection (c) Larger memory (d) Shorter paths **Ans:(B Cycle detection**
2	13	UCS expands nodes based on: (a) Depth (b) Cost-so-far (c) Heuristic (d) Random **Ans:(B Cost-so-far**
2	14	UCS is optimal if all costs are: (a) Negative (b) Non-negative (c) Random (d) Unbounded **Ans:(B Non-negative**
2	15	UCS time complexity is roughly O(b^C), where C is:** (a) Branching factor (b) Maximum cost (c) Optimal path cost (d) Depth **Ans:(C Optimal path cost**

U.NO	Q NO	QUESTIONS
2	16	UCS requires which queue type? (a) LIFO (b) FIFO (c) Priority queue (d) Random access **Ans:(C Priority queue**
2	17	UCS behaves like BFS when step costs are: (a) Uniform (b) Nonuniform (c) Zero (d) Increasing **Ans:(A Uniform**
2	18	UCS is a form of: (a) Depth-first search (b) Best-first search (c) Greedy search (d) Heuristic search **Ans:(B Best-first search**
2	19	UCS is complete when: (a) Step cost $\geq \varepsilon > 0$ (b) Depth is finite (c) Heuristic is admissible (d) Heuristic is consistent **Ans:(A Step cost $\geq \varepsilon > 0$**
2	20	Best-first search is: (a) Complete (b) Optimal (c) Fast but not optimal (d) Memory efficient **Ans:(C Fast but not optimal**
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:(C 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:(A 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:(C Poor optimality**
2	24	A* heuristic is admissible if it never: (a) Underestimates (b) Overestimates (c) Equals (d) Exceeds the true cost **Ans:(D Exceeds the true cost**
2	25	A* heuristic overestimating the cost is: (a) Admissible (b) Inadmissible (c) Consistent (d) Useful **Ans:(B Inadmissible**

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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:(B 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:(C g(n) + h(n)**
2	28	With admissible h, A* is: (a) Complete and optimal (b) Complete only (c) Optimal only (d) Neither **Ans:(A 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:(B 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:(B Backtrack optimal path**
2	31	A* halts when the goal is: (a) Generated (b) Popped from priority queue (c) In frontier (d) At highest depth **Ans:(B Popped from priority queue**
2	32	Worst-case time complexity of A* is: (a) Polynomial (b) Exponential (c) Constant (d) Logarithmic **Ans:(B Exponential**
2	33	Among these, which minimizes f(n)? (a) CIF (b) Greedy (c) A* (d) DFS **Ans:(C A***
2	34	UCS reduces to BFS when step costs are: (a) Nonuniform (b) Zero (c) Uniform (d) Infinite **Ans:(C Uniform**
2	35	Which search can handle inconsistent heuristics with proper duplicate checking? (a) Greedy (b) UCS (c) A* with graph search (d) BFS **Ans:(C A* with graph search**

U.NO	Q NO	QUESTIONS
2	36	A heuristic that overestimates is: (a) Admissible (b) Inadmissible (c) Consistent (d) Safe **Ans:(B Inadmissible**
2	37	A consistent heuristic guarantees no: (a) Re-expansion (b) Optimal path (c) Completeness (d) Memory usage **Ans:(A Re-expansion**
2	38	The quality of a heuristic improves when it is: (a) Closer to zero (b) Closer to true cost (c) Always admissible only (d) Random **Ans:(B Closer to true cost**
2	39	Best-first can be thought of as a special case of: (a) A* with g(n) = 0 (b) A* with h(n) = 0 (c) UCS with g(n) only (d) DFS **Ans:(A A* with g(n) = 0**
2	40	A heuristic of zero reduces A* to: (a) Greedy (b) UCS (c) DFS (d) BFS **Ans:(B UCS**
2	41	Best-first search works when: (a) f(n) = g(n) + h(n) (b) f(n) = h(n) (c) f(n) = g(n) (d) f(n) = 0 **Ans:(B f(n) = h(n)**
2	42	Complete search algorithms do not guarantee optimality unless: (a) Heuristic is zero (b) Heuristic is negative (c) Costs are uniform (d) Graph is finite **Ans:(C Costs are uniform**
2	43	Which search uses exponential memory? (a) DFS (b) IDS (c) A* (d) Greedy **Ans:(C A***
2	44	If h(n) is the perfect heuristic (true cost to goal), A* will: (a) Expand all nodes (b) Only along the optimal path (c) Act like UCS (d) Fail **Ans:(B Only along the optimal path**
2	45	In A* tree search, inconsistent heuristics cause: (a) Termination failure (b) Node re-expansions (c) Immediate optimality (d) Lower memory usage **Ans:(B Node re-expansions**

