

# CS607 Midterm Subjective and Objective Solved with References

Year: 2013,2012

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## Objective (Year : 2012)

1) "The branch of computer science concerned with the automation of intelligent behavior " this definition of AI is from:

**Answer:** Luger and Stubblefield, 1993

2) Which of the following discipline provides us the theories of structure and meaning of language?

**Answer:** Linguistic

3) Technically Hit and Trial Method called Generate and \_\_\_\_\_ method

**Answer:** Test

4) Most of the solution spaces for problems can be represent in a

**Answer:** Graph

5) By getting grips on \_\_\_\_\_ that deal with searching techniques in graphs and trees, problem can be performed in an efficient manner.

**Answer:** Algorithms

6) I depth first search the node with the largest value of height will be at the \_\_\_\_\_ priority to be picked.

**Answer:** Maximum

7) The plateau comes up when there is a mostly flat area \_\_\_\_\_ the peaks.

**Answer:** Separating

8) Best-first search always moves \_\_\_\_\_ from the node that seems closest to the goal node.

**Answer:** Forward

9) In adversarial search there may occur such a scenario where two opponents also called \_\_\_\_\_ searching for the goal.

**Answer:** Adversaries

10) In the basic algorithm the term mutation refers to a small random \_\_\_\_\_

**Answer:** Change

11) Genetic Algorithm uses evolutionary techniques ,based on function optimization and artificial intelligence , to develop a situation.

**Answer:** True

12) In the worst case of semantic network we may need to traverse the entire network and then discover that the requested info \_\_\_\_\_

**Answer:** Doesn't exist

13) Frames were developed from semantic networks and later evolved into our modern-day classes and objects.

**Answer:** True

14) Deductive reasoning is based on deducing old information from logically related unknown information.

**Answer:** false

15) Another expert system named \_\_\_\_\_ was developed by DEC (Digital Equipment Corporation), as a computer configuration assistant.

**Answer:** R1/XCON

16) Which of the following is involved in an ES development project?

**Answer:** Domain expert , knowledge engineer , End user = All of the given

17) In backward chaining terminology , the hypothesis to prove is called \_\_\_\_\_

**Answer:** Goal

18) \_\_\_\_\_ chaining is more focused and tries to avoid exploring unnecessary paths.

**Answer:** backward chaining

19) Assisting an Expert is the most common rule of Expert System.

**Answer:** True

20) Procedures that search the solution space in an uninformed manner are usually costly w.r.t \_\_\_\_\_

**Answer:** Time and Space Both

21) Components of a statement in CNF are **clauses and literals**

22) The human brain the number of neurons and links are in the order of **10power15**

**23)** Expert system has

They possess specialized knowledge in a certain area

They- possess experience in the given area

They can provide, upon elicitation, an explanation of their decisions

**All of the given**

**24)** In genetic algorithm we start from multiple locations (states) in the solution space and try to search the space in (parallel)

**Answer:** True

**25)** **Lisp** that became the dominant AI programming language.

**26)** Search strategies and algorithms that we will study are primarily of four types.

**(Blind/uninformed, informed/heuristic, any path/non-optimal and optimal path search algorithms)**

### Subjective (YEAR 2012)

**Q.1 Write the CLIPS commands which is used to remove only facts information from the memory?**

**Ans:** **Page no:135 Topic:**

The retract command is used to remove or retract facts. For example:

(retract 1) removes fact 1

**Q.2 Do you think that deduction mechanism is feasible in practical system or not? Give Example.**

**Ans:** **Page no:107 Topic: 4.12.3**

The deduction mechanism we discussed above, using the four rules of inference may be used in practical systems, but is not feasible. It uses a lot of inference rules that introduce a large branch factor in the search for a proof.

**Q.3 Out of the general components of AI which of the two components can be called closely coupled?**

**Ans:** **Page no: 89 Topic: 4.1**

Knowledge representation (KR) and reasoning are closely coupled components; each is intrinsically tied to the other. A representation scheme is not meaningful on its own; it must be useful and helpful

in achieve certain tasks. The same information may be represented in many different ways, depending on how you want to use that information.

