

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF APPLIED SCIENCE**  
**COMPUTER SCIENCE DEPARTMENT**  
**AUGUST SUPPLEMENTARY 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) What is the difference between positive logic and negative logic? [5]
- b) How is TTL different from MOS? [5]
- c) What is key bounce? [5]
- d) Why is a resistor required when connecting an LED? Explain using diagrams. [5]

**QUESTION TWO**

Explain how combination logic circuit design is used in memory mapping (i.e. Address coding). [15]

**QUESTION THREE**

Compare and contrast functions of an encoder and a decoder. [15]

## SECTION B

### **QUESTION FOUR**

Use a Finite State Machine to model the following behaviour of a security system:

- The is set using the following sequence:
    - Press "Instant". This takes the system from the IDLE state
    - Key in the following code 27AF
  - If the same key is activated more than once in sequence (i.e. 777) the system stays in the same state.
  - If a key out of sequence is pressed, the system goes to the IDLE state.
- [25]

### **QUESTION FIVE**

Draw a diagram of RAM and explain how it works. In your discussions clearly explain the following:

- Internal register selection
- External address decoding
- Read Write control

[25]

### **QUESTION SIX**

Explain the function of a shift register. Clearly define how a sequence of ones and zeros is a possible source of problems and demonstrate how your design addresses this problem.

[25]

### **QUESTION SEVEN**

Give at least five reasons why should we use minimization during logic design. What two techniques are used to minimise a circuit.

[25]

**END OF QUESTION PAPER**



**GOOD LUCK!**