U.NO	Q NO	QUESTIONS
2	46	Fringe (frontier) consists of: (a) Visited nodes (b) Generated but not expanded nodes (c) Goal nodes only (d) Root node only **Ans:(B Generated but not expanded nodes**
2	47	For a graph with unit costs and consistent heuristic, A* and BFS/UCS will: (a) Behave identically (b) Expand fewer nodes (c) Expand more nodes (d) Fail **Ans:(A Behave identically**
2	48	Bidirectional search works by: (a) Searching from root to leaf (b) Searching from goal to start (c) Searching simultaneously from both start and goal (d) Searching randomly **Ans:(C 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? (a) 121 (b) 243 (c) 364 (d) 728 **Ans:(C 364**
2	50	BFS guarantees finding the shallowest solution. But it fails when: (a) The branching factor is infinite (b) The cost is uniform (c) The search space is finite (d) The graph has no cycles **Ans:(A The branching factor is infinite**
2	51	In search algorithms, what does the branching factor represent? (a) Number of successors generated by a node (b) Maximum depth of the search tree (c) Cost of reaching the goal (d) Number of goal nodes **Ans:(A Number of successors generated by a node**
2	52	In A* Search, a node has g(n) = 6 and h(n) = 4. What is its evaluation value f(n)? (a) 2 (b) 4 (c) 10 (d) 24 **Ans:(C 10**
2	53	A heuristic function gives the estimated distance from the current city to the destination. Which search strategy can use this information to decide which city to explore next? (a) Depth First Search (b) Best First Search (c) Breadth First Search (d) Uniform Cost Search **Ans:(C Best First Search**
2	54	A search problem has two paths to reach the same goal. Path A contains 4 steps with a total cost of 12, while Path B contains 6 steps with a total cost of 9. Which search algorithm is more likely to prefer Path B? (a) Uniform Cost Search (b) Breadth First Search (c) Depth First Search (d) Bidirectional Search **Ans:(A Uniform Cost Search**
2	55	In a search tree, the goal node is located at depth 3. Which algorithm is most likely to find it before exploring nodes at greater depths? (a) DFS (b) BFS (c) UCS (d) Best first search **Ans:(B BFS**

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

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

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

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

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

U.NO	Q NO	QUESTIONS
3	51	Which of the following is an example of a propositional statement? (a) Open the door (b) Is it raining? (c) Chennai is in Tamil Nadu (d) x + 2 = 5 **Ans:(C Chennai is in Tamil Nadu**
3	52	In a Genetic Algorithm, a collection of candidate solutions is called a (a) Gene (b) Population (c) Chromosome (d) Generation function **Ans:(B Population**
3	53	An AI agent needs to represent an occurrence such as "The student submitted the assignment at 10 AM." Which knowledge representation concept is most appropriate? (a) Category (b) Object (c) Event (d) Fitness function **Ans:(C Event**
3	54	In Hill Climbing, a current state has several neighboring states. The algorithm selects the neighbor with the highest evaluation value. What happens if none of the neighbors has a better value? (a) It moves to a random state (b) It starts BFS (c) It stops at the current state (d) It changes to Genetic Algorithm **Ans:(C It stops at the current state**
3	55	Which problem is particularly suitable for optimization using Genetic Algorithms? (a) Finding an optimal timetable (b) Checking whether a number is even (c) Reading a text file (d) Adding two numbers **Ans:(A Finding an optimal timetable**
4	1	Which algorithm is used to choose the optimal move in a two-player zero-sum game? (a) Hill climbing (b) Minimax (c) A* search (d) Genetic algorithm **Ans:(B Minimax**
4	2	What is the primary advantage of alpha-beta pruning in game search? (a) Improves accuracy (b) Reduces the number of nodes evaluated (c) Increases branching factor (d) Removes heuristic evaluation **Ans:(B Reduces the number of nodes evaluated**
4	3	In a game tree, the nodes at even depths represent which player's turn? (a) Maximizing player (b) Minimizing player (c) Random player (d) Chance nodes **Ans:(A Maximizing player**
4	4	Which term describes a game where both players have complete knowledge of the state? (a) Partially observable (b) Fully observable (c) Stochastic (d) Hidden information **Ans:(B Fully observable**
4	5	What is the evaluation function in game playing used for? (a) To store game rules (b) To estimate the desirability of a position (c) To record moves made (d) To compute branching factor **Ans:(B To estimate the desirability of a position**