## Subjective(YEAR 2013)

**Q:1**

**One was to convert into CNF :**

**Ans:- page no : 108, topic :4.12.7.5**

### Method of Conversion:-

#### **4.12.7.5 Conversion to CNF**

1. Eliminate arrows (implications)

$$A \rightarrow B = \neg A \vee B$$

2. Drive in negations using De Morgan's Laws, which are given below

$$\neg(A \vee B) = (\neg A \wedge \neg B)$$

$$\neg(A \wedge B) = (\neg A \vee \neg B)$$

3. Distribute OR over AND

$$A \vee (B \wedge C)$$

$$= (A \vee B) \wedge (A \vee C)$$

### Solution:

$$(A \vee B) \rightarrow (C \vee D)$$

$$\neg(A \vee B) \vee (C \vee D)$$

$$\neg A \wedge \neg B \vee (C \vee D)$$

$$(\neg A \vee C \vee D) \wedge (\neg B \vee C \vee D)$$

**Q:2**

### **Conflict resolution strategies**

**Ans: Page no : 125**

To overcome the conflict problem we may choose to use one of the following conflict resolution strategies:

- **Fire first rule in sequence (rule ordering in list).** Using this strategy all the rules in the list are ordered (the ordering imposes prioritization). When more than one rule matches, we simply fire the first in the sequence.

- **More specific rules (more premises)** are preferred over general rules. This strategy is based on the observation that a rule with more premises, in a sense, more evidence or votes from its premises, therefore it should be fired in preference to a rule that has less premises.
- **Prefer rules** whose premises were added more recently to WM (timestamping).

This allows prioritizing recently added facts over older facts.

- **Parallel Strategy (view-points)**. Using this strategy, we do not actually resolve the conflict by selecting one rule to fire. Instead, we branch out our execution into a tree, with each branch operation in parallel on multiple threads of reasoning. This allows us to maintain multiple view-points on the argument concurrently

**Q:3**

**Prime role of ES designer**

**Ans:** **Page no : 117 Topic : 5.7.1**

One of the prime roles of the expert system designer is to act as a knowledge engineer. As a knowledge engineer, the designer must overcome the knowledge acquisition bottleneck and find an effective way to get information from the expert and encode it in the knowledge base, using one of the knowledge representation techniques we discussed in KRR.

**Q:4**

**Experience gained by driving a truck is the knowledge "Declarative Knowledge". Do you agree? Justify 5 marks**

**Ans:** **Page no : 90 Topic : 4.3**

I strongly disagree.

Declarative knowledge describes objects, rather than processes. What is known about a situation, e.g. it is sunny today, and cherries are red.

**Q:5**

**Riding a horse just like riding a donkey..Analyze this statement and tell which reasoning working here and also give strong reason 5 marks**

**Ans:** **Page no: 103 Topic : 4.12.4**

Analogical reasoning works by drawing analogies between two situations, looking for similarities and differences, e.g. when you say riding a horse just like riding a donkey, by analogy you know that there are some similarities in the driving mechanism, but you also know that there are certain other distinct characteristics of each.

**Q:6**

**32 bit computer words set to 16 bit to 1's and 16 bit to 0's using GA..5 marks**

**Ans:** **Page no: 79**

**Q:7**

**Fuzzy Facts:**

**Ans:** **Page no: 94**

Fuzzy facts are ambiguous in nature, e.g. the book is heavy/light. Here it is unclear what heavy means because it is a subjective description. Fuzzy representation is used for such facts. While defining fuzzy facts, we use certainty factor values to specify value of "truth".

**Q:8**

**Which topic in AI is related to a situation in which a computer system emulates the decision making ability of a human expert?**

**Ans:** **Page no: 111 Topic: 5.2**

According to Durkin, an expert system is "A computer program designed to model the problem solving ability of a human expert". With the above discussion of experts in mind, the aspects of human experts that expert systems model are the experts:

?? Knowledge

?? Reasoning

**Q:9**

**Replace of expert is a role of an expert system give an example of daily life?**

**Ans:** **Page no :122 Topic : 5.3.3**

R1/XCON (late 70's)

R1/XCON is also amongst the most cited expert systems. It was developed by DEC (Digital Equipment Corporation), as a computer configuration assistant. It was one of the most successful expert systems in routine use, bringing an estimated saving of \$25million per year to DEC. It is a classical example of how an ES can increase productivity of organization, by assisting existing experts.

