



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017**

COURSE NAME : COMPUTER SECURITY
COURSE CODE : BNF 41403
PROGRAMME CODE : BNF
EXAMINATION DATE : DECEMBER 2016 / JANUARY 2017
DURATION : 2 HOURS 30 MINUTES
INSTRUCTION : ANSWER ALL QUESTIONS

TERBUKA

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

- Q1** (a) An agent is anything that can perceive and act on its environment.
- (i) Illustrate and explain how an agent interacts with its environment.
 - (ii) List **FOUR (4)** rules of an intelligent agent
- (10 marks)
- (b) Artificial Intelligence (AI) is about building rational agents. Perfect Rationality assumes that the rational agent knows all and will take the action that maximize its utility function
- (i) Define the term utility function.
 - (ii) Explain the basic concept of a utility-based agent
- (6 marks)
- (c) Goal formulation and Problem formulation are both fundamental criteria in designing a problem-solving agent. Using an appropriate example, differentiate between goal and problem formulation.
- (4 marks)
- Q2** (a) Based on **Figure Q2(a)**, work out a route from town A to town M using the A* algorithm. Answer the following based on these cost functions,
- $g(n)$ = the cost of each move as the distance between each town (shown on map).
 $h(n)$ = the SLD (straight line distance) between any town and town M. These distances are given **Figure Q2(a)**.
- (i) Provide the search tree for your solution, showing the order in which the nodes were expanded and the cost at each node. You should not re-visit the town that you have just come from.
 - (ii) State the route you would take and the cost of that route.
- (15 marks)
- (b) List **FIVE (5)** main advantages of using decision trees.
- (5 marks)

TERBUKA

- Q3** (a) Genetic Algorithm (GA) is one of the heuristic method that imitates evolution cycle in nature. Name **FIVE (5)** main elements in GA and illustrate the evolution cycle. (8 marks)
- (b) Given a function, $f(x) = x^3 - 60x^2 + 900x + 100$, where x is constrained between 0 ... 31.
- (i) Assume GA is initialized with four binary chromosomes given by P1 = 11100, P2=01111, P3=10111, P4=00100. Find the value for x and $f(x)$ for each chromosome.
- (ii) Two pairs of P2-P3 and P2-P4 are chosen as parents, then resulting children C1-C2 and C3-C4 are generated respectively. One-point crossover is applied with crossover point is randomly selected. If crossover point of 2 for P2-P3 and crossover point of 3 for P2-P4 are selected, generate all resulting childrens.
- (iii) Calculate the value of x and $f(x)$ for C1, C2, C3 and C4. (12 marks)
- Q4** (a) Consider the following relations: $F(x)$ is true when x is female, $M(x)$ is true when x is male, $U(x)$ is true when x a UTHM student and $K(x, y)$ is true when x likes y . Translate the following into first order logic.
- (i) There is at least one male and female UTHM student that likes each other.
- (ii) All male and female UTHM students like each other. (6 marks)
- (b) "Herbert is a small elephant who lives in Endau-Rompin National Park. Like all elephants he eats grass and like swimming". Convert the statement above using the following knowledge representations.
- (i) Sematic network model.
- (ii) Frame model. (14 marks)

TERBUKA

- Q5** (a) Reinforcement learning (RL) enables an agent to become proficient in an unknown environment, given only its percepts and occasional rewards.
- (i) Draw and label basic block diagram of a RL agent interacting with its environment
 - (ii) Differentiate between supervised and unsupervised learning. (6 marks)
- (b) **Figure Q5(b)** shows 5 rooms in a building connected by doors. Each room inside the building is numbered from 0 to 4 and the outside is labelled as 5.
- (i) Assume a person can move from one room to the next using door and each room the person is at indicate the state. Represent the rooms on a graph, where each rooms as a node and each door as a link.
 - (ii) Let the goal is to be in room 5 (the outside) and the link connected to room 5 is given reward valued 10. Provide reward matrix R and resulting learning matrix Q if the initial state is room 2 and random state path is given by:

2 – 3 – 4 – 5

Update the graph in **Q5(b)(i)** with the resulting Q values. (14 marks)

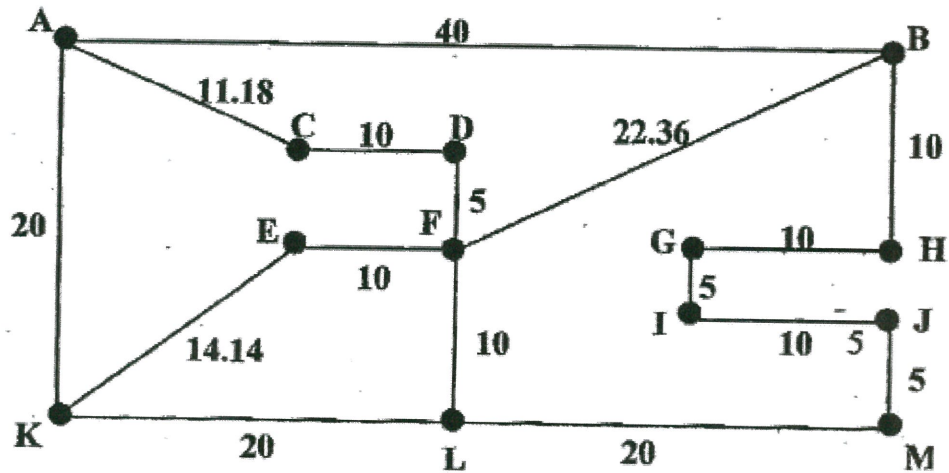
-END OF QUESTIONS -

TERBUKA

FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 2016/2017
 COURSE NAME : COMPUTER SECURITY

PROGRAMME CODE : BNF
 COURSE CODE : BNF 41403



Straight Line Distance to M

A	44.72	E	31.62	I	11.18	M	0.00
B	20.00	F	22.36	J	5.00		
C	33.54	G	14.14	K	40.00		
D	25.00	H	10.00	L	20.00		

FIGURE Q2(a)

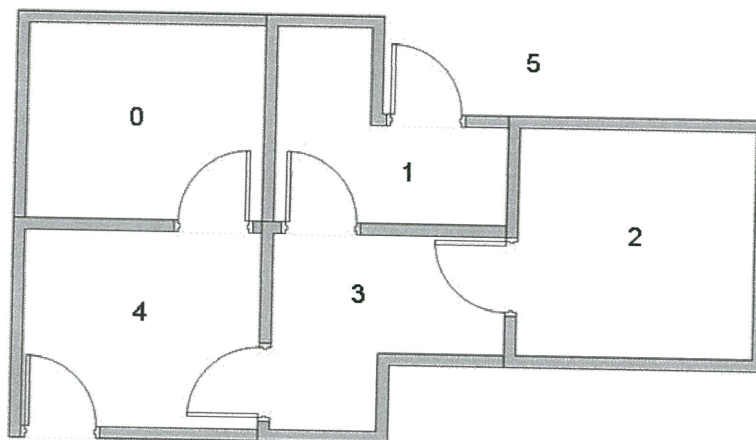


FIGURE Q5(b)

TERBUKA