

# AI Oral Question-Answers

Sub:- Artificial Intelligence Lab

BE (comp)

## (1) What is AI?

*"Artificial intelligence is the study of how to make computers do things which, at the moment, people can do better."*

Artificial Intelligence is the study of human intelligence such that it can be replicated artificially.

## (2) What are the different applications of AI?

- o Game playing
- o Speech recognition
- o Understanding natural language
- o Computer vision
- o Expert system
- o Fuzzy logic system

## (3) What are the different problems involved in AI?

- o Deduction, Reasoning, Problem solving
- o Knowledge representation (represent things among object, property, category, relation)
- o Planning (set goals and achieve them)
- o Learning
- o Natural Language Processing
- o Motion and manipulation (AI is closely related to Robotic.)
- o Perception (ability to use input from sensors)
- o Creativity

## (4) What is meant by heuristic search technique?

It is a search technique that relies on the estimate provided by the heuristic function. Heuristic search techniques make use of domain specific information.

Heuristic techniques use a heuristic function, which when applied on a state as argument; return a value indicating how close this state is to the goal.

(5) What are different heuristic search techniques?

- o Generate and test
- o Hill climbing
- o Best-first search
- o Means end analysis

(6) What is meant by a heuristic function?

Heuristic function takes current state as input and returns cost to reach goal state. It is problem domain specific.

(7) What are the different areas involved in AI?

- o

(8) Which algorithm will you use for a given problem? Why?

- o Simple and small problem : Generate and test
- o Good heuristic fn. But no other useful knowledge : Hill Climbing
- o Single player : A\*
- o Two player : MiniMax

(9) What is a water jug problem?

- o Two friends who have an eight-quart jug of water wish to share it evenly. They also have two empty jars, one holding five quarts, the other three. How can they each measure exactly 4 quarts of water?
- o We are given 2 jugs, a 4 liter one and a 3-liter one. Neither has any measuring marker on it. There is a pump that can be used to fill the jugs with water. How can we get exactly 2 liters of water in to the 4-liter jugs?

(10) What is A\* algorithm?

- o Heuristic search algorithm

- o Improvement of *best-first search*
- o Implemented on OR-graph

(11) How A\* algorithm works?

(12) What data structures are used in theoretical A\* algorithm?

- o OPEN
- o CLOSED
- o  $f'$ ,  $g$ ,  $h'$

(13) What heuristic function is used in A\* algorithm?

$f'$  : Function returning estimated cost from current node to goal state.

(14) What is AO\* algorithm?

- o Improvement of problem reduction.
- o Implemented on AND-OR graph
- o Branch and bound technique

(15) How AO\* algorithm works?

(16) Which types of problems can be solved by A\* algorithm?

- o Minimal-cost overall path
- o Any path as quickly as possible.

(17) What is a depth-first search?

Class of search technique where, before going for next path, every path is expanded until it gets exhausted.

(18) What is a breadth-first search?

All possibilities at same level is checked once and best promising path is expanded for further expansion.

(19) What is meant by best first search?

Mix of BFS and DFS, where best promising node is selected (bfs) and then it is expanded (dfs).

Preferably best promising result is obtained.

(20) What is meant by problem reduction?

Search technique for problems which can be decomposed into some interdependent sub-problems. AND-OR graph.

(21) What are OR-graphs?

Data structure which represent problem state space in such a way that goal state can be reached via any one path.

(22) What are AND-OR graphs?

Goal state can be reached using one independent or more inter-dependent path. It involves *and-Arc*.

(23) Which types of problems can't be solved by A\* algorithm?

- o Two player game problems
- o Two inter-dependent paths

(24) What is meant by a crypt-arithmetic problem?

It is a constraint satisfaction problem.

The goal state is a problem state in which all letters have been assigned a digit in such a way that all the initial constraints are satisfied.

(25) How to solve SEND+MORE = MONEY?

- o Step1: constraint, mathematical deduction.
- o Step2: propagation
- o Step3: guess/hypothesis

(26) What is meant by constraint satisfaction?

Constraint satisfaction is AI problem in which the goal is to discover some problem state that satisfies the given set of constraint.

(27) What are weak methods? Why these are called weak methods?

Weak method is most general search method, also known as *brute force* or *blind search*. Do not use domain knowledge; however they give less efficient result.

(28) What is meant by game playing?

(29) What are the important components of any game playing program?

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(30) What is meant by a plausible move generator?

It generates the set of all possible state at next level of game.

(31) What is meant by a static evaluation function?

Evaluates that "how promising is the node?"

(32) What is meant by minimax procedure?

(33) Whether minimax is a dfs or bfs?

Depth first, limited depth search.

(34) How minimax procedure is called?

Recursively

(35) Whether minimax procedure is recursive or iterative?

Recursive

(36) When you will stop calling minimax procedure?

(37) Whether A\* or AO\* algorithm can be used to solve any two player games?

No. Minimax is used.

(38) Whether minimax algorithm is an efficient algorithm?

(39) Whether any improvements can be made in minimax algorithm?

Yes.

