高科院
The i

Member of VTC Group
VTC 機構成員

Department of Construction, Environment and Engineering

SBS4115

Fundamentals of AI & Data Analytics

INSTRUCTIONS TO CANDIDATES

1. Answer all **FOUR (4)** questions.
2. All questions carry **EQUAL** marks.
3. This question paper has **THREE (3)** pages.
4. This question paper contains **FOUR (4)** questions.

DO NOT TURN THIS PAGE OVER UNTIL YOU ARE TOLD TO DO SO

End-of-Semester Examination
Semester One 2024/25

Date	:	**(TBC)23 December 2024**
Time	:	**(TBC) 2:00 p.m. – 5:00 p.m.**
Time Allowed	:	**3 hours**

Q.1

(i) Outline the key stages involved in developing a basic image recognition system using frameworks like OpenCV. In your answer, highlight the significance of data preprocessing, training, and model evaluation.

(8 marks)

(ii) Illustrate the real-world applications of image recognition, focusing on face recognition technologies. Propose a scenario in which AI-based facial recognition can significantly improve accuracy and operational efficiency.

(9 marks)

(iii) Identify the three principal approaches to Natural Language Processing (NLP) development. Describe the central ideas behind each approach, the models or techniques typically used and give one practical example of their application.

(8 marks)

Q.2

(i) Discuss two ethical challenges that arise from using AI in sensitive domains. Explain why these challenges guarantee careful consideration.

(10 marks)

(ii) Analyze the broader implications of algorithmic bias for society. Include a real example where bias in AI led to unfair or discriminatory outcomes.

(9 marks)

(iii) Propose strategies or frameworks that AI developers and engineers can implement to ensure fairness, transparency, and bias mitigation in future AI solutions.

(6 marks)

Q.3 (a)

(i) Examine how AI innovations are revolutionizing urban infrastructure to create smart cities. Include specific examples showing how AI improves both sustainability and productivity.

(8 marks)

(ii) Discuss the applications of AI in healthcare engineering, focusing on diagnostics and medical imaging. Support your explanation with examples highlighting improvements in patient outcomes and accuracy.

(8 marks)

(b) Describe how AI and data analytics can streamline project management, minimize costs, and enhance operational efficiency within construction and building services. Additionally, provide examples of AI-driven solutions in areas such as energy optimization, predictive maintenance, and safety compliance.

(9 marks)

Q.4

(i) Differentiate between supervised learning and unsupervised learning and discuss how each approach underpins various AI applications.

(6 marks)

(ii) Compare and contrast narrow AI and artificial general intelligence (AGI). Provide real-world examples to illustrate their distinctions.

(9 marks)

(iii) Evaluate the potential impacts of narrow AI and AGI on operational efficiency, risk management, and technological advancement across different industry sectors.

(10 marks)

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