MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)

University Examinations 2014/2015

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

INTRODUCTION TO LOGICS

DATE: 10/12/2014 **TIME: 8:30 – 10:30 AM**

QUESTION ONE (30 MARKS)

(a) Define the following terms as applied to logics

(i) Graphical logics (2 marks)

(ii) Propositions (2 marks)

(iii) Causal (2 marks)

(iv) Premise (2 marks)

(b) (i) What is Boolean algebra? (2 marks)

(ii) Name the operators permitted in Boolean algebra. (3 marks)

(c) Consider the following sentences

(i) The sum of the numbers 5 and 3 equals to 8

(ii) May good fortune come your way

Which of the above sentences is declarative in nature and which ? Explain why. (8 marks)

(d) (i) What is a truth table? (2 marks)

(ii)Name the features of a truth table. (6 marks)

(iii)What is tautology? (1 mark)

QUESTION TWO (20 MARKS)

(a) State the following Boolean laws. (1 mark)

(i) Commutative law (2 marks)

(ii) Associative law (2 marks)

(iii) Distributive law

(b) Prove the following Boolean equality using a truth table (14 marks)

(A+B)(A+C) = A + BC

QUESTION THREE (20 MARKS)

(a) From a simple electrical circuit, deduce the truth table of the following logig gates

(i) AND (4 marks)

(ii) OR (4 marks)

(iii) NOT (4 marks)

(b) (i) State the rule for elimination implication. (2 marks)

(iii) On using symbols Φ and Ψ write an equation to represent the above rule. (6 marks)

QUESTION FOUR (20 MARKS)

(a) Consider the following sentences

(i) P: " I won the lottery last week"

(ii) Q:" I purchased a lottery ticket"

(iii) R:" I won last week's sweepstake"

Symbolically show that "IF p **and** q, the **not** r **or** q. (8 marks)

(b) Use the rule of natural deduction to prove that

$p \wedge q, r \vdash q \wedge r$ is valid (use the declarative sentences in Q.4 (a). (12 marks)

QUESTION FIVE (20 MARKS)

Use the rule of double negation to prove the following sequent

p¬¬ (q∧ r) ⊢¬¬ p∧r (Use the declarative sentences in (Q.4)