U.NO	Q NO	QUESTIONS
4	6	In CSPs, what does each variable have? (a) Constraints only (b) A domain of possible values (c) A heuristic function (d) An evaluation score **Ans:(B A domain of possible values**
4	7	Which technique eliminates inconsistent values from domains in CSPs? (a) Arc consistency (b) Hill climbing (c) Minimax (d) Alpha-beta pruning **Ans:(A Arc consistency**
4	8	Which term describes a CSP where all constraints involve only two variables? (a) Unary CSP (b) Binary CSP (c) Ternary CSP (d) Global CSP **Ans:(B Binary CSP**
4	9	Which search method for CSPs uses no backtracking and just selects values randomly? (a) Random restart hill climbing (b) Monte Carlo search (c) Local search (d) Forward checking **Ans:(C Local search**
4	10	What does alpha-beta pruning never affect? (a) Branching factor (b) Search time (c) Optimality of the result (d) Number of nodes generated **Ans:(C Optimality of the result**
4	11	Which is an example of a deterministic game? (a) Chess (b) Poker (c) Backgammon (d) Rock-paper-scissors with hidden choices **Ans:(A Chess**
4	12	In constraint propagation, which consistency is stronger than arc consistency? (a) Node consistency (b) Path consistency (c) Forward consistency (d) Value consistency **Ans:(B Path consistency**
4	13	What is the branching factor in a game tree? (a) Number of possible end states (b) Average number of legal moves from a position (c) Depth of the tree (d) Number of pruned branches **Ans:(B Average number of legal moves from a position**
4	14	Which CSP algorithm assigns values and immediately eliminates inconsistent options for neighboring variables? (a) MRV (b) Forward checking (c) Alpha-beta pruning (d) Simulated annealing **Ans:(B Forward checking**
4	15	What is the main goal of constraint satisfaction techniques? (a) Maximize score (b) Find a consistent assignment for all variables (c) Reduce branching factor (d) Learn from previous games **Ans:(B Find a consistent assignment for all variables**

U.NO	Q NO	QUESTIONS
4	16	In alpha-beta pruning, alpha represents: (a) The best score for the maximizing player so far (b) The best score for the minimizing player so far (c) The maximum branching factor (d) The depth limit of the search **Ans:(A The best score for the maximizing player so far**
4	17	Which CSP property ensures every variable assignment is consistent with all unary constraints? (a) Node consistency (b) Arc consistency (c) Path consistency (d) Global consistency **Ans:(A Node consistency**
4	18	In alpha-beta pruning, beta represents: (a) The best score for the maximizing player so far (b) The best score for the minimizing player so far (c) The branching factor (d) The average depth limit **Ans:(B 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? (a) Backtracking search (b) Local search (c) Forward checking (d) Arc consistency **Ans:(B Local search**
4	20	Which CSP-solving method is most efficient when the problem is nearly complete but has few conflicts? (a) Backtracking (b) Local search with min-conflicts (c) Arc consistency (d) Path consistency **Ans:(B Local search with min-conflicts**
4	21	In alpha-beta pruning, when is pruning performed? (a) When alpha ≥ beta (b) When alpha < beta (c) At the end of the search (d) Only at the root **Ans:(A When alpha ≥ beta**
4	22	Which algorithm for CSPs can be seen as depth-first search with constraint checking at each step? (a) Forward checking (b) MRV (c) Minimax (d) Simulated annealing **Ans:(A Forward checking**
4	23	Which CSP property ensures consistency for every set of three variables? (a) Node consistency (b) Arc consistency (c) Path consistency (d) Global consistency **Ans:(C Path consistency**
4	24	Which algorithm eliminates unnecessary nodes in minimax trees? (a) Minimax (b) Alpha-beta pruning (c) Hill climbing (d) A* search **Ans:(B Alpha-beta pruning**
4	25	Which term in game theory refers to the best outcome achievable assuming the opponent also plays optimally? (a) Nash equilibrium (b) Minimax value (c) Pareto optimum (d) Dominant strategy **Ans:(B Minimax value**