(40) What improvements can be made in minimax algorithm?

- o Alpha-beta pruning.
- o Waiting for quiescence

(41) How minimax procedure works?

(42) Why it is called minimax?

(43) What is alpha-beta cut-off?

(44) What is the use of alpha-beta pruning?

(45) What is alpha?

(46) What is beta?

(47) What is meant by waiting for quiescence?

Search is continued until no any drastic change in value occurs while moving from one level to next level.

(48) What is meant by a secondary search?

(49) What is the output of minimax algorithm?

- o Path
- o value



3) Variable

4) compound

(59) What is structure of any prolog program?

A Prolog program consists of a database of facts, rules, and queries. This program is, in essence, a knowledge base.

\* **Fact:** head but no body

man(socrates).

man(plato).

\* **Rules:** head and body

mortal(X) :- man(X).

\* **Questions:** body but no head

mortal(X).

Use ";" to get next possible answer, Return to end.

Yes means true with no variables, no means not consistent with database.

(60) What is a Horn clause?

A PROLOG program is described as a series of logical assertions, each of which is a *Horn Clause*. A horn clause is a clause that has at most one positive literal. E.g. p, ~p V q, and p->q

(61) How prolog is different from c programming?

(62) What are applications of prolog?

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(63) What is reasoning?

Reasoning is the act of deriving a conclusion from certain premises using a given methodology.

Reasoning is a process of thinking; reasoning is logically arguing; reasoning is drawing inference.

(64) What are different types of reasoning?

- o Mathematical: axioms, theorems, definitions, proofs
- o Logical: deductive, inductive, and abductive
- o Non-logical: linguistic, language

**Three approaches:**

- o Symbolic reasoning
- o Statistical reasoning
- o Fuzzy logic reasoning

(65) Conditions of uncertainty in AI.

- o Incomplete knowledge
- o Inconsistent knowledge
- o Changing knowledge

(66) Which type of reasoning is used in prolog?

Logical reasoning

(67) What is difference between forward and backward reasoning?

- o Forward reasoning: begin from start state; next level node is created using right side of rule.
- o Backward reasoning: begin from goal state; next level node is created using left side of rule.

(68) What is meant by statistical reasoning?

Statistical reasoning is a type of reasoning that deals with uncertainty and probability. It involves the use of statistical methods to draw conclusions from data that is subject to variation and error.

(69) What is predicate logic? #####

First order logic

(70) How to represent knowledge in AI?

How best to use a set of symbols to represent a set of facts within a knowledge domain.

A good knowledge representation covers six basic characteristics:

- o **Coverage**, which means the KR covers a breadth and depth of information. Without a wide coverage, the KR cannot determine anything or resolve ambiguities.
- o **Understandable by humans**. KR is viewed as a natural language, so the logic should flow freely. It should support modularity and hierarchies of classes (Polar bears are bears, which are animals). It should also have simple primitives that combine in complex forms.
- o **Consistency**. If John closed the door, it can also be interpreted as the door was closed by John. By being consistent, the KR can eliminate redundant or conflicting knowledge.
- o **Efficient**
- o **Easiness for modifying and updating**.
- o **Supports the intelligent activity which uses the knowledge base**

(71) What is propositional logic?

Truth table proofing

(72) What is difference between propositional and predicate logic?

In propositional logic a complete sentence can be presented as an atomic proposition. And complex sentences can be created using AND, OR, and other operators.....these propositions have only true or false values and we can use truth tables to define them... e.g. book is on the table....this is a single proposition...

In predicate logic there are objects, properties, and functions (relations) are involved.

(73) What is unification algorithm?

Used for comparison in propositional logic.

(74) How unification algorithm works?

- o First literal must be same
- o Each literal pair is compared and substituted.

(75) What is the use of unification algorithm?

contradiction

(76) Can you unify two predicates having different number of arguments?

No.
(77) What is meant by TMS? Truth management system
(78) What is meant by non-monotonic reasoning? Logic is non-monotonic if the truth of the preposition may change when new information (axioms) is added. It is used to formalize plausible (believable reasoning).
(79) What is difference between monotonic reasoning and non-monotonic reasoning?
(80) Whether predicate logic is used for monotonic reasoning?
(81) Give example of non-monotonic reasoning.
(82) How TMS is classified?
(83) Which type of TMS you have implemented?
(84) How a TMS could be used in medical diagnosis?
(85) How a JTMS could be used to select a TV program to watch?
(86) Can a JTMS be used to solve crypt-arithmetic problem? How?
(87) What are weak slot and filler structures?

(88) What is meant by strong slot and filler structures?

(89) Which different structures can be used for knowledge representation?

- o **Frames:** Used to describe a collection of attributes that a given object possesses (e.g.: description of a chair).
- o **Scripts:** Used to describe common sequence of events (e.g.: a restaurant scene).
- o **Stereotype:** Used to describe characteristics of people.
- o **Rule models:** Used to describe common features shared among a set of rules in a production system.

(90) What is a semantic net?

Semantic net is a representation of entity and concepts relevant to other existing facts, using nodes and labeled arcs.

