UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER 1
SESSION 2019/2020

COURSE NAME	:	ARTIFICIAL INTELLIGENCE
COURSE CODE	:	BEC 41503
PROGRAMME	:	BEJ
EXAMINATION DATE	:	DECEMBER 2019 / JANUARY 2020
DURATION	:	3 HOUR
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Answer all the questions

Q1   (a)   Consider an Artificial Intelligence tree in FIGURE Q1. The root represents various of knowledge discipline which have contributed to the emergence of intelligent techniques an applications, among them are those depicted on the top part of the tree.
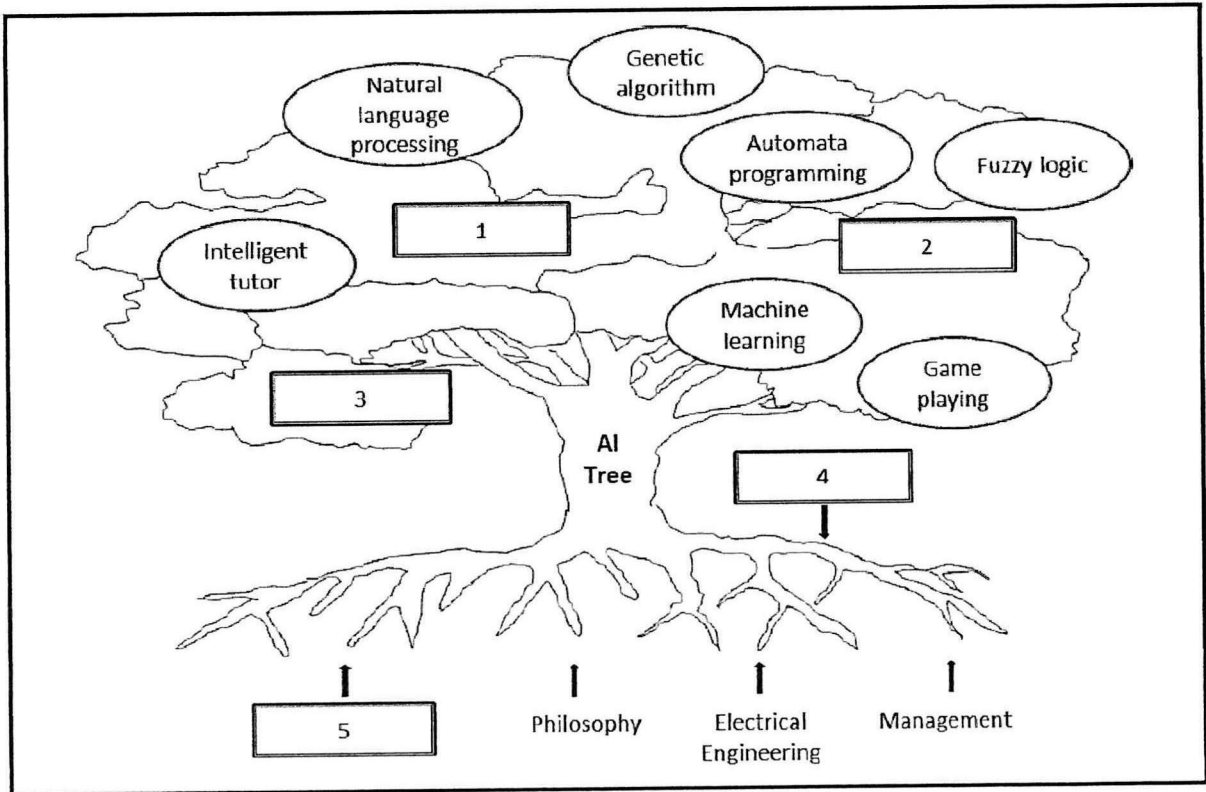
Figure Q1

Based on **Figure Q1**, answer the following questions

(i)   State **THREE (3)** intelligent techniques or applications to fill in the boxes numbered 1 to 3.

