JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR SCIENCE IN COMPUTER SECURITY AND FORENSICS

3RD YEAR 2ND SEMESTER 2016/2017 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: IIT 3327

COURSE TITLE: ARTIFICIAL INTELLIGENCE

EXAM VENUE: **STREAM: BSC COMP. SECURITY**

DATE: APRIL 2017 **EXAM SESSION:**

TIME: 2.00 HOURS

INSTRUCTIONS:

1. **Answer Question 1 (Compulsory) and ANY other two questions**
2. **Candidates are advised not to write on the question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE **[30 MARKS]**

(a) Define the following terms and concepts as applies to Artificial Intelligence. [8 Marks]
   (i) Problem space
   (ii) Modus Ponens
   (iii) Genetic Algorithms
   (iv) Goal Stack Planning

(b) Explain your understanding of *Artificial Intelligence techniques*. [2 Marks]

(c) Explain the four important steps one needs to address when building a system to solve a particular problem in Artificial Intelligence. [4 Marks]

(d) Represent the following in predicate logic [6 Marks]
   (i) No politician is honest
   (ii) All politicians are honest

(e) Explain the component of a production system. [4 Marks]

(f) Using a suitable family tree to aid your demonstration, write a prolog program to prove that *James is a son-in-law to Angela*. [6 Marks]

QUESTION TWO **[20 MARKS]**

(a) Explain the four properties of a good system for the representation of knowledge in a particular domain. [4 Marks]

(b) When solving a problem, one can choose a problem-solving search either forward or backward. Explain the factors that can determine the choice of direction for a particular problem. [4 Marks]

(c) Use a simple diagram and algorithm to explain the following searches: [12 Marks]
   (i) Depth-first search
   (ii) Breadth-first search

QUESTION THREE **[20 MARKS]**

(a) Transform the informal argument below into a formalized well-informed formulas (wff's): [6 Marks]

   Every rational number is a real number. There is a rational number. Therefore there is a real number.

(b) Explain the components of a planning system. [4 Marks]

(c) Apart from hierarchical planning, explain any other three planning techniques you know that applies to problem-solving systems. [6 Marks]

(d) Identify four major factors that contribute to the difficulty of understanding a problem in artificial intelligence. [4 Marks]

QUESTION FOUR **[20 MARKS]**

(a) Explain the following as applies to natural language processing [10 Marks]
   (i) Morphological analysis
   (ii) Syntactic analysis
   (iii) Semantic analysis

(iv) Discourse integration
(v) Pragmatic analysis

(b) A learning machine is the dream system of artificial intelligence. Discuss. [10 Marks]

QUESTION FIVE **[20 MARKS]**

(a) Define the following as applies to artificial intelligence [6 Marks]
(i) Robot architectures
(ii) Fuzzy logic systems
(iii) Artificial immune systems

(b) Using a suitable diagram, explain your understanding of an expert system. [4 Marks]

(c) Name and explain the four major problems facing expert systems. [4 Marks]

(d) Describe three different ways of combining speech recognition with a natural language understanding system. [6 Marks]

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