



Taibah University
College of Computer Science and Engineering
Department of Computer Science

Form
A

Mid 1 – 1st Semester (2020/2021)

CS 362: Intelligent Systems

Date: Wednesday - 28/10/2020

Total: 15 Marks

Time: 09:00 AM

Duration: one hour

Student Name:

Student No.:

Section:

Instructions to students:

1. MCQs answers are to be in the table on next page.
2. This is a closed-book, closed-note examination (NO examination materials).
3. **Mobile phones, calculators and any electronic device are not allowed** in this exam.
4. ...
5. ...

For instructors:

CLO	Questions	Assigned marks	Awarded marks
1.1	A1-A4, A7, A9,A10	3.5	
1.2	B1-B4 A5, A6	2 1	
2.1	C2-C4	7	
2.2	C1	1	
	A8	0.5	
4.1			
	
Total		...	

#Section A (5 marks):

1-) is a computer system that can act like or simulate the functioning of the human brain.

A. Neural network

B. Perceptive system

C. Robotics

D. Expert system

2-) The two most fundamental concerns of AI researchers are:

A. Search and Knowledge Representation

B. Knowledge Representation and Machine learning

C. Search and Expert Systems

D. Robotics and machine learning

3-) the ability to decide on a good sequence of actions to achieve our goals.

A. Problem Representation

B. Automated Reasoning

C. Planning

D. Search

4-) stores knowledge and makes inferences

A. Perceptive system

B. Vision system

C. Expert system

D. Learning system

5-) For propositional expressions P, Q and R, the law below is:

$$P \vee (Q \wedge R) \equiv (P \vee Q) \wedge (P \vee R)$$

A. Commutative law

B. Distributive law

C. Contrapositive law

D. Associative law

6-) Which an inference rule should be used for the example below?

p

p → q

∴ q

A. Modus ponens

B. Modus tollens

C. Introduction

D. Elimination

7-) In Turing test, if the interrogator can't distinguish the machine from the human then

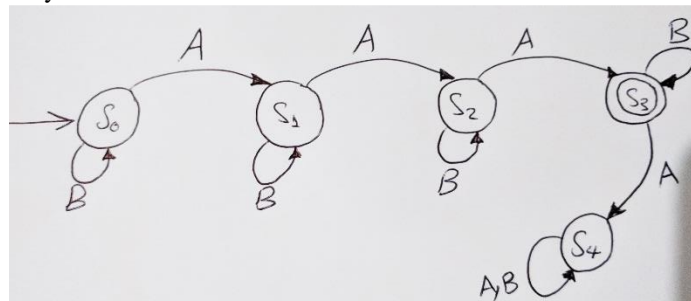
A. The machine may be assumed to be intelligent

B. The interrogator is intelligent

C. The machine is not intelligent

D. The interrogator is not intelligent

8-) Which word is accepted by the machine below?



- A. BABABABA
- B. AAABBBAAABB
- C. BBABBABBAB**
- D. ABAABBAAABBB

9-) ... is a science of translating actual knowledge into a format that can be used by the computer.

- A. Automated Reasoning
- B. Problem Representation**
- C. Planning
- D. Search

10-) is the most primitive unit of the predicate calculus language

- A. Complex sentence
- B. Atomic sentence**
- C. Composition sentence
- D. None of the mentioned

File the following table with your answers:

1	2	3	4	5	6	7	8	9	10

#Section B (2 marks): Translate the following English sentences into Predicate Logic (FOL) and vice-versa

1-) Saleh does not own a house

$$\neg \exists X (\text{house}(X) \wedge \text{owns}(\text{saleh}, X))$$

2-) $\forall X \forall Y \forall Z (\text{father_of}(X,Z) \wedge \text{father_of}(Y,Z) \rightarrow X \equiv Y)$

Every person has only one father

3-) If it is not cloudy tomorrow, Rami will go to the zoo and he will not take his umbrella with him.