U.NO	Q NO	QUESTIONS
4	26	In CSPs, when each pair of variables connected by a constraint satisfies the constraint, the network is: (a) Node consistent (b) Arc consistent (c) Path consistent (d) Globally consistent **Ans:(B Arc consistent**
4	27	Which algorithm is an improvement over minimax by eliminating branches that cannot affect the outcome? (a) Forward checking (b) Alpha-beta pruning (c) AC-3 (d) Hill climbing **Ans:(B Alpha-beta pruning**
4	28	In CSPs, what is backtracking search's primary drawback? (a) It requires too much memory (b) It may revisit the same partial assignments (c) It cannot solve binary constraints (d) It ignores variable ordering **Ans:(B It may revisit the same partial assignments**
4	29	What is a game tree? (a) A representation of all possible moves and states in a game (b) A tree of CSP variable assignments (c) A search tree with only winning states (d) A binary tree for alpha-beta pruning **Ans:(A A representation of all possible moves and states in a game**
4	30	In game playing, the evaluation function is used to: (a) Compute exact game outcomes (b) Estimate the value of a game state (c) Determine the branching factor (d) Reduce the depth limit **Ans:(B Estimate the value of a game state**
4	31	In alpha-beta pruning, which order of node expansion gives the best pruning performance? (a) Random order (b) Worst-case order (c) Best moves first (d) Deepest nodes first **Ans:(C Best moves first**
4	32	Which CSP property ensures that the problem remains consistent when considering sequences of variables longer than three? (a) Arc consistency (b) Path consistency (c) Global consistency (d) Node consistency **Ans:(C Global consistency**
4	33	Which CSP solving method tries all possible assignments until a solution is found? (a) Backtracking search (b) Min-conflicts (c) AC-3 (d) Alpha-beta pruning **Ans:(A Backtracking search**
4	34	Which type of games involve hidden information for at least one player? (a) Perfect information games (b) Imperfect information games (c) Zero-sum games (d) Stochastic games **Ans:(B Imperfect information games**
4	35	What is the main advantage of constraint propagation in CSPs? (a) Reduces the domain of variables early (b) Guarantees optimal solution (c) Works only for binary constraints (d) Avoids variable ordering **Ans:(A Reduces the domain of variables early**

