

الزمن: 3 ساعات

التاريخ: 30/12/2017

الإسم ..... الرقم .....

أجب عن السؤال الأول و أي أربعة أسئلة أخرى

\*ورقة الإمتحان تشتمل على 8 صفحات\*

Q1	Q2	Q3	Q4	Q5	Q6	Total

**Question (1): (20 Marks)**

1- Define the following terms:

A. Artificial intelligence (AI) as :

(15 Marks)

1) A system thinks humanly.

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2) A system acts rationally.

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B. Intelligent Agent

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C. Search strategy

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D. State space

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2- What are the systems capabilities needed to pass Turing test? And what is the total Turing test?

(5 Marks)

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**Question (2): (20 Marks)**

**1- Mark with circle the correct answer (only one) : (12 Marks)**

1. To construct a machines program to think like a human is known as.....
  - A. Machine learning
  - B. Cognitive Modeling
  - C. Expert system
  - D. Robotics
2. Laws of Thought mean systems that :
  - A. Acting rationally
  - B. Thinking humanly
  - C. Thinking rationally
  - D. Decision statements
3. Rational behavior means :
  - A. Doing the right thing
  - B. Maximize goal achievement
  - C. Rational thinking
  - D. All mentioned answers are true
4. ....is the academic discipline deal with design systems that maximize an objective function over time.
  - A. Linguistics
  - B. Computer Engineering
  - C. Control Theory
  - D. Mathematics
5. Linguistics is academic field or discipline related and importance to AI in:
  - A. To know how humans think and act
  - B. Provides reasoning models for AI
  - A. Utility, decision theory
  - B. Knowledge representation
6. Intelligent systems that are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it is called:
  - A. Natural Language Processing (NLP)
  - B. Speech Recognition
  - C. Data Mining and Data warehousing
  - D. Handwriting Recognition
7. Basic Agent structure it can be represented by:
  - A. Agent = Structure + program
  - B. Agent = Architecture + program
  - C. Agent = Architecture + function
  - D. Agent = program + function
8. The Agent environment is Fully Observable when:
  - A. The next state of the environment completely determined by the current state.
  - B. Agent's experience can be divided into atomic steps.
  - C. Agent's sensors give it full access to the complete state of the environment.
  - D. All the above answers is true.
9. Which of the following AI application represent a system acts rationally
  - A. Robots
  - B. Internet Search engine
  - C. Game of Chess
  - D. Vacuum cleaner
10. A Search strategy, in which the highest layer of a decision tree is searched completely before proceeding to the next layer is called:
  - A. DFS
  - B. BFS
  - C. Best-First Search
  - D. Hill climbing
11. A search strategy which searches the most promising branches of the state-space first is:
  - A. Uninformed
  - B. Informed
  - C. Heuristic search
  - D. Both (b) and (c)
12. A search strategy that extends the current path as far as possible before backtracking to the last choice point and trying the next alternative path is called:
  - A. A\*
  - B. DFS
  - C. BFS
  - D. CSP

**2- Answer only with True (T) or False (F) (8 Marks)**

1. A constraint satisfaction problem (CSP) consists of a set of variables, a set of domains (one for each variable), and a set of constraints that specify allowable combinations of values. ( )
2. Logic can't express everything, but when using fuzzy logic we can express uncertainty. ( )
1. Simple reflex agents can only react on partially observable environment. ( )
2. Informed Search use only the information available in the problem definition. ( )
3. Uninformed search reduce the amount of time spent in searching. ( )
4. The heart of the goal based agent is the search function. ( )
5. Memory space is efficiently utilized in BFS while space utilization in DFS is not effective. ( )
6. Any graph –search –space can transform into a search –space –tree. ( )
7. Tree is a special case of a graph ( )
8. The only thing that a blind search can do is distinguish a non-goal state from a goal state. ( )

**Question (3): (20 Marks)**

**Answer the following questions**

**1- What are the four things that the rational agent depends on at any given time? (4 Marks)**

1-	2-
3-	4-

**2- Compare between Heuristic search and Brute force or Blind search techniques using the following table. (4 Marks)**

Heuristic search	Blind search

**3- Mention any four (4) AI applications. (4 Marks)**

1-	2-
3-	4-

**4- List any two (2) advantages /disadvantages of Simple Reflex Agents. (4 Marks)**

Advantages	Disadvantages

**5- What are the major characteristics of the model based agent? (4 Marks)**

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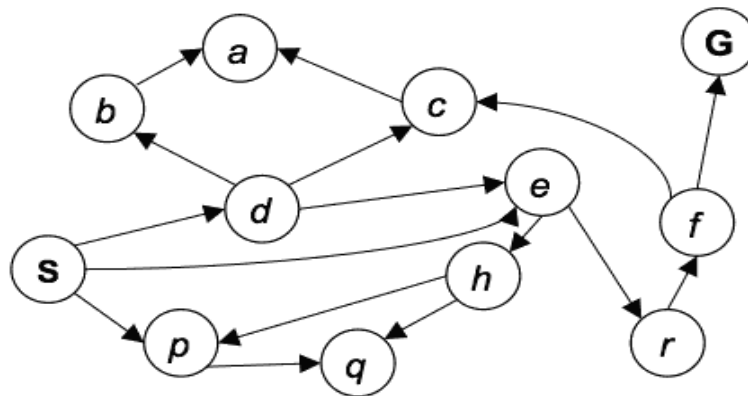
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**Question (4): (20 Marks)**

From the following state space graph try to solve the following questions:



1- Define search tree.

**(2 Marks)**

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2- Show the corresponding search tree.

**(6 Marks)**

1- Find the path from the start state **S** to the goal state **G** if we implement:

**(4 Marks)**

a) **Depth First Search (DFS)**

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b) **Breadth First Search (BFS)**

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2- Which is the best (**quick and not costly**) solution from the above? And why?

**(2 Marks)**

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1- List the variables.

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2- What are the domain of each variable?

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3- Explain and state the possible constraint of the problem (with the aid of mathematical equations).

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4- Find out the values of the variables that can satisfy the arithmetic addition (justify your solution).

**Question (6): (20 Marks)**

1- Consider the 8- puzzle problem find the path from the start state and to the goal state(given below)

if we implement the search strategies : **(14 Marks)**

(b) Best First search

**Start State**

**Goal State**

(c) Hill climbing

1		3
7	2	4
6	8	5

1	2	3
8		4
7	6	5

**Hint :**

1-Show the search tree in both cases

2-Use the evaluation function :  $F(n) = d(n) + w(n)$

Best First search Strategy

Path Cost.....

Hill Climbing Strategy

Path Cost.....

Best Solution from both strategies: .....

2- Specify the state space through determines the following Fill the table below : **(6 Marks)**

<u>Space-State</u>	<u>States</u>	<u>Initial state</u>	<u>Actions</u>	<u>Goal test</u>	<u>Path cost</u>	<u>Solution</u>
Problem						
Vacuum Cleaner						
Robotic assembly						

**End of Exam / Good Luck**

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