

**FINAL EXAMINATION****DIPLOMA IN COMPUTER SCIENCE****COURSE : ARTIFICIAL INTELLIGENCE****COURSE CODE : SWC3723****DURATION : 2 HOURS AND 30 MINUTES****INSTRUCTIONS TO CANDIDATES:**

1. This question paper consists of **TWO (2)** parts. : PART A (30 questions)
: PART B (4 questions)
2. Answer **ALL** questions from PART A and PART B.
 - i. Answer PART A in the Objective Answer Sheet
 - ii. Answer PART B 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
 - iii. An Objective Answer Sheet
4. Do not bring any material into the examination hall. Electronic calculator is allowed.
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 11 printed pages including the front page.

PART A : MULTIPLE CHOICE QUESTIONS**Instruction: Choose the CORRECT answer.**

1. In a real-world application, which of the following best represents Artificial Intelligence (AI)?
 - A. A computer network
 - B. A programming language
 - C. A system that only stores data
 - D. Machines that can perform tasks requiring human intelligence

2. Which of the following applications most likely uses Artificial Intelligence to improve user experience?
 - A. Online shopping recommendation system
 - B. Computer keyboard
 - C. USB storage device
 - D. Digital calculator

3. A virtual learning assistant is designed to understand students' emotions and respond appropriately during online learning sessions. Which field contributes most to the development of this AI capability by studying human thinking and behavior?
 - A. Chemistry
 - B. Geography
 - C. Accounting
 - D. Psychology

4. Which AI foundation focuses on logical reasoning and decision-making?
 - A. Mathematics
 - B. Economics
 - C. Literature
 - D. Biology

5. A technology company is developing an intelligent system that can learn from data, make decisions, and solve problems. The development team refers to historical milestones in AI to understand how the field evolved.

Which statement best explains the contribution of the Dartmouth Conference in 1956 to the development of modern AI?

- A. It resulted in the creation of the first smartphone.
 - B. It led to the invention of the Internet for AI communication.
 - C. It stopped the development of machine learning techniques.
 - D. It introduced AI as a formal field of study and encouraged further AI research.
6. Which statement best describes AI?
- A. AI only works in robots
 - B. AI performs tasks without any data
 - C. AI can learn, reason, and make decisions
 - D. AI can always replace humans completely
7. Which of the following is an AI application?
- A. Printer
 - B. Flash drive
 - C. Spreadsheet software
 - D. Recommendation system
8. A company invested heavily in AI technology, but the system failed to deliver the expected results. As a result, the company stopped funding AI projects. This situation is most like which period in AI history?
- A. AI Winter
 - B. Expert System Era
 - C. Deep Learning Era
 - D. Dartmouth Conference Era

9. A smart vacuum robot can detect obstacles, identify dirty areas, and automatically adjust its cleaning path to clean a room efficiently.

Based on the scenario above, why can the vacuum robot be considered an intelligent agent?

- A. It stores data in a database only.
 - B. It functions as a programming language.
 - C. It connects devices through a network cable.
 - D. It perceives its environment and takes actions to achieve a goal.
10. In an intelligent agent, sensors are used to:
- A. Perceive the environment
 - B. Connect computers
 - C. Store information
 - D. Execute actions
11. Which of the following is an actuator in a robotic vacuum cleaner?
- A. Wheels
 - B. Camera
 - C. Microphone
 - D. Dust sensor
12. A rational agent always:
- A. Chooses actions that maximize performance
 - B. Uses the most expensive technology
 - C. Makes random decisions
 - D. Copies human behavior
13. Which environment is fully observable?
- A. Poker game
 - B. Chess game
 - C. Driving in traffic
 - D. Medical diagnosis

14. A self-driving car operates in a:
- A. Static environment
 - B. Simple environment
 - C. Dynamic environment
 - D. Single-state environment
15. Which environment contains uncertainty?
- A. Static
 - B. Stochastic
 - C. Deterministic
 - D. Fully observable
16. A thermostat that turns on the air conditioner when the temperature is high is an example of:
- A. Learning agent
 - B. Goal-based agent
 - C. Utility-based agent
 - D. Simple reflex agent
17. Which agent type can improve its performance through experience?
- A. Random agent
 - B. Learning agent
 - C. Table-driven agent
 - D. Simple reflex agent
18. Which component evaluates how well an agent is performing?
- A. Sensor
 - B. Actuator
 - C. Environment
 - D. Performance measure

19. A problem-solving agent attempts to:
- A. Find a sequence of actions to achieve a goal
 - B. Increase memory usage
 - C. Reduce network traffic
 - D. Create databases
20. In a search problem, the starting point is called:
- A. Goal state
 - B. Initial state
 - C. Action state
 - D. Terminal state
21. Which search strategy explores the shallowest nodes first?
- A. Hill Climbing
 - B. Greedy Search
 - C. Depth-First Search
 - D. Breadth-First Search
22. A robot is exploring a maze and always follows one path as far as possible before backtracking when it reaches a dead end. Which search strategy is the robot using?
- A. Greedy Best-First Search
 - B. Uniform Cost Search
 - C. Breadth-First Search
 - D. Depth-First Search
23. Breadth-First Search guarantees:
- A. No solution
 - B. Lowest memory usage
 - C. Fastest execution in all cases
 - D. Optimal solution when path costs are equal

