



# MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)  
University Examinations for 2014/2015 Academic Year

## SCHOOL OF ENGINEERING AND TECHNOLOGY

### DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

### SECOND SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN INFORMATION COMMUNICATION TECHNOLOGY

#### STI 108: INTRODUCTION TO LOGISTICS

**DATE: 7/4/2015**

**TIME: 2:00 – 4:00 pm**

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#### INSTRUCTIONS

**Attempt question one and any other two questions. Question one carries 30 marks and rest carries 20 marks each**

#### **QUESTION ONE (30 Marks)**

(a) Define the following terms as applied to logics

- (i) Graphical logics
- (ii) Propositions
- (iii) Causal
- (iv) Premise

(10 marks)

(b) (i) What is Boolean algebra?

(2 marks)

(ii) Name the operators and the operands permitted in Boolean algebra

(5 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? Explain why.

(5 marks)

- (iii) State the following logic gate laws  
 AND laws  
 OR laws  
 NOT laws (8 marks)

## **QUESTION TWO**

- (a) State the following Boolean laws  
 (i) Commutative law  
 (ii) Associative law  
 (iii) Distributive law (9 marks)
- (b) Prove the following Boolean equality using a truth table  
 $(A+B)(A+C) = A + BC$  (11 marks)

## **QUESTION THREE**

- (a) From a simple electrical circuit, deduce the truth table of the following logic gates  
 (i) AND  
 (ii) OR  
 (iii) NOT  
 (iv) NAND  
 (v) NOR (10 marks)
- (b) (i) State the rule for elimination implication (5 marks)
- (ii) On using symbols  $\Phi$  and  $\Psi$  write an equation to represent the above rule. (5 marks)

## **QUESTION FOUR**

- (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. (9 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). (11 marks)

## **QUESTION FIVE**

Use the rule of double negation to prove the following sequent

$p \neg (q \wedge r) \vdash \neg p \vee r$  ( Use the declarative sentences in Q.4) (20 marks)