

**FINAL EXAMINATION**

**BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN CYBER
SECURITY**

**BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN COMPUTER
APPLICATION DEVELOPMENT**

COURSE : ARTIFICIAL INTELLIGENCE

COURSE CODE : SWC3553

DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES:

1. This question paper consists of **FOUR (4)** questions.
2. Answer **ALL** questions in the Answer Booklet provided.
3. Please check to make sure that this examination pack consists of :
 - i. The Question Paper
 - ii. An Answer Booklet
4. Do not bring any material into the examination hall.
5. Please write your answer using permanent ink.

MYKAD/ PASSPORT NO : _____

ID. NO. : _____

LECTURER : _____

SECTION : _____

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

This question paper consists of 6 printed pages including the front page

QUESTION 1

Artificial Intelligence (AI) has four main frameworks for defining intelligence, and it is increasingly embedded in everyday life to solve real-world problems.

- a. Explain any **TWO (2)** frameworks used to describe Artificial Intelligence (AI) according to Russell & Norvig with **ONE (1)** real-world application to support your explanation.
(8 marks)
- b. Explain the Turing Test by describing:
 - i. How the test works.
(4 marks)
 - ii. **TWO (2)** capabilities required for an AI system to pass the standard Turing Test.
(4 marks)
 - iii. **ONE (1)** limitation of the Turing Test .
(2 marks)
- c. A university introduces an AI chatbot on its website to answer students' questions regarding course registration, examination schedules, and campus facilities.
 - i. Identify the AI technology used in this scenario.
(2 marks)
 - ii. Explain **TWO (2)** benefits of the chatbot for students.
(4 marks)
 - iii. Discuss **THREE (3)** advantages of using an AI chatbot for the university.
(6 marks)

(Total : 30 marks)

QUESTION 2

A smart home security system is deployed in a residential building. The system consists of motion sensors placed at entry points, a camera at the front door with facial recognition, a smart lock, and a mobile application for the homeowner. The system monitors all entry points in real time, identifies visitors using facial recognition, and automatically locks or unlocks doors based on recognised identities. It also sends alerts to the homeowner when an unrecognised person is detected. The system operates in both predictable conditions (e.g., recognising registered occupants) and unpredictable conditions (e.g., power fluctuations or sensor failures).

Based on the scenario above, answer the following questions:

- a. Classify the smart home security system according to:
 - i. Sensors (1 mark)
 - ii. Actuators (1 mark)
 - iii. Determine the Percept, Process, and Action stages in the agent - environment loop using **ONE (1)** suitable example. (3 marks)
- b. Using the PEAS model below, explain **TWO (2)** relevant examples for each component of the smart home security system:
 - i. Performance Measure (2 marks)
 - ii. Environment (2 marks)
 - iii. Actuators (2 marks)
 - iv. Sensors (2 marks)

- c. For each environment property, identify the correct classification for the smart home security system and explain how the scenario supports your answer.
- i. Observable or Partially Observable (2 marks)
 - ii. Deterministic or Stochastic (2 marks)
 - iii. Static or Dynamic (2 marks)
 - iv. Discrete or Continuous (2 marks)
- d. Select **ONE (1)** most appropriate intelligent agent type from the following: (Simple Reflex Agent, Model-Based Reflex Agent, Goal-Based Agent, Utility-Based Agent, Learning Agent).
- i. Identify the most suitable agent type and explain its suitability for the system. (3 marks)
 - ii. Describe **ONE (1)** limitation of each of the other four agent types when applied to the system. (6 marks)

(Total: 30 marks)

QUESTION 3

A university campus shuttle service is developing an AI-based route planning system to help shuttles navigate between bus stops on campus. The campus is represented as a graph where each bus stop is a node and each road between stops is an edge with a known distance (in metres). The system starts at the Main Gate (Node A) and must reach the Library (Node G) using the minimum total travel distance.

Table 1 : Campus bus stops information

From	To	Distance (m)	Route Description
A (Main Gate)	B (Admin Block)	150	Main Road
A (Main Gate)	C (Cafeteria)	200	Side Road
B (Admin Block)	D (Faculty Block)	100	Campus Road
B (Admin Block)	E (Sports Complex)	250	Campus Road
C (Cafeteria)	D (Faculty Block)	180	Campus Road
C (Cafeteria)	F (Hostel)	120	Back Road
D (Faculty Block)	G (Library)	90	Direct Route
E (Sports Complex)	G (Library)	200	Long Route
F (Hostel)	G (Library)	160	Back Route

Note: The heuristic values $h(n)$ (straight-line distance estimates to Library G) are as follows: $h(A)=380$, $h(B)=250$, $h(C)=260$, $h(D)=90$, $h(E)=200$, $h(F)=160$, $h(G)=0$.

Refer to Table 1 and the heuristic values provided. Using the campus shuttle route planning problem:

- Show the Uniform Cost Search (UCS) cumulative path cost for all possible routes to identify the route selected by UCS.
(10 marks)
- Compute the optimal route from Node A to Node G using A* search algorithm.
(10 marks)

(Total: 20 marks)

QUESTION 4

A large company has implemented an AI-powered system to automate recruitment, monitor employee performance, and analyze customer data. After several months, the company faces various issues. Some employees lose their jobs due to automation, customers complain about privacy concerns, certain applicants believe the AI recruitment system is unfair, and cybercriminals use AI-generated deepfake videos to spread misinformation about the company.

Based on the scenario above, discuss **FOUR (4)** risks of future AI that are demonstrated in the scenario and state **ONE (1)** suitable solution for each risk.

(Total: 20 marks)
(TOTAL: 100 MARKS)

END OF QUESTION PAPER