24. Before searching for a solution, a problem-solving agent must first:
- A. Identify the problem and goal state
 - B. Select a heuristic function
 - C. Expand all possible nodes
 - D. Generate random actions
25. A heuristic function is used to:
- A. Encrypt information
 - B. Store data permanently
 - C. Generate random paths
 - D. Estimate the cost to reach a goal
26. In a search problem, what is a state space?
- A. The destination only
 - B. The cost of reaching the goal
 - C. The sequence of actions selected by the agent
 - D. The collection of all possible states that can be reached from the initial state
27. What does path cost represent in a search problem?
- A. The total cost of actions taken from the initial state to a state
 - B. The estimated distance to the goal
 - C. The number of nodes expanded
 - D. The number of goals available
28. A robot can occupy 50 different locations inside a warehouse. These locations collectively form the:
- A. Goal test
 - B. Path cost
 - C. State space
 - D. Performance measure

29. One major concern regarding future AI development is:
- A. Larger keyboards
 - B. Smaller databases
 - C. Ethical and privacy issues
 - D. Fewer programming languages
30. A logistics company adopts AI-powered vehicles that can plan routes, avoid obstacles, and deliver goods without a driver. Which future AI technology is the company implementing?
- A. Database systems
 - B. Autonomous vehicles
 - C. Spreadsheet automation
 - D. Manual navigation systems

(TOTAL: 30 MARKS)

PART B: STRUCTURED QUESTIONS

Instruction: Answer ALL questions.

QUESTION 1

Read the following scenario and answer the questions that follow:

A hospital plans to implement an AI system that assists doctors in identifying patients who are at risk of heart disease by analyzing medical records and test results.

- a. Define Artificial Intelligence (AI) and explain its role in the hospital system. (3 marks)
- b. A heart disease prediction system uses AI techniques to support medical decision-making. Explain the contribution of TWO (2) foundations of Artificial Intelligence in the development of this system. (4 marks)

- c. The hospital director claims that AI will completely replace doctors in the future.

Discuss whether you agree with this statement. Explain your answer.

(4 marks)

- d. Explain **TWO (2)** important milestones in the history of AI and their contributions to modern AI applications.

(4 marks)

(Total: 15 marks)

QUESTION 2

Based on the situation below, answer the following questions:

A smart agriculture system is used to monitor crops. The system automatically activates irrigation pumps when soil moisture levels become low and sends alerts to farmers when unusual conditions are detected.

- a. Identify the following components of the intelligent agent:

- i. Performance Measure
- ii. Sensors
- iii. Actuators
- iv. Environment

(4 marks)

- b. Using the concept of rationality, explain how the smart agriculture agent should decide whether to activate the irrigation system.

(6 marks)

- c. Classify the agriculture system environment according to the following properties and explain your answers:

- i. Fully Observable or Partially Observable
- ii. Deterministic or Stochastic
- iii. Static or Dynamic

(6 marks)

- d. Provide **ONE (1)** suitable agent structure for the smart agriculture system and explain your answer.

(4 marks)

(Total: 20 marks)

QUESTION 3

Review the following scenario before answering the questions:

Figure 1 below shows a university campus uses an autonomous delivery robot to transport documents between buildings. The robot starts at the Administration Building (A) and must deliver a document to the Library (G).

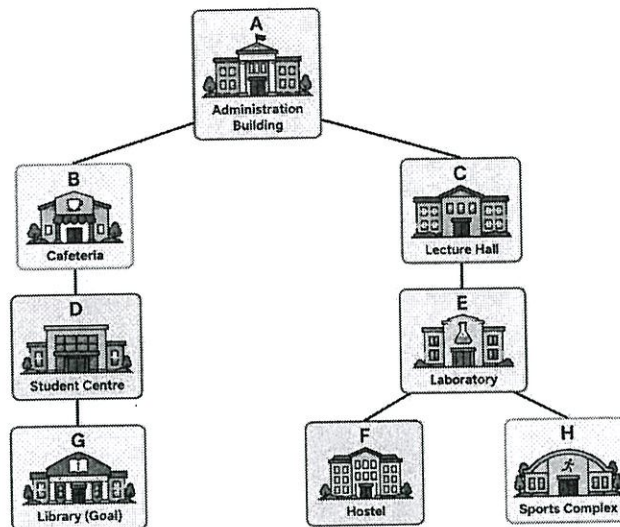


Figure 1 University Campus Map

a. Identify the following components of the search problem:

- i. Initial State
- ii. Goal State
- iii. Possible Actions
- iv. Path Cost

(4 marks)

b. Show the order of node expansion using Breadth-First Search (BFS) until the goal node is found.

(6 marks)

- c. Show the order of node expansion using Depth-First Search (DFS) until the goal node is found.

(6 marks)

- d. State which searches technique is more suitable to find the shortest path and discuss your answer.

(4 marks)

(Total: 20 marks)

QUESTION 4

Given the following scenario:

A manufacturing company plans to adopt AI technologies such as predictive maintenance systems, autonomous robots, and intelligent quality inspection systems.

- a. Discuss **TWO (2)** benefits that AI can provide to the manufacturing company.

(4 marks)

- b. Explain **TWO (2)** challenges the company may face when implementing AI technologies.

(4 marks)

- c. Discuss **TWO (2)** ethical issues that should be considered when using AI in the workplace.

(4 marks)

- d. Provide **ONE (1)** future AI trend or technology that may further transform the manufacturing industry and explain its potential impact.

(3 marks)

(Total : 15 marks)

(TOTAL: 70 MARKS)

(TOTAL :100 MARKS)

END OF QUESTION PAPER

