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University Examinations 2013/2014

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL ENGINEERING

EEE 0224: DIGITAL ELECTRONICS I

DATE: APRIL 2014 **TIME: 1 ½ HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE – (30 MARKS)

(a) In the circuit of figure 1.1 below, the switches may be ON (1) or OFF (0) and will cause the bulb to be ON (1) or OFF(0).

Prepare a truth table for the circuit diagram above indicating all the possible conditions of the switches S1 and S2 and the corresponding responses for the bulb. (5 Marks)

(b) For the logic expression

$Y = A\bar{B} + \bar{A}B$

(i) Obtain the truth table (2 Marks)
(ii) Realize the operation using AND, OR and NOT gates (3 Marks)
(iii) Realize the operation using only NAND gates (3 Marks)
(iv) Name the operation performed (2 Marks)

(c) Convert the following decimal to octal
(i) 24 (2 Marks)

(ii) 110.2 (3 Marks)

(d) Draw the schematic diagram of a 2-input RTL NOR gate and explain its logic operation. (5 Marks)

(e) Define the following terms;
(i) Bit (1 Mark)
(ii) MSB (2 Marks)
(iii) Fan-out (2 Marks)

QUESTION TWO – (15 MARKS)

(a) Use the figure below to answer the following questions

(i) Obtain the Boolean expression for C, D, E and F. (4 Marks)
(ii) Obtain the truth table of the circuit. (5 Marks)

(b) Perform the following arithmetic operations
(i) $IB_{(16)} + 2E_{(16)} =$ (2 Marks)
(ii) $21_{(8)} + 14_{(8)} =$ (2 Marks)
(iii) $1101_{(2)} - 1100_{(2)} =$ (2 Marks)

QUESTION THREE – (15 MARKS)

(a) Represent the decimal number 27 in binary form using;

(i)	Binary code (straight binary)	(3 Marks)
(ii)	BCD code	(2 Marks)
(iii)	Excess-3 code	(2 Marks)
(iv)	Gray code	(2 Marks)
(v)	Octal code	(2 Marks)
(vi)	Hexadecimal code	(2 Marks)

(b) State two commonly used alphanumeric codes. (2 Marks)

QUESTION FOUR – (15 MARKS)

Draw the schematic diagram of a 3-input TTL NAND gate and explain its operation showing the components used to fabricate it. (15 Marks)