U.NO	Q NO	QUESTIONS
4	36	In minimax search, the maximizing player tries to: (a) Minimize the opponent's score (b) Maximize their own score (c) Minimize branching factor (d) Avoid alpha-beta pruning **Ans:(B Maximize their own score**
4	37	In CSPs, path consistency means: (a) All variables satisfy unary constraints (b) All pairs of variables satisfy binary constraints (c) All triples of variables are consistent with each other (d) The problem is solved without backtracking **Ans:(C 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? (a) Forward checking (b) AC-3 (c) Iterative deepening (d) Min-conflicts **Ans:(A Forward checking**
4	39	In CSP solving, when each variable's domain has exactly one value consistent with all constraints, the problem is: (a) Node consistent (b) Solved (c) Path consistent (d) Over-constrained **Ans:(B Solved**
4	40	In CSPs, domain reduction is primarily achieved through: (a) Constraint propagation (b) Iterative deepening (c) Minimax (d) Monte Carlo sampling **Ans:(A Constraint propagation**
4	41	Which type of games are deterministic with perfect information? (a) Chess and Checkers (b) Poker and Bridge (c) Go Fish and Battleship (d) Rock-Paper-Scissors **Ans:(A Chess and Checkers**
4	42	What does pruning do in search algorithms? (a) Increases branching factor (b) Removes unpromising branches (c) Guarantees optimal solution (d) Randomizes search **Ans:(B Removes unpromising branches**
4	43	Which algorithm is a local search method for CSPs that minimizes the number of constraint violations? (a) AC-3 (b) Min-conflicts (c) Forward checking (d) Backtracking **Ans:(B Min-conflicts**
4	44	Which CSP algorithm can detect inconsistencies between variable pairs before search begins? (a) Arc consistency checking (b) Forward checking (c) Min-conflicts (d) Iterative deepening **Ans:(A Arc consistency checking**
4	45	Which type of games require strategies that consider future uncertainty? (a) Stochastic games (b) Deterministic games (c) Perfect information games (d) Zero-sum games **Ans:(A Stochastic games**

U.NO	Q NO	QUESTIONS
4	46	Which game playing search method expands only the most promising moves based on evaluation? (a) Beam search (b) Depth-first search (c) Minimax (d) AC-3 **Ans:(A Beam search**
4	47	Which property of CSPs ensures every variable's domain satisfies unary constraints? (a) Node consistency (b) Arc consistency (c) Path consistency (d) Global consistency **Ans:(A Node consistency**
4	48	In CSP solving, a problem is over-constrained when: (a) There are more variables than constraints (b) No assignment satisfies all constraints (c) Domains are too large (d) Arc consistency fails **Ans:(B No assignment satisfies all constraints**
4	49	Which game playing concept measures how good a position is for a player? (a) Utility function (b) Constraint satisfaction (c) Path cost (d) Arc consistency **Ans:(A Utility function**
4	50	Which term describes a game where all players benefit from cooperation? (a) Cooperative game (b) Zero-sum game (c) Stochastic game (d) Imperfect information game **Ans:(A Cooperative game**
4	51	Which CSP technique chooses the variable with the largest number of constraints on remaining variables? (a) MRV (b) Degree heuristic (c) Min-conflicts (d) Arc consistency **Ans:(B Degree heuristic**
4	52	Why does Alpha-Beta pruning produce the same final move as Mini-Max even though it examines fewer nodes? (a) It ignores MIN nodes (b) It removes only branches that cannot influence the final decision (c) It changes the utility values of terminal nodes (d) It replaces Mini-Max with heuristic search **Ans:(B It removes only branches that cannot influence the final decision**
4	53	During backtracking search for a CSP, a variable assignment causes a constraint violation. What should the algorithm do? (a) Continue with the same assignment (b) Remove the constraint (c) Backtrack and try another assignment (d) Terminate with success **Ans:(C Backtrack and try another assignment**
4	54	During Alpha-Beta pruning, suppose $\alpha = 9$ at a MAX node and the current $\beta = 7$ at a MIN node. What does this indicate? (a) The remaining branches can be pruned (b) The MAX node must select 7 (c) The search must restart (d) Alpha must become 7 **Ans:(A The remaining branches can be pruned**
4	55	In a CSP, an assignment that specifies a value for every variable is called a: (a) Partial assignment (b) Constraint assignment (c) Complete assignment (d) Domain assignment **Ans:(C Complete assignment**

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

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

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

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

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

U.NO	Q NO	QUESTIONS
5	51	Which operation determines whether a knowledge base logically supports a particular sentence? (a) Entailment checking (b) Mutation (c) Crossover (d) Compilation **Ans:(A Entailment checking**
5	52	In multi-agent systems, an agent that provides information to another agent is commonly called a: (a) Source agent (b) Provider agent (c) Sensor agent (d) Reflex agent **Ans:(B Provider agent**
5	53	Which inference rule uses a clause and its negated counterpart to derive a new clause? (a) Mutation (b) Selection (c) Resolution (d) Crossover **Ans:(C Resolution**
5	54	In propositional model checking, the KB is evaluated against: (a) Only one possible model (b) All possible models (c) Only the initial state (d) Only the goal state **Ans:(B All possible models**
5	55	Consider the knowledge base: $P \vee Q$ and $\neg P$. Which conclusion can be derived using propositional reasoning? (a) $\neg Q$ (b) P (c) Q (d) $P \wedge Q$ **Ans:(C Q**