(3 marks)

(ii)   State **TWO (2)** disciplines of knowledge to fill in the boxes numbered 4 and 5.

(2 marks)

(b)   Based on the definition given below, identify the **FOUR (4)** approaches of AI.

"The exciting new effort to make computer think ... machines with minds, in the full and literal sense." (Haugeland, 1985)	"The study of the computations that make it possible to perceive, reason, and act." (Winston, 1992)
"The study of how to make computers do things at which, at the moment, people are better." (Rich and Knight, 1991)	"Computational Intelligence is the study of the design of intelligent agents." (Poole et at, 1998)

(4 marks)

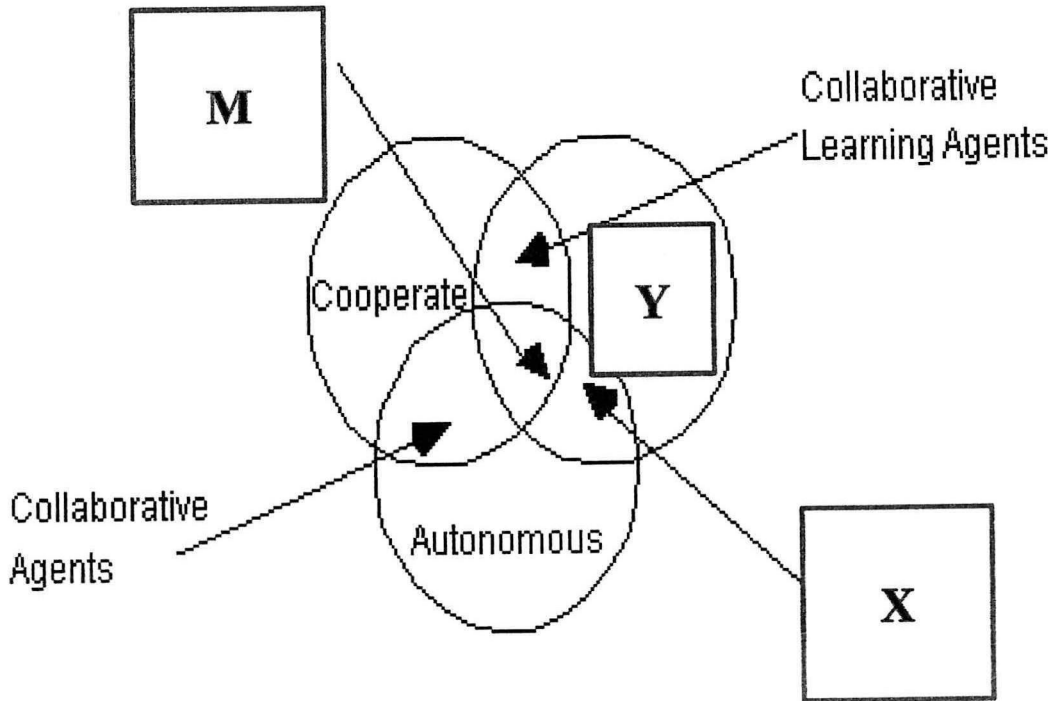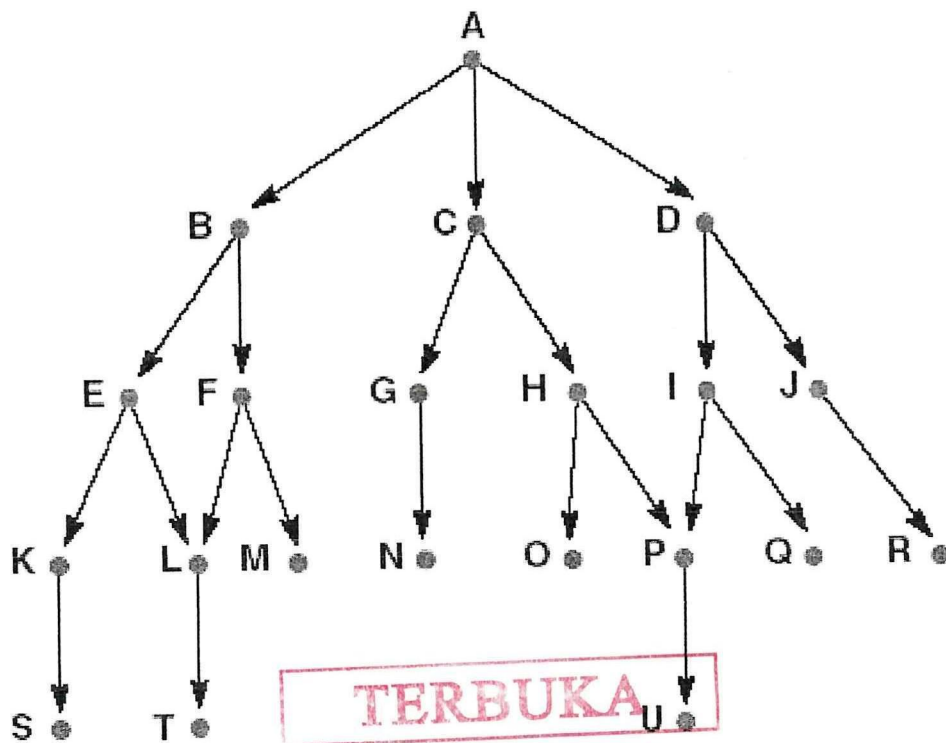**Q2** **Figure Q2** describe the agent typology. Label X, Y and M

