

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE

BSc HONS DEGREE IN NETWORK ENGINEERING

BSc HONS DEGREE IN COMPUTER SCIENCE

BSc HONS DEGREE IN SOFTWARE ENGINEERING

BSc HONS DEGREE IN INFORMATION TECHNOLOGY

NOV 2024

CS414 / NWE414 / SWE414/ IT414 : ARTIFICIAL INTELLIGENCE AND INTELLIGENT SYSTEMS

DURATION: 2HRS 30 MINS

TOTAL MARKS: 100

INSTRUCTIONS TO CANDIDATES

Answer all questions.

QUESTION ONE

- a) A man wishes to take a wolf, a goat and a cabbage across a broad river, from the south side to the north side, in a rowboat. The boat is very small and the poor man has room in the boat for only one of these items at a time. What's worse, he cannot leave the wolf and the goat on the same bank, whether coming or going, for the wolf will surely eat the goat. Nor can he leave the goat and cabbage on the same bank because the goat will eat the cabbage. He does not know what to do and turns to the smart students in CS414 Artificial Intelligence [10 Marks]
- b) Discuss any five characteristics of human intelligence that can be applied in Expert and Knowledge based systems [15 marks]

QUESTION TWO

- a) There are five members of the expert system development team; the knowledge engineer, the domain expert, programmer, project manager and the end user. Explain their roles and functions in the expert system development [16 marks]
- b) Determine whether the following PL formula $(p \wedge q) \rightarrow r \vee \neg q$ is Satisfiable, contradictory or Valid [5 marks]

QUESTION THREE

Consider the developments in the analysis and interpretation of large data sets using AI techniques.

- a) Describe one example of how AI technology is used in online data analytics. [10 marks]
- b) Discuss the problems that large data sets (Big Data) pose for AI based data analytics applications and give examples to illustrate your answer. [10 marks]

QUESTION FOUR

- a) There are increasing numbers of artificial intelligence and expert systems being developed which raises concerns for possible societal risks. Discuss the ethical issues and challenges raised by different types of artificial intelligence and expert systems and their impact on people and society using relevant examples to illustrate your answers. [15 marks]
- b) Explain the concept of cyborgs and how it is going to disrupt the modern world [8 marks]

QUESTION FIVE

- a) Prepare a set of frames of an organization, given the following information: [15 marks]
- Company: 1,050 employees, \$130 million annual sales, Mary Shumba is the president
 - Departments: accounting, finance, marketing, production, personnel
 - Production department: five lines of production
 - Product: computers

- Annual budget: $\$50,000 + (\$12,000 \times \text{number of computers produced})$
 - Materials: \$6,000 per unit produced
 - Working days: 250 per year
 - Number of supervisors: 1 for every 12 employees
 - Range of number of employees: 400-500 per shift (two shifts per day). Overtime or part time on a third shift is possible.
- b) Construct a semantic network for the following situation: Mini is a robin; it lives in a nest on a pine tree in Ms.Wang's backyard. Robins are birds, they can fly, and they have wings. They are an endangered species, and they are protected by government regulations [10 marks]

QUESTION SIX

Describe four different ways that a person can commit Search methods in AI have their basis on some aspect of the real world. Propose an idea for a search algorithm based on some natural process or animal behaviour. Discuss how your method could be used in problem solving. [11 marks]

END OF PAPER