PART – B

UNIT	PART	Q.NO	QUESTION
1	B	1	Mention the features of Learning Agents.
1	B	2	Write about Utility-Based Agents.
1	B	3	Write about Goal-Based Agents.
1	B	4	What is Model-Based Reflex Agent?
1	B	5	With neat sketch write about Simple Reflex Agents.
1	B	6	What is PEAS? Give an example.
1	B	7	List the types of environments.
1	B	8	Give examples for any 2 environment types.
1	B	9	Give differences between Narrow AI and General AI.
1	B	10	Write about Natural Language Processing (NLP).
1	B	11	What is Turing test?

UNIT	PART	Q.NO	QUESTION
2	B	1	Given branching factor=3 and depth of goal node =4. Calculate time and space complexity for DFS.
2	B	2	Given branching factor=3 and depth of goal node =4. Calculate time and space complexity for BFS.
2	B	3	Write about Best First Search.
2	B	4	Write the differences between uninformed and informed search strategies.
2	B	5	Write the differences between DFS and BFS.
2	B	6	What is UCS and what happens when all path cost are equal?
2	B	7	List the applications of Heuristic search in AI.
2	B	8	Write about the disadvantages of Best First Search.
2	B	9	Write the time and space complexity of DFS and BFS.
2	B	10	Define completeness, optimality, time complexity and space complexiy in a search strategy.
2	B	11	Why is A* considered both complete and optimal?

UNIT	PART	Q.NO	QUESTION
3	B	1	Mention the advantages of knowledge-based agents.
3	B	2	List the types of knowledge base.
3	B	3	Write about the types of logic of AI.
3	B	4	Give applications of ontological engineering.
3	B	5	Write about objects in AI.
3	B	6	Write about events in AI.
3	B	7	Write about the features of Hill Climbing algorithm.
3	B	8	Write about advantages of Local Beam Search.
3	B	9	What is a Genetic Algorithm?
3	B	10	Write any four differences between Local Beam Search and Genetic Algorithms.
3	B	11	List the drawback of Hill climbing algorithm.

UNIT	PART	Q.NO	QUESTION
4	B	1	Define CSP for map coloring.
4	B	2	Define CSP for soduku solver.
4	B	3	Define CSP for N-Queens Problem.
4	B	4	Write about backtracking search for CSP.
4	B	5	Write about min-conflicts heuristic.
4	B	6	Give some applications of game theory.
4	B	7	Write about the working principle of Mini-Max algorithm.
4	B	8	Define alpha (α) and beta (β). Give the condition for pruing.
4	B	9	List and explain the components of CSP.
4	B	10	Write the differences between binary and non-binary constraints.
4	B	11	What is Alpha-Beta pruning?

UNIT	PART	Q.NO	QUESTION
5	B	1	Write the truth table for implication (P->Q).
5	B	2	Write the truth table for Biconditional (P<->Q).
5	B	3	How to infer rules using Modus Ponens? Give an example.
5	B	4	How to infer rules using Modus Tollens? Give an example.
5	B	5	Define Entailment, Validity and Satisfiability.
5	B	6	What is inference-based agent?
5	B	7	What is circuit based agent?
5	B	8	Write about hybrid agent?
5	B	9	List the types of agent architectures.
5	B	10	List types of messages in agent communication.
5	B	11	Briefly write about BDI architecture.

PART C

UNIT	PART	Q.NO	QUESTION
1	C	1	Explain AI and state its primary goals.
1	C	2	Explain major real-world applications of AI.
1	C	3	Differentiate between Human and Machine intelligence.
1	C	4	Explain the types of agents and give example.
1	C	5	Explain the key characteristics like (Deterministic vs. Stochastic) and (Static vs. Dynamic).
1	C	6	Explain the structure of agents.

