American International University- Bangladesh (AIUB)
Faculty of Engineering (EEE)

Course Name :	MICROPROCESSOR AND EMBEDDED SYSTEMS	**Term:**	Mid
Semester :	**2022-2023 Summar**	**Sec :**	**F**
Lab Instructor :	**Md Sajid Hossain**	**Assignment :**	**01**

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Marking Rubrics (to be filled by Lab Instructor)

Category	Proficient [6]	Good [4]	Acceptable [2]	Unacceptable [1]	Secured Marks
Theoretical Background, Methods & procedures sections	All information, measures and variables are provided and explained.	All Information provided that is sufficient, but more explanation is needed.	Most information correct, but some information may be missing or inaccurate.	Much information missing and/or inaccurate.	
Results	All of the criteria are met; results are described clearly and accurately;	Most criteria are met, but there may be some lack of clarity and/or incorrect information.	Experimental results don't match exactly with the theoretical values and/or analysis is unclear.	Experimental results are missing or incorrect;	
Discussion	Demonstrates thorough and sophisticated understanding. Conclusions drawn are appropriate for analyses;	Hypotheses are clearly stated, but some concluding statements not supported by data or data not well integrated.	Some hypotheses missing or misstated; conclusions not supported by data.	Conclusions don't match hypotheses, not supported by data; no integration of data from different sources.	
General formatting	Title page, placement of figures and figure captions, and other formatting issues all correct.	Minor errors in formatting.	Major errors and/or missing information.	Not proper style in text.	
Writing & organization	Writing is strong and easy to understand; ideas are fully elaborated and connected; effective transitions between sentences; no typographic, spelling, or grammatical errors.	Writing is clear and easy to understand; ideas are connected; effective transitions between sentences; minor typographic, spelling, or grammatical errors.	Most of the required criteria are met, but some lack of clarity, typographic, spelling, or grammatical errors are present.	Very unclear, many errors.	
Comments:				Total Marks (Out of):	

Question 1: Complete Table 1 after going through the datasheet of the specified microcontrollers.

Table 1

Specifications	**ATMega328P**	**STM32F401RE**	**ATMega2560**	**PIC33FJ32GP302**
Manufacturer Name	Microchip Technology Inc	STMicroelectronics	Microchip Technology Inc	Microchip Technology Inc
Number of pins	28	64	100	28
Processing Speed (MIPS)	20	84	16	16
Program flash memory (bytes)	32,768	512,000	256,000	32,768
Communication Interfaces	UART, SPI, I2C	UART, SPI, I2C, CAN	UART, SPI, I2C	UART,SPI, I2C

Given unit price of each microcontroller:

	ATMega328P	**STM32F401RE**	**ATMega2560**	**PIC33FJ32GP302**
Price	2.70	4.10	18.86	4.02

The minimum required specifications for intended design for the CPU are given as follows:

Minimum Clock Speed	16 MHz
Minimum SRAM	8 Kbytes
Minimum ADC Resolution	10-bit
Minimum Program Memory	32 KBytes
Minimum Number of PWM Channels	5

Ans:

Based on the provided specifications and minimum requirements, the ATMega328P is the most appropriate microcontroller for the budget-friendly shop security system design. Microchip Technology, Inc.'s ATMega328P complies with the following specifications:

This number of pins: 28
Speed of Processing (MIPS): 20
Program flash memory: 32,768 bytes
Interfaces for Communication: UART, SPI, and I2C
The ATMega328P meets the security system's minimum requirements for clock speed, ADC resolution, programme memory, and PWM channel. In addition, it is accessible at a lower cost than the other alternatives, making it a cost-effective option for an economical solution.

Considering these factors, Microchip Technology Inc.'s ATMega328P is the best microcontroller for the design of the shop's security system.