



**PROGRAM** : NATIONAL DIPLOMA  
*ENGINEERING : COMPUTER SYSTEMS*  
*ENGINEERING : ELECTRICAL*

**SUBJECT** : **DIGITAL SYSTEMS 1**

**CODE** : **EDS121**

**DATE** : 29 July 2016  
WINTER SSA Examination

**DURATION** : 08:00 - 11:00

**WEIGHT** : 40 : 60

**TOTAL MARKS** : 100

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**ASSESSOR** : MR V Rameshar

**MODERATOR** : MR D.R. Van Niekerk

**NUMBER OF PAGES** : 3 PAGES

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**INSTRUCTIONS**

1. NO CALCULATORS ALLOWED
  2. ALL SKETCHES MUST BE NEAT AND FULLY LABELLED.
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### QUESTION 1

Calculate in binary and then follow the instructions for each question:

- 1.1  $23_8 + 6E_{16}$  (Convert your answer to Decimal) (6)
- 1.2  $225_8 - 13_{10}$  (Convert your answer to Hexadecimal) (6)
- 1.3  $10101 \times 1001$  (Convert your answer to Octal) (6)
- 1.4  $1100010 \div 1101$  (6)

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### QUESTION 2

- 2.1 Sketch the symbol and provide a truth table for each of the following logic gates below: -

2.1.1 Half Subtractor

2.1.2 NOR

2.1.3 NAND

(9)

- 2.2 Sketch the circuit equivalent of the following equations below and provide the equivalent Boolean expressions output: -

2.2.1  $AB + \overline{AB}$

(6)

2.2.2  $\overline{\overline{CD}}$

(6)

- 2.3 By using NOR gates only simplify sketch the logic gate circuit diagram. (Use de Morgans theorem)

$$F = \overline{A}BC + \overline{A}\overline{B}D + (\overline{AC} + \overline{D})$$

(10)

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### **QUESTION 3**

- 3.1 By the use of parity bits and the given data 101101, prepare the transmission using hamming code. ODD parity should be used. Show all steps. (10)
- 3.2 Why are parity checks performed in data transmission? (3)
- 3.3 How many bits are there in a kilobyte of data (2)
- [14]**
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### **QUESTION 4**

- 4.1 Give the binary equivalent of 11101 Gray code. (3)
- 4.2 Expand the acronym ASCII and provide one use the code? (3)
- 4.3 What is the excess-3 equivalent of 543? (2)
- 4.4 Explain weighted and unweighted codes. (4)
- 4.5 Sketch two forms of digital signals and provide detailed labels. (4)
- 4.6 Indicate how sign bits are used in the binary number system. (2)
- 4.7 Explain with aid of sketches debounced and not debounced digital signals (4)
- [22]**
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### **QUESTION 5**

Sketch a 1 to 4 demultiplexer circuit showing its input and output on a truth table. The circuit must be clearly labeled and neat.

**[9]**

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**TOTAL = 100**