UNIT	PART	Q.NO	QUESTION
2	C	1	Explain the Breadth First Search (BFS) and Depth First Search (DFS) algorithms with suitable examples.
2	C	2	Explain the Uniform Cost Search (UCS) algorithm with a neat example.
2	C	3	Explain the Bidirectional Search algorithm.
2	C	4	Explain heuristic search techniques with example.
2	C	5	Explain in detail about A* search algorithm with example.
2	C	6	Explain in detail about Best First search algorithm with example.

UNIT	PART	Q.NO	QUESTION
3	C	1	Explain Knowledge-Based Agents and their working with a suitable example.
3	C	2	Explain types of logics used in AI.
3	C	3	Explain Hill Climbing algorithm.
3	C	4	Explain Local Beam Search algorithm.
3	C	5	Explain the Genetic Algorithm with a neat example and its working steps.

UNIT	PART	Q.NO	QUESTION
3	C	6	Explain in detail about propositional logic.
4	C	1	Explain in detail about mini-max algorithm with example.
4	C	2	Explain Alpha - Beta pruning algorithm in detail with example.
4	C	3	Explain CSP with N-Queens.
4	C	4	Explain in detail about CSP with 9x9 sudoku.
4	C	5	Explain in detail about CSP with map colouring.
4	C	6	Explain in detail about Backtracking search for CSP with example.

UNIT	PART	Q.NO	QUESTION
5	C	1	Explain in detail about propositional logic.
5	C	2	Explain the architecture for intelligent agents.
5	C	3	Explain about agent communication.
5	C	4	Explain types of messages in agent communication.
5	C	5	Explain argumentation among agents.
5	C	6	Explain in detail about propositional model checking.

ANALYTICAL TYPE MODEL QUESTIONS

1) An autonomous delivery robot operates in a city. It perceives its surroundings, plans a route to the customer's location, uses stored knowledge about roads and locations, makes decisions when multiple delivery constraints exist, and communicates with other delivery robots.

a) The robot perceives the city using sensors and takes actions using actuators. What type of AI system is the robot?

b) To find a suitable route from its current location to the customer's location using distance information, which heuristic search technique can be used?

c) The robot stores information such as *"Hospital A is located on Main Road"* and *"Main Road connects to Market Road."* Which AI concept is used to represent this information?

d) If the robot has to assign deliveries while satisfying constraints such as time, vehicle capacity, and destination**,** which AI technique is appropriate?

e) When two delivery robots exchange information about available routes and coordinate their actions, which AI concept enables this interaction?

2) An intelligent banking system detects suspicious transactions, investigates possible transaction sequences, maintains banking rules, resolves competing transaction requirements, and exchanges information with other banking agents.

a) A transaction-monitoring agent receives incomplete information about a customer's activities. What type of environment does this represent?

b) The system explores different transaction sequences and assigns priority according to the cost associated with each sequence. Which search method is appropriate when lowest accumulated cost determines the preferred path?

c) Consider the rule: **"**If a transaction exceeds the permitted limit, an alert must be generated**."** What type of knowledge representation is this?

d) A payment must satisfy conditions involving account balance, transaction limit, currency, and authorization. What is the role of constraint**s** in this situation?

e) A banking agent presents reasons for rejecting a transaction, while another agent challenges those reasons with supporting evidence. What process is taking place?

3) A smart agricultural system uses AI to monitor crops, predict irrigation requirements, represent information about soil and crops, schedule limited water resources, and coordinate autonomous farming devices.

a) The system observes soil moisture and crop conditions before deciding whether to irrigate. Which agent characteristic allows it to select an appropriate action?

b) The system must determine a sequence of actions to move an autonomous tractor from the storage area to a particular field while avoiding obstacles. Which search problem component represents the desired destination?

c) The system stores the relationship *"Cotton requires less water during the harvesting stage."* Is this an example of fact, rule, or constraint?

d) Three fields require irrigation, but only a limited quantity of water is available. Which CSP component specifies the possible quantities of water that can be assigned to each field?

e) Two autonomous tractors need to negotiate which one should use a narrow path first. What form of interaction between intelligent agents is illustrated?