

UNIVERSITY EXAMINATIONS

1ST SEMESTER 2022/2023 ACADEMIC YEAR

THIRD YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE (COMPUTER SCIENCE)

BICT 415: KNOWLEDGE BASED SYSTEMS

STREAM: R

TIME: 2 HRS

DAY: MONDAY (2.30-4.30PM)

DATE: 5/12/22

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS: - Answer Question 1 and Any Other Two.**QUESTION ONE: (30 MARKS)**

- (a) Explain the role of knowledge in Artificial Intelligence (3 marks)
- (b) Differentiate between:
- i. Information and Knowledge [2 Marks]
 - ii. Tacit Knowledge and Explicit Knowledge [2 Marks]
 - iii. Knowledge Engineer and the Inference Engine [2 Marks]
- (c) Describe two challenges of rule based Expert Systems. [4 Marks]
- (d) List and explain any five application areas of Artificial Neural Networks. [5 Marks]
- (e) Explain the difference between Procedural and Declarative Knowledge. Use relevant examples to illustrate your answer. (6 Marks)
- (f) Explain the difference between inductive and deductive reasoning. Use relevant examples to illustrate your answer. (6 Marks)

QUESTION TWO: (20 MARKS)

- (a) There are a number of fundamental differences between knowledge based systems and conventional systems. Describe with examples the differences and similarities between knowledge based systems and conventional information systems, include any claimed advantages of KBSs over conventional information systems. (10 Marks)
- (b) Using relevant examples, discuss the difficulties facing the developer of knowledge based systems when processing natural language. (10 Marks)

QUESTION THREE: (20 MARKS)

- (a) What are the differences between an expert system and a knowledge-based system? Explain and use examples to explain your answer. (2 Marks)
- (b) What major stages or steps would you recommend to someone building a KBS? In which stages would interaction with the expert be most crucial? Does this change with varying approaches to acquiring knowledge from the expert? (6 Marks)



- (c) One of the most often heard criticisms of AI is that machines cannot be called intelligent until they are able to learn to do new things and adapt to new situations Argue either for or against this statement using expert systems as your platform. (12 Marks)

QUESTION FOUR: (20 MARKS)

- (a) “The possibility of creating thinking machines raises a host of ethical issues.” (Bostrom & Yudkowsky, The ethics of artificial intelligence, 2013). Demonstrate your understanding of the ethical issues which are raised by artificial intelligence and knowledge based systems. (10 Marks)
- (b) Recent advances in cloud technology have opened up new possibilities for the application of knowledge base systems. Describe two knowledge based systems applications which have been made possible by the availability of big data and/or cloud technology. For each knowledge based systems application you choose to make it clear how new technology has enabled the development of that application. (10 Marks)

QUESTION FIVE: (20 MARKS)

- (a) Select one application domain for which a knowledge base might be created. Outline three techniques which could be used for knowledge elicitation in your chosen application domain, highlighting the advantages and disadvantages of each technique. (10 Marks)
- (b) There is currently much concern about data security and the emergence of cybercrime. Some researchers believe that knowledge based systems and artificial intelligence may offer possible cyber-security solutions and help us to combat cybercrime, explaining why these techniques might be applicable and how they might be used in the development of systems for cyber security. (10 Marks)