**Q:10**

**When we run out of time in GA then can it guaranteed to fine exact solution which is required?**

**Ans:** **Page no :79**

If we run out of time, we either present the best possible solution (the one with most number of 1-bits) as the answer or we can say that the solution can't be found. Hence GA is at times used to get optimal solution given some parameters.

**Q:11**

**Apply GA to solve the following problem suppose our individual have 32 bit computer word ,we want a word which all bits are zeros?**

**Ans:** **Page no :79**

Here's how you can do it:

- Create 100 randomly generated computer words
- Repeatedly do the following:
- Count the 0 bits in each word
- Exit if any of the words have all 32 bits set to 0
- Keep the ten words that have the most 0s (discard the rest)
- From each word, generate 9 new words as follows:

- Pick a random bit in the word and toggle (change) it
- Note that this procedure does not guarantee that the next “generation” will have more 0 bits, but it’s likely

**Q:12**

**Difference b/w crossover and mutation 2marks**

**Ans:**                      **Page no :77**      **Topic :3.5**

Mutation means change in genetic structure. Whereas crossover means interchanging the genetic structure of two or more chromosomes..

**Q:13**

**Importance of Knowledge Base in expert systems**

**Ans:**                      **Page no :77**      **Topic :3.5**

Importance of knowledge in expert system:

1. Knowledge is the enquire part of the expert system.
2. Allow easy modification adding and deleting skill from the knowledge base.
3. Easy modification of the knowledge base is a major factor in producing a successful program in expert system.
4. Knowledge engineering must address a range of problem.
5. Through a knowledge we create one part without affecting the other.
6. User knowledge specific to a problem domain to provide "expert quality" performance in that application area.

**Q:14**

**Difference working memory and expert system 5marks**

**Reasoning**

**Ans:**                      **Page no :102**      **Topic :4.11**

Reasoning is the process of deriving logical conclusions from given facts. Durkin defines reasoning as ‘the process of working with knowledge, facts and problem solving strategies to draw conclusions’.

**Q:15**

**Structural knowledge**

**Ans:**                      **Page no: 90**      **Topic: 4.3**

Describes structures and their relationships e.g. how the various parts of the car fit together to make a car, or knowledge structures in terms of concepts, sub concepts, and objects.

**Q:16**

**Forward chaining**

**Ans:**                      **Page no: 123**      **Topic: 5.11.1**

Forward Chaining is an “inference strategy that begins with a set of known facts, derives new facts using rules whose premises match the known facts, and continues this process until a goal state is reached or until no further rules have premises that match the known or derived facts” (Durkin). As you will come to appreciate shortly, it is a data-driven approach.

AI CYALE

Almost all AI systems have the following components in general:

?? Perception

?? Learning

?? Knowledge Representation and Reasoning

?? Planning

?? Execution

**Q:17**

**Which is better in terms of cost, expert system or human expert? (3 marks)**

**Answer:**

**Page no:**

Expert System is better in term of cost.

**Q:18**

**In adversarial search probabilistic function is used to score/number the nodes? yes or no and give reason to justify your answer (3mrks)**

**Answer:**

**Page no:**

I think yes it is used. Probabilistic function is used for probability. In adversarial search we are dealing with multiple players who are trying to reach goal and dealing other player as their opponent. If one player takes one move then there are chances that he might reach to goal first. In general Probabilistic function is used to guess the chances of win or loss.

**Q:19**

**In GA static evaluator is the criteria that check various individuals/solutions for being better than other in the population..? agree or not....**

**5**

**Ans:**

Yes Agreed.

We assume that we have a situation analyzer that converts all judgments about board situations into a single, overall quality number. This situation analyzer is also called a static evaluator and the score/ number calculated by the evaluator is called the static evaluation of that node.

**Q:20**

**Guess the type of reasoning with example.**

**3**

**Ali wears long shoes of bata, when running**

**Today ali walking in long shoes.**

**So it is raining.**

**Ans:**

Deductive Reasoning: Ali wears long shoes of bata, when running

Abdicative Reasoning: Today ali is walking in long shoes So it is raining.

**Q:21**

**Differentiate the Structural knowledge and shallow knowledge**

**2**

**Ans:** Page no : 90 Topic : 4.3

**Heuristic knowledge:** Rule-of-thumb, e.g. if I start seeing shops, I am close to the market.

o Heuristic knowledge is sometimes called shallow knowledge.

o Heuristic knowledge is empirical as opposed to deterministic

**Structural knowledge:** Describes structures and their relationships. e.g.

how the various parts of the car fit together to make a car, or knowledge structures in terms of concepts, sub concepts, and objects.

