



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

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

**CODE** : **EDS121**

**DATE** : 9 June 2015  
WINTER Main Examination

**DURATION** : 08:30 - 11:30

**WEIGHT** : 40 : 60

**TOTAL MARKS** : 100

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**ASSESSOR** : MR V RAMESHAR

**MODERATOR** : MR JA NIEUWOUDT

**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**

- 1.1 Convert 11101 Gray code to Binary (3)
- 1.2 What does ASCII stand for and where do we use this code? (3)
- 1.3 Convert 543 to excess-3 BCD (2)
- 1.4 Differentiate between weighted and unweighted codes. (4)
- 1.5 Sketch two forms of digital signals and provide detailed labels. (4)
- 1.6 Indicate how sign bits are used in the binary number system. (2)
- 1.7 Explain with aid of sketches debounced and not debounced digital signals (4)

**[22]**

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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 XOR
  - 2.1.2 XNOR
  - 2.1.3 NAND (9)
- 2.2 Sketch the circuit equivalent of the following equations below and provide the equivalent Boolean expressions:-
  - 2.2.1  $AB + \overline{AB}$  (6)
  - 2.2.2  $\overline{\overline{CD}}$  (6)
- 2.3 Sketch the logic circuit of the simplified expression using NOR gates only. (Use de Morgans theorem)

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

(10)

**[31]**

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### **QUESTION 3**

- 3.1 By the use of parity bits and the given data 101101101, prepare the transmission using hamming code. ODD parity should be used. Show all steps involved. (10)
- 3.2 Why are parity checks necessary on data before transmission? (3)
- 3.3 If 8-bits make up a byte of data. How many bits are there in a kilobyte (2)
- [14]
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### **QUESTION 4**

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

- 4.1  $63_8 + 6E_{16}$  (Convert your answer to Decimal) (6)
- 4.2  $115_8 - 31_{10}$  (Convert your answer to Hexadecimal) (6)
- 4.3  $10001 \times 1101$  (Convert your answer to Octal) (6)
- 4.4  $1100010 \div 111$  (6)
- [24]
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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**