$$\neg \text{cloudy}(\text{tomorrow}) \rightarrow \text{go}(\text{rami}, \text{zoo}) \wedge \neg \text{takes}(\text{rami}, \text{umbrella})$$

$$4-) \exists X(\text{bird}(X) \wedge \text{falcon}(X)) \wedge \neg \exists Z(\text{bird}(Z) \wedge \text{cat}(Z))$$

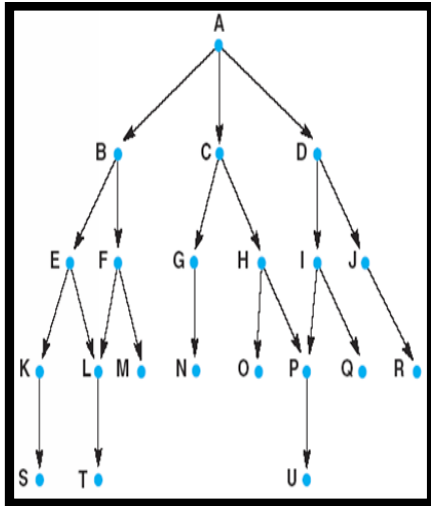
Some birds are falcons but no birds are cats

Section C (8 marks):

C.1 (1 mark) Please, draw a Moore machine that accepts words that has at least two B's, and the stream of inputs consists only of A and B



C.2 (2marks) Use the breadth-first search algorithm on the search tree (the start state is A, the goal state is U) below to specify the contents of Open list and Closed list after 4 iterations:

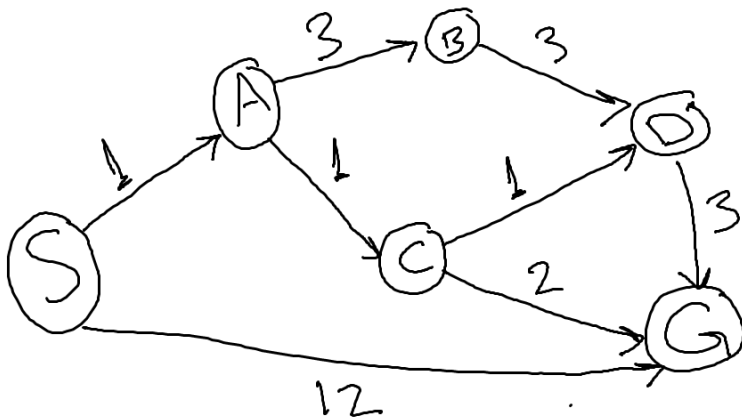


1. **open = [A]; closed = []**
2. **open = [B,C,D]; closed = [A]**
3. **open = [C,D,E,F]; closed = [B,A]**
4. **open = [D,E,F,G,H]; closed = [C,B,A]**

C.3 (2marks) Use the depth -first search algorithm on the search tree (the start state is A, the goal state is U) of the previous problem to specify the contents of Open list and Closed list after 4 iterations:

1. **open = [A]; closed = []**
2. **open = [B,C,D]; closed = [A]**
3. **open = [E,F,C,D]; closed = [B,A]**
4. **open = [K,L,F,C,D]; closed = [E,B,A]**

C.4 (3marks) Please, use A* algorithm on the graph below to find the shortest path from start state S to goal state G



state	h(n)
S	4
A	2
B	6
C	2
D	3
G	0

C.4.a What could be the contents of Open list when the goal state is reached

C.4.b What could be the contents of Closed list when the goal state is reached

$f(n) = g(n) + h(n)$

	open	closed
S	[S, 4]	[]
A	[A, 3, G, 12]	[S, 4]
C	[C, 1, B, 6, G, 12]	[S, 4, A, 3]
D	[D, 3, B, 6, G, 12]	[S, 4, A, 3, C, 1]
G	[G, 2, D, 3, B, 6, G, 12]	[S, 4, A, 3, C, 1, D, 3]

Final Path is : $S \rightarrow A \rightarrow C \rightarrow G$