(91) What is a partitioned semantic net?

It is a variation of semantic net; that break network into spaces which consist of groups of nodes and arcs and regard each space as a node.

(92) What is a CD?

(93) What is a frame?

A frame is a collection of attributes (usually called slots) and associated values (and possibly constraint on values) that describes some entity in the world.

(94) What is a script?

Script is a structured stereotyped sequence of events in a context.

(95) What is an expert system?

An expert system is a computer program that simulates the *judgment and behavior* of a human or an organization that has expert knowledge and experience in a particular field.

(96) What are the different stages/components/blocks of expert system?

- o Analysis
- o Specification
- o Development
- o Deployment

(97) What is meant by a knowledge base?

In general, a knowledge base is a *centralized repository for information*: a public library, a database of related information about a particular subject.

(98) How a knowledge base is different from a database?

A data base is a software program which keeps data/record in an organized way.

Knowledge base is a type of database which keeps abstract facts of physical or virtual world entities.

(99) What is an inference engine?

A collection of inference program which uses knowledge contained in knowledge base to draw a conclusion.

(100) Whether an expert system can replace human experts?

No.

(101) Have you downloaded a expert system and used it?

No.

(102) What is an expert shell?

A system that could be used to construct a new expert system by adding new knowledge corresponding to the new problem domain.

(103) How you build an expert system?

(104) What are the desirable properties of a good expert system?

- o Low cost
- o Better than human
- o High performance
- o Reliable conclusions

(105) What is MYCIN?

MYCIN is an early expert system, or artificial intelligence (AI) program, *for treating blood infections*. In 1972 work began on MYCIN at Stanford University in California. MYCIN would attempt to diagnose patients based on reported symptoms and medical test results.

(106) What is EMYCIN?

Variation of MYCIN as an expert shell.

(107) What is PROSPECTOR?

PROSPECTOR is an expert system that help *geologists* locate *ore deposits* and to identify sites for drilling.

(108) Contrast expert systems and neural networks in terms of knowledge representation, knowledge acquisition, and explanation.

(109) Give one domain in which expert system approach would be more promising than neural network.

(110) Give one domain in which neural network approach would be more promising than expert system.

(111) What are major problems which are faced by current expert systems?

(112) How is knowledge acquired in expert systems?  
From expert, knowledge base,

(113) What is an ANN?

An artificial neural network (ANN), usually called neural network (NN), is a mathematical model or computational model that is inspired by the structure and/or functional aspects of biological neural networks. A neural network consists of an interconnected group of artificial neurons, and it processes information using a connectionist approach to computation.

(114) What is a biological neuron?

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(115) Do you know how many neurons are there in a human body?

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(116) How neural network learns?

Training, experience.

(117) How the neural network is classified?

(118) List the applications of neural networks.

- o Detection of medical phenomena.
- o Stock market prediction.
- o Monitoring the condition of machinery.
- o Classification and clustering

(119) How neural networks are useful in classification problems?

(120) How neural networks are useful in clustering problems?

(121) What is difference between classification and clustering?

(122) How neural network is useful in recognizing characters?

(123) What are different layers in neural networks?

- o Input layer
- o Output layer
- o Hidden layer

(124) What is the role of the hidden layer?

Active layer.

(125) What is the job of the input layer in NN?

Passive layer.

(126) What is the job of the output layer in NN?

Active layer.

(127) What is the 8-puzzle problem?

The 8-puzzle is a square board with 9 positions, filled by 8 numbered tiles and one gap. At any point, a tile adjacent to the gap can be moved into the gap, creating a new gap position. In other words the gap can be swapped with an adjacent (horizontally and vertically) tile. The objective in the game is to begin with an arbitrary configuration of tiles, and move them so as to get the numbered tiles arranged in ascending order either running around the perimeter of the board or ordered from left to right, with 1 in the top left-hand position.

(128) What is the missionaries and cannibals problem?

Three missionaries and three cannibals come to a river and find a boat that holds two. If the cannibals ever outnumber the

missionaries on either bank, the missionaries will be eaten. How shall they cross?

(129) What is the monkey and bananas problem?

A monkey is in a room. Suspended from the ceiling is a bunch of bananas, beyond the monkey's reach. However, in the room there are also a chair and a stick. The ceiling is just the right height so that a monkey standing on a chair could knock the bananas down with the stick. The monkey knows how to move around, carry other things around, reach for the bananas, and wave a stick in the air. What is the best sequence of actions for the monkey to take to acquire lunch?

(130) What is natural language processing?

NLP is a form of human-to-computer interaction where the elements of human language, be it spoken or written, are formalized so that a computer can perform value-adding tasks based on that interaction.

(131) What are the different stages in NLP?

- o Morphological Analysis
- o Syntactic Analysis
- o Semantic Analysis
- o Discourse integration
- o Pragmatic Analysis

(132) Explain each step in NLP.

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(133) What is difference between syntactic and semantic analysis?

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(134) What is difference between top-down parser and bottom-up parser?

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(135) Which type of parser you have used?

(136) In which fields in AI currently research is going on?