**Q:22**

**Differentiate b/w monotonic and non-monotonic...marks 2**

**Ans:** Page no: 104

Non-Monotonic reasoning is used when the facts of the case are likely to change

after some time, e.g.

Rule:

IF the wind blows

THEN the curtains sway

However, if we use monotonic reasoning, this would not happen. The fact that the curtains are swaying would be retained even after the wind stopped blowing. In nonmonotonic reasoning, we have a 'truth maintenance system'. It keeps track of what caused a fact to become true. If the cause is removed,

**Q:23**

**Suppose u r AI administrator you have to define how "system expert" is different from Engineering Knowledge" that the other person can understand the difference.....marks**

**Ans:** Page no:117

As we have emphasised several times, the power of an ES lies to a large extent in its richness of knowledge. Therefore, one of the prime roles of the expert system designer is to act as a knowledge engineer. As a knowledge engineer, the designer must overcome the knowledge acquisition bottleneck and find an effective way to get information from the expert and encode it in the knowledge base, using one of the knowledge representation techniques we discussed in KRR.

**Q:24**

**Differentiate briefly and precisely in perception and Knowledge presentation? 2mark**

**Ans:**

Perception component that allows the system to get information from its environment

Knowledge representation maybe static or it may be coupled with a learning component that is adaptive and

draws trends from the perceived data.

**Q:25**

**Write windows used by CLIPS. Any 3? 3marks**

**Ans:**

**Q:26**

**Deductive reasoning is based on forming, or inducing a “generalization” from a limited set of observations. Is it true or false? Justify? 3marks**

**Ans:**

No, Because inductive reasoning is based on forming, or inducing a “generalization” from a limited set of observations.

**Q.27 Command used to execute CLIPS program?**

**Ans:**

The agenda is the list of activated rules. We use the run command to run the agenda. Running the agenda causes the rules in the agenda to be fired.

CLIPS>(run)

**Q.28**

**Precisely explain how to explore genetic algorithm mrks 3**

**Ans:** **Page no:77**

Genetic Algorithms is a search method in which multiple search paths are followed in parallel. At each step, current states of different pairs of these paths are combined to form new paths. This way the search paths don't remain independent, instead they share information with each other and thus try to improve the overall performance of the complete search space.

**Q.29**

**There are many types of knowledge , u are gain some knowledge ,various parts of a truck combined together ,which type of knowledge will be suit able for it. Mrks 5**

**Ans:** **Page no:90**

Structural knowledge: Describes structures and their relationships. e.g. how the various parts of the car fit together to make a car, or knowledge structures in terms of concepts, sub concepts, and objects.

**Q.30**

**Give a command to run a CLISP 2 mrks**

**Ans:** repeat

**Q.31**

**Give a command to print a "Hello World" mrks 3**

**Ans:** Page no:136

(printout t "Hello world" crlf)

**Q.32**

**Which topic in Artificial intelligence is related to a situation in which a computer system emulates the decision making ability of a human expert.**

**Ans:** Page no:111

According to Durkin, an expert system is "A computer program designed to model the problem solving ability of a human expert". With the above discussion of experts in mind, the aspects of human experts that expert systems model are the experts:

- Knowledge
- Reasoning

**Q.33**

**Differentiate briefly and precisely b/w Meta knowledge and Heuristic knowledge.**

**Ans:** Page no:90

Meta knowledge: Knowledge about knowledge, e.g., the knowledge that blood pressure is more important for diagnosing a medical condition than eye color.

- Heuristic knowledge: Rule-of-thumb, e.g. if I start seeing shops, I am close to the market.

o Heuristic knowledge is sometimes called shallow knowledge.

o Heuristic knowledge is empirical as opposed to deterministic

**Q.34:**

**It will probably be rain today is fuzzy fact or not.Give reasons.**

**Ans:** Page no:94

Sometimes we need to represent uncertain information in facts. These facts are called uncertain facts, e.g. it will probably be rain today.

While Fuzzy facts are ambiguous in nature, e.g. the book is heavy/light.