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**University Examinations 2014/2015**

SECOND YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL ENGINEERING

**EEE 0233: DIGITAL ELECTRONICS II**

**DATE: DECEMBER 2014 TIME: 1**$\frac{1}{2}$ **HOURS**

**INSTRUCTIONS:** *Answer questions* ***on****e**and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Define the following terms (6 marks)
2. Register
3. Counter
4. Flip flop
5. Explain clearly the difference between the following (4 marks)
6. Combinational and sequential circuits
7. Racing and toggling
8. Simplify the following expression and show the minimum gate implementation.

Y= (4 marks)

The figure above show a TTL circuit. Describe its operation and hence draw the truth table of the circuit (5 marks)

1. Find the Boolean expression for the output of y in the logic circuit shown above

(3 marks)

1. State the following laws of Boolean algebra (3 marks)
2. Commutative
3. Associative
4. Distributive
5. Simplify the following Boolean expression using the Karmaugh mapping technique

x= (5 marks)

**QUESTION TWO (15 MARKS)**

1. State the De Morgan’s theorem (2 marks)
2. Simplify the following expression using De Morgans theorem

 (3 marks)

1. (i) Discuss NOR gate as a universal gate

(ii)Draw the truth and electronic equivalent switching circuit of the NOR gate

(10 marks)

**QUESTION THREE (15 MARKS)**

1. Draw the logic circuit that implements the following logic expression

x=AB(C (3 marks)

1. Draw and explain the working of a master slave J-k flip flop using NINE NAND gates. Explain how the race around is eliminated in the master slave J-k flip flop (12 marks)

**QUESTION FOUR (15 MARKS)**

1. Discuss the two types of registers (8 marks)
2. Draw and explain the working of a 4-bit binary ripple counter (7 marks)