(5 marks)

Figure Q2

Q3 Given a search tree as illustrated in **Figure Q3**

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Figure Q3

(a) Assume G is the goal. Traverse the tree using Breadth-first-search by giving the sequence of node

(8 marks)

(b) Assume G is the goal. Traverse the tree using Depth-first-search by giving a sequence of node.

(10 marks)

(c) Distinct the difference between Depth-first-search and Iterative Deepening Search?

(2 marks)

Q4 Represent the following data by using semantic network.

Tom is a cat. Tom caught a bird. Tom is owned by John. Tom is ginger in colour. Cats like cream. The cat sat on the mat. A cat is a mammal. A bird is an animal. All mammals are animals. Mammals have fur

Draw a semantic network for the given problem.

(20 marks)

Q5 Translate the following sentence into First Order Predicate Logic (FOPL).

(a) Popeye loves spinach

(2 marks)

(b) Every apple is either green or yellow

(2 marks)

(c) No person likes a smart vegetarian

(2 marks)

(d) All horses have four legs as well as two eyes

(2 marks)

(e) Stalin was a dictator and not an Ancient Greek

(2 marks)

Q6   **Figure Q6** is a map of Pekan Semarak in Malaysia.
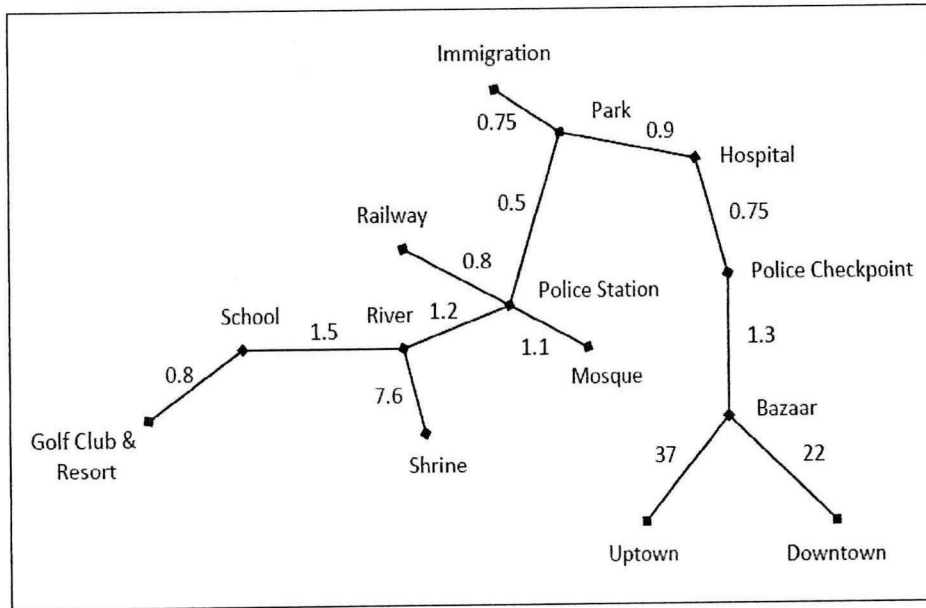
Figure Q6

