NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
JUNE EXAMINATIONS 2004

SUBJECT: LOGIC DESIGN AND SWITCHING CIRCUITS
CODE: SCS1204

INSTRUCTION TO CANDIDATES

Answer all questions in section A.
Answer two questions of your choice in Section B.

Time: 3 hours

SECTION A

QUESTION ONE

a) Show the logic symbol, Boolean algebra, and truth table of an a three input exclusive or functions. [5]
b) Using diagrams, explain how an LED can be used to indicate an alarm condition. [5]
c) Explain the function of a one-shot monostable. [5]
d) What is and encoder. [5]

QUESTION TWO

Digital circuits can be classified as either combination circuits or sequential circuits. Clearly explain the differences between circuits by using diagrams to show how each example functions. [15]

QUESTION THREE

i) Explain how a two to 4 decoder can be used to split a memory map into 4 logical sections. [10]
ii) Clearly explain how each section would be addressed. [5]

SECTION B

QUESTION FOUR

i) Flips Flops can be implemented using RS, D, or JK. Explain the different behaviours of these flip flops. [15]

ii) Clearly demonstrate which one has more functionality. [5]

iii) If your where to de-bounce a switch, which flip flop would you use and why? [5]

QUESTION FIVE

Design a control circuit for a boiler that meets the following conditions.

- Only turn the boiler on if there is water n the tank
- Once the temperature reaches 140 degrees Celsius, reduce the temperature to 100 degrees
- Once you have reduced the temperature to 100 degrees, only allow it to rise to above hundred if the clear button is on. [25]

QUESTION SIX

Show a circuit diagram that drives a seven-segment display. [10]

Explain the function of resistors in your diagram. Also explain the problem of loading and how you would overcome that in your design. [10]

Show a multiplexing technique for enabling one Seven segment display at a time if your are driving four seven segment displays. [5]

QUESTION SEVEN

Draw a diagram of RAM and explain how it works. [10]

In your discussions clearly explain the following:

- Internal register selection [5]
- External address decoding [5]
- Read Write control. [5]

END OF QUESTION PAPER

GOOD LUCK!