



Machakos University

ISO 9001:2008 Certified

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

Supplementary

SIT110 INTRODUCTION TO LOGIC

Date: /08/2018

Time: 2 HOURS

Instruction

Answer question **ONE** and **Any** other **Two** among the four selective questions

Question one (Compulsory)

- (a) Define the following terms (10 Marks)
- Fallacy
 - Logic
 - Reasoning
 - FOL
- (b) Write the circuit equivalent of the following logic gates (6 Marks)
- Ex-OR gate
 - NOR Gate
 - NOT
- (c) Use the truth table method to decide whether the following pair of statement form is logically equivalent: $\neg(p \wedge q)$ and $(\neg p \vee \neg q)$. (8 Marks)
- (d) Explain the binary relation below with the aid of a diagram (6 Marks)

$\{\langle \text{France, Italy} \rangle, \langle \text{Italy, Austria} \rangle, \langle \text{France, France} \rangle, \langle \text{Italy, Italy} \rangle, \langle \text{Austria, Austria} \rangle\}$

Question two

- (a) Using relevant examples differentiate converse and contrapositive of a logical statement (6 Marks)
- (b) State any four laws for logical equivalence (4 Marks)
- (c) Explain the following terms by use of a clear example (10 Marks)
- functions and sets
 - proposition and predicate

- (iii) Consistent and logically truth
- (iv) Validity and sound reasoning
- (v) Contradiction and tautology

Question three

- a) Explain any four features of logically valid statements **(8 Marks)**
- b) Given the logic expression $p \rightarrow (p \wedge \neg r)$. **(8 Marks)**
 - i. Draw Logic diagram using logic gates
 - ii. Draw Circuit Diagram (i) above
- c) Symbolize the following in predicate logic **(4 Marks)**
 - i. All things are mortal
 - ii. $\exists x (\text{Human}(x) \wedge \neg \text{Mortal}(x))$ 'Some human is not mortal'

Question four:

- a) Identify the following argument as deductive or inductive **(4 Marks)**
 - (i) If inflation is receding, the government's economic policies are sound. Inflation is indeed receding. Therefore, the government's economic policies are sound.
 - (ii) Most of the crows observed so far have been black. Therefore, probably the next crow we see will be black.
 - (iii) By accident Karina baked her cake two hours longer than she should have. Therefore, they have probably been ruined.
 - (iv) All reptiles ever examined are cold-blooded. Dinosaurs resemble reptiles in many ways. So dinosaurs were cold blooded.
- b) Describe the composition of an argument **(4 Marks)**
- c) Use the truth table method to decide whether the statement $(p \rightarrow q), (\neg p \vee \neg q), \neg(q \rightarrow p)$ is: **(12 Marks)**
 - i. Consistent
 - ii. Tautology
 - iii. Contradiction

Question five:

- a) Discuss the following **(12 Marks)**
 - i. Formal fallacies
 - ii. informal fallacies
 - iii. DNF and CNF
- b) Describe functions as used in logic arguments **(8 Marks)**

