AFRICA UNIVERSITY
(A United Methodist-Related Institution)

"Investing in Africa's Future"

**FACULTY OF MANAGEMENT AND ADMINISTRATION**

**COURSE TITLE: CSC301 ARTIFICIAL INTELLIGENCE**

**SEMESTER : EXAMINATION NOV-DEC 2014**

**LECTURER: Agrippah Kandiero**

**TIME: 3 HOURS**

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Answer questions as specified in each section.
Total possible mark is **100.**

Start **each Section B** question on a new page in your answer booklet.

The marks allocated to **each** question are shown at the end of the section.

**Avoid zero-intelligible content and answer in expanded bullet point form.**

Credit will be awarded for logical, systematic and neat presentations.

SECTION A – **ANSWER ALL QUESTIONS**

1. What is involved in Artificial Intelligence **[3]**
2. Outline and describe one recent artificial intelligence application you are familiar with **[5]**
3. Define the following artificial intelligence terms, and give specific examples
   - **a.** Rational Agent **[2]**
   - **b.** Performance measure **[2]**
   - c. Environment (Task environment) **[2]**
   - d. Actuators **[2]**
   - **e.** Sensors **[2]**
4. What are production systems in AI and what are their main components **[5]**
5. Draw the search tree that would be generated by a best-fit heuristic search when solving the eight-puzzle from the starting configuration below assuming that "the number of tiles out of place" were used as the heuristic. **[12]**

   1 2 3
   5 6
   4 7 8

6. Draw the search tree that would be generated by a breadth-first search when solving the eight-puzzle from the starting configuration below. **[10]**

   1 2 3
   4 5 6
   7 8

## SECTION B - ANSWER ANY **TWO** QUESTIONS

**1. Reasoning Systems [30 Marks]**

a) Define and illustrate the concept of reasoning systems [5]
b) Define and illustrate the following approaches to reasoning
   i. Symbolic reasoning [5]
   ii. Statistical reasoning [5]
   iii. Fuzzy logic reasoning [5]
c) There are different methods of reasoning, define and illustrate the following reasoning methods
   i. Deduction [5]
   ii. Abduction [5]

**2. Natural Language Processing [30 Marks]**

a) Define and illustrate the concept of natural language processing [5]
b) Define and illustrate the concept of formal language in artificial intelligence [5]
c) Define and illustrate syntactic processing [10]
d) Define and illustrate the concept of Context Free Grammar(CFG) [10]

**3. Learning Systems [30 Marks]**

a) Define and illustrate the concept of learning systems [5]
b) Outline and describe the paradigms of machine learning [10]
c) Define and illustrate the learning model postulated by Winston (1975) [10]
d) What is theory driven discovery [5]

**4. Learning Systems [30 Marks]**

a) Define and illustrate the concept of knowledge representation [5]
b) Outline and describe the knowledge model by Bellinger (1980) [10]
c) Outline and describe the knowledge representation model by Poole(1985) [15]

**5. Expert Systems [30 Marks]**

a) Define and illustrate the concept of expert systems [5]
b) What are the features of expert systems [10]
c) What are the characteristics of expert systems [10]
d) What is backward chaining algorithm [5]