



American International University - Bangladesh (AIUB)

Faculty of Engineering

Department of Electrical and Electronic Engineering (EEE)

Course Name:	Microprocessor and Embedded Systems	Course Code:	EEE 4103
Semester:	Fall 25-26	Term:	Mid
Faculty Name:	Md Sajid Hossain	Assignment #:	01 (MID)

Course Outcome Mapping with Questions

Item	COs	POIs	K	P	A	Marks	Obtained Marks
Q1	CO2	P.a.4.C3	K4	P1, P3, P7		30	

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Submission Information:

Submission Date:	03/11/2025	Due Date:	3 rd Week of MID
Student ID #:	23-53292-3	Department:	CSE

Marking Rubrics (to be filled by Faculty):

Problem #	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
	Detailed unique response explaining the concept properly and answer is correct with all works clearly shown.	Response with no apparent errors and the answer is correct, but explanation is not adequate/unique.	Response shows understanding of the problem, but the final answer may not be correct	Partial problem is solved; response indicates part of the problem was not understood clearly.	Unable to clarify the understanding of the problem and method of the problem solving was not correct	No Response/ copied from others/identical submissions with gross errors/image file printed	
1							
Comments							Total marks (30)

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

Table 1

Specifications	ATMega328P	STM32F401RE	ATMega2560	PIC33FJ32GP302
Manufacturer Name	ATMEL Corporation	STMicroelectronics	ATMEL Corporation	Microchip Technology
Number of pins	28 pins	64 pins	100 pins	28 pins
Processing Speed (MIPS)	Up to 20 MIPS at 20 MHz	Up to 84 MHz	Up to 16 MIPS at 16 MHz	Up to 40 MIPS at 40 MHz
Program flash memory (bytes)	32 KB	512 KB	256 KB	32 KB
Communication Interfaces	UART, SPI, I ² C	UART, SPI, I ² C, USB, CAN	4 x UART, SPI, I ² C	UART, SPI, I ² C

The unit prices of the above mentioned MCUs are as follows: (1 USD = 122 BDT)

	ATMega328P	STM32F401RE	ATMega2560	PIC33FJ32GP302
Price	\$2.70	\$4.10	\$18.86	\$4.02

X Company in Bangladesh is trying to develop an affordable shop security system and they have shortlisted the listed 4 MCUs as possible candidates for their system CPU. The required minimum specifications for their intended design for the CPU are given below:

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

Being a design engineer at X Company, you have been given the responsibility to select the most suitable IC from the list for the security system design. Select an IC from the list to design an **affordable** system and justify your answer with proper reasoning dzg

ANSWER NO. 02

MCU	Clock Speed	SRAM	ADC Resolution	Program Memory	Number of PWM Channels	Cost
ATMega328P	20 MHz	2 KB	10 bit	32 KB	6	$\$2.70 \times 122 = 329.4 \text{ BDT}$
STM32F401RE	84 MHz	96 KB	12bit	512KB	11	$\$4.10 \times 122 = 500.2 \text{ BDT}$
ATMega2560	16 MHz	8 KB	10 bit	256 KB	16	$\$18.86 \times 122 = 2,300.92 \text{ BDT}$
PIC33FJ32GP302	Up to 40 MHz	8 KB	10 bit	32 KB	9	$\$4.02 \times 122 = 490.44 \text{ BDT}$

Here, STM32F401RE, ATMega2560, and PIC33FJ32GP302 meet all the minimum required specifications. However, when comparing their costs, the STM32F401RE costs 500.2 BDT, the ATMega2560 costs 2,300.92 BDT, and the PIC33FJ32GP302 costs 490.44 BDT. Among these three, the PIC33FJ32GP302 is the cheapest option. Therefore, for X Company, the PIC33FJ32GP302 is the best choice as it fulfills all the required specifications while offering the lowest cost, making it ideal for designing an affordable shop security system.

PIC33FJ32GP302 Is the best choice..