Assume that you want to go from Park to Golf Club & Resort. Heuristic value, h(n) is as shown in the following **Table Q6**

Table Q6

Location	$h(n)$	Location	$h(n)$
Immigration	3.5	Police Station	3.5
Park	5	Railway	3.3
Hospital	4	Mosque	4
Police Checkpoint	4.5	River	2.5
Bazaar	5.5	School	0.3
Uptown	15	Shrine	3.5
Downtown	10	Golf Club & Resort	0

(a)   Assume g(n) is the distance (in kilometer) between locations as stated on the map. Calculate f(n) and complete the **Table Q6(a)**

(15 marks)

Table Q6(a)

| Location	h(n)	g(n)	f(n)	Location	h(n)	g(n)	f(n)
Immigration	3.5			Police Station	3.5		
Park	5			Railway	3.3		
Hospital	4			Mosque	4		
Police Checkpoint	4.5			River	2.5		
Bazaar	5.5			School	0.8		
Uptown	15			Shrine	3.5		
Downtown	10			Golf Club & Resort	0		

    (b)   List the sequence of nodes to the Golf Club & Resort using A* algorithm.

(5 marks)

Q7   Artificial neural network (ANN) is inspired by human's biological neural network.

    (a)   Sketch the basic architecture of an ANN

(6 marks)

    (b)   State **FOUR (4)** relationship between the components in the ANN architecture you sketched in **Q7(a)** with the components of a biological neuron shown in Figure **Q7(b)**.
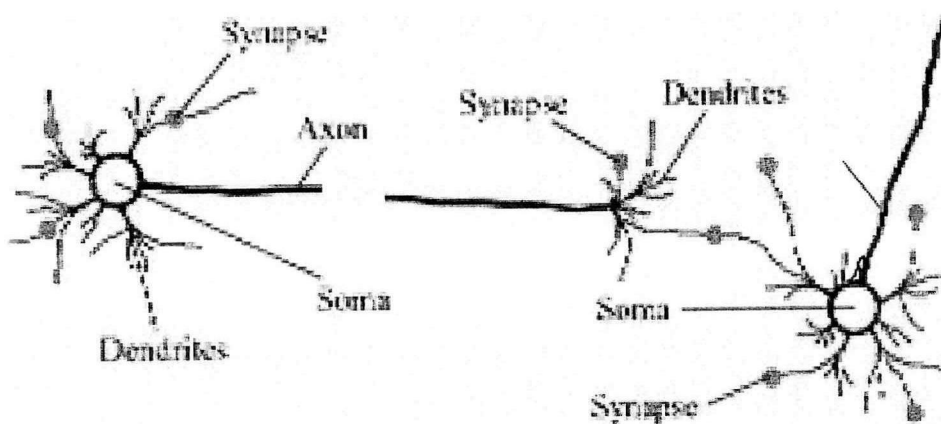
Figure Q7(b)

(4 marks)

(c) Give **ONE (1)** example of Neural Network usage in each of the fields listed in the **Table Q7(c)**.

(6 marks)

Table Q7(c)

Field	Example of usage
Medicine	
Business	
Education	
Engineering	
Law	
Construction	

- **END OF QUESTIONS -**