 

**National University of Sciences and Technology**

**College of Electrical and Mechanical Engineering**

Department of Computer & Software Engineering

Subject: Microprocessor and Microcontroller based Design (EC-310)

**Title: RFID Security system using PIC16F877A**

Group members detail(Tentative):

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***Abstract:*** This project demonstrates the interfacing of an RFID module (EM-18) with the PIC16F877A microcontroller to develop a basic access control system. The system reads RFID tag data via UART communication and compares it with pre-stored authorized IDs in the microcontroller’s memory. Upon successful identification, the system displays "Access Granted" on a 16x2 LCD; otherwise, it shows "Access Denied." The implementation highlights the use of serial communication, string comparison logic, and real-time LCD feedback, offering a cost-effective and beginner-friendly approach to RFID-based security systems.

**Technical Description:**

The project involves interfacing an EM-18 RFID reader with a PIC16F877A microcontroller using UART protocol to build a basic access control system. The RFID reader transmits the unique 12-character tag ID to the microcontroller, which then compares it against a set of predefined authorized IDs stored in the code. Based on the result, the system displays "Access Granted" or "Access Denied" on a 16x2 LCD. The implementation showcases serial communication, string matching, and LCD interfacing using the MPLAB IDE and XC8 compiler.

**Equipment Required(Tentative):**

1. PIC16F877A
2. 20Mhz Crystal
3. 2pcs 33pF ceramic disc capacitor
4. 16x2 Character LCD
5. A breadboard
6. 10k preset pot
7. 4.7k resistor
8. Single strand wires to connect
9. A 5V adapter
10. RF Module EM-18
11. 5V Buzzer
12. 100uF & .1uF 12V capacitor
13. BC557 Transistor
14. LED
15. 2.2k and 470R resistor.

**Methodology:**

* **Hardware Setup:** Connect the EM-18 RFID reader to the PIC16F877A microcontroller via UART. Interface a 16x2 LCD to display system messages.
* **Microcontroller Programming:** Write code in MPLAB IDE using the XC8 compiler to handle UART communication, read RFID tag data, and compare it with stored IDs.
* **ID Verification Logic:** Store authorized tag IDs in the code. On receiving a tag, compare it character-by-character to determine if access is allowed.
* **LCD Display:** Based on the comparison result, display "Access Granted" or "Access Denied" on the LCD.
* **Testing and Debugging:** Simulate the circuit in Proteus, then test it on a breadboard or PCB to verify functionality with different RFID tags.

**Application domains:**

* **Access Control Systems:** Used in offices, labs, and hostels to grant or restrict access based on RFID tags.
* **Attendance Management:** Automates attendance tracking in schools, universities, and workplaces.
* **Asset Tracking:** Monitors movement and presence of tagged equipment or items in secure areas.
* **Library Management:** Simplifies book check-in/check-out processes through RFID-based identification.
* **Parking Systems:** Controls vehicle access in restricted areas